Progress Report To The
National Aeronautics and Space Administration

MONTE CARLO SHOWER COUNTER STUDIES

NAG 5 1812

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I. Computer Operations

A. GEANT

A tape of the VMS version of the GEANT software was obtained in November of 1991 and installed on the central computer at Gallaudet University. Due to difficulties encountered in updating this VMS version, a decision was made to switch to the UNIX version of the package and this was obtained at no cost over the computer network. This version (v92a) was installed and used to generate the set of data files currently accessed by our analysis programs. As soon as a upgrade is completed to our University network communications links (factor of 3 speedup), a newer version of the CERN library (v92b) will be downloaded, installed and used to produce new data files.

To date the program has only been used successfully in non-interactive "batch" mode. Numerous event dumps were made to check basic program operation. Considerable effort was made to activate GEANT graphics in interactive mode, so that the program could be used to display the experimental geometry and sample tracks occurring in events. It was felt that this display would provide another check on the software, but each attempt to build the software resulted in "missing links". Printouts of the experimental geometry and detailed step-by-step event listings were used to check the operation of the software.

B. Data Files

Since runs of the GEANT program are extremely time consuming, the software was used to write files of data for positron and proton showers. Showers were simulated for a detector consisting of 50 alternating layers of lead and scintillator. The files stored data for 6000 proton showers and 6000 positron showers. Each file consisted of 1000 events at each of the following energies: 0.1 GeV, 0.5 GeV, 2.0 GeV, 10 GeV, 44 GeV and 200 GeV.

The experimental geometry consisted of 50 layers of alternating layers of lead (1 m x 1 m x 0.05 cm each) and scintillator (1 m x 1 m x 0.5 cm each). The goal of the analysis is to specify the shortest possible detector that can identify protons and positrons with high efficiency. Identification strategies will be tried with 5, 10, 15,..., 50 layers to try to select a minimum configuration of detectors.

During the first phases of the analysis, the data files included only the energy deposited in every scintillator of the simulated apparatus. Runs of the analysis programs which tried to separate proton from positron events did this with disappointingly low efficiency. In view of this fact, the data files were regenerated in order to include shower radial spread information. It was felt that this additional data would provide an additional signature and serve as a key to identifying events.

Presently, the information recorded for each event and layer is the total energy deposited and the "center of deposited energy" radius for the shower at each scintillator layer. Numbers written to the data files were written as integers in units of 500 keV for deposited energy and 100 micrometers for the radial shower spread.

II. Data Analysis

A. Clustering

An initial attempt was made to use hierarchical cluster identification software of the IMSL library (CDIST, CLINK) to group together events with similar shower development. Results proved to be disappointing. Clustering algorithms are applied to data in order to group together similar lists of numbers (a vector). It was hoped that straightforward application of the clustering methods to proton and positron data would result in groupings of events that would consist predominantly of one kind of particle: positron or proton. Once determined, these groupings could then serve to identify "unknown" events.

Unfortunately, such wide fluctuations exist in the data that the clustering program would normally create one large group and many "clusterings" of one or few events. The large group would typically be evenly balanced in protons and positrons, and so would be useless for identification purposes. Attempts to recluster the single large group yielded similar results: one large cluster and many small "clusters" would be formed.

Several clustering methods were used: single linkage, complete linkage, average distance within clusters, average distance between clusters and Ward's method. Several measures of distance were used to estimate the difference between event vectors: Euclidean distance, sum of absolute differences, maximum difference, Mahalanobis distance, absolute value of the cosine of the angle between vectors, angle between vectors, correlation coefficient, absolute value of the correlation coefficient and the number of exact matches. Scaling of values was used to normalize the data: standard deviation, range and logarithmic. All attempts yielded similar results and so the strict hierarchical clustering approach was abandoned.

Borrowing the distance metrics and scaling methods from cluster analysis, the present analysis program attempts to classify an "unknown" event (selected at random from the 12000 events of the data files) based on its distance from "known" events. Before computing the distance metric, the raw data may be scaled logarithmically to reduce the influence of large fluctuations and linearly (using the range or standard deviation) to equalize the number ranges:

$$\frac{(R_i - Rmin)}{(Rmax - Rmin)}$$

$$\frac{R_i - \overline{R}}{\sqrt{\frac{\sum (R-\overline{R})^2}{N-1}}}$$

As with the cluster analysis, several measures of distance were used to estimate the difference between event vectors:

1. Euclidean distance (sensitive to additive, proportional and mirror image translations)

$$\sqrt{\sum (R_i - S_i)^2}$$

2. sum of absolute differences
3. maximum difference
4. coefficient of shape difference (sensitive to proportional translations and mirror image translations, ignores additive translations)

$$\frac{N}{N-1}\left(\sum \frac{(R_i - S_i)^2}{N} - \frac{1}{N^2}\left(\sum (R_i - S_i)\right)^2\right)$$

5. cosine of the angle between vectors (insensitive to additive and proportional translations)
6. the Bray - Curtis coefficient (sensitive to additive, proportional and mirror image translations)

$$\frac{\sum |R_i - S_i|}{\sum (R_i + S_i)}$$

7. correlation coefficient (insensitive to size displacements due to additive and proportional translations)
8. absolute value of the correlation coefficient
9. chisquared

10. the number of exact matches
11. the number of near matches
12. the Canberra coefficient (sensitive to additive, proportional and mirror image translations)

$$\frac{1}{N}\sum \frac{|R_i - S_i|}{(R_i + S_i)}$$

After a scaling method and distance metric are selected, one computes distances between the unknown and a sample of events from each energy catagory and particle type (2400 events total, 200 for each energy catagory and particle type). At present, three distances are computed for each event comparison: a distance using the scintillator energy deposit data (de), a distance using the radial shower spread data (dr), and a distance which is the sum of the two (de + dr). Each resulting array of distances is partially sorted in the order of increasing distance, and the <N> events with the lowest distance to the "unknown" are used to vote on the identity of the particle initiating the shower. Majority voting is used to decide the particle identity (proton or positron) and an average over the majority is used estimate the incident energy of the showering particle. A tally is kept of all votes and a final printout is made showing a contour graphic of the efficiency percentages for each catagory of particle, energy, maximum number of detectors, distance measure, scaling method,....

B. ChiSquare

Chi-Square is a distance metric that was initially studied as a separate tool for identification of protons and positrons. The analysis program computed the chi-square "distance" between an unknown event and all other events in the data files:

$$X = \sum \frac{(R_i - S_i)^2}{R_i + S_i}$$

and used the "nearest" events to vote and identify the incident particle responsible for the observed shower. When the strict hierarchical clustering approach failed as an identification method, the clustering program was adapted to use various distance metrics to find nearest "look-alike" events to the unknown. The clustering methodology became identical to chi-square and chi-square was included as an option within the "clustering" analysis program.

C. Likelihood

A second identification strategy uses probability and likelihood to decide on a best match between an unknown event and a known sample of events. A Poisson or Gaussian distribution is fitted to the known event sample (1000 per energy, per particle) for each energy, each particle and each detector. These functions then may be used to estimate the probability that the unknown's energy deposits and radial spread match the fitted distribution. The matchup yielding the best probability values will be used to identify the unknown particle as proton or positron, and serve to estimate its incident energy.

The distribution fits to the known event sample were carried out in several ways. Both Gaussian and Poissonian distributions were used and were fitted assuming either data independence or data dependence between layers. Given the nature of a shower of particles, one would naturally suspect that the values measured in the current layer depend, to some extent, on the values measured in the previous layer. The random nature of subatomic particle interactions keeps this linkage between layers somewhat uncertain, but the "upstream to downstream" flow of events makes dependence a reasonable hypothesis. On the other hand, data independence is a simpler hypothesis and may yield adequate identification efficiencies if the random fluctuations dominate or all events are quite similar in their shower profile.

Under the independent detector hypothesis, it is assumed that the energy deposit and radial spread in the "ith" layer is largely independent of the deposit and spread observed in the "(i-1)th" layer. In this case, all events in the known sample were used to perform the Poissonian and Gaussian fit, independent of values in the upstream layer.

Under the dependent hypothesis, the data observed in the upstream layer should serve as a good predictor of downstream measurements. In this case, the distribution fit uses only events from the sample data that have similar energy deposits or radial spread in the upstream layer. "Similar" is defined as having an energy or radial spread in the upstream layer that is within a few standard deviations of the upstream value for the unknown event. After this subsample of data is selected for the distribution function fit, a correction may be applied to adjust for differences between the unknown and sample data in the upstream layer. The current program prefit options are for no adjustment of data, an additive (translational) adjustment to all subsample data to force equal values in the neighboring upstream layer and a product (multiplicative scaling) adjustment to all subsample data to force equal values in the neighboring upstream layer.

D. Neural Net

Some preliminary investigations and coding have been done but no progress to report as yet.

III. Student Participation

Four students have worked on the project during the year: Charles Brown, Lily Leung, Subramanian Natarajan, Joy Robinson.

GEANT User Subprograms

The following listing presents the source code for the user subroutines that established the experimental geometry of the 50 layer detector, and generated the data files for this report. For each shower, the following data was written to disk: total energy deposited in each layer of the scintillator material, the "center of energy" radial shower spread at each scintillator, the layer number in which the first particle interaction occurred, and the total number of secondary particles produced in the shower.

```
c        corrected on Sep.22, 1992
c-------------------------------------------------------------------------------
c
      PARAMETER (NG=100000,NH=10000)
      COMMON/PAWC/H(NH)
      COMMON/GCBANK/Q(NG)
c
c         Allocate memory for ZEBRA and HBOOK
c         -----------------------------------
      CALL GZEBRA(NG)
c
c         Initialisation phase
c         --------------------
      CALL UGINIT
c
c         Processing phase
c         ----------------
      CALL GRUN
c
c         Termination phase
c         -----------------
      CALL UGLAST
c
      END
c_______________________________________________________________________________
c
      SUBROUTINE UGINIT
c
         INCLUDE 'gbeven.inc'
         INCLUDE 'geantcom.inc'
c
c         Initialize GEANT variables
c         --------------------------
         CALL GINIT
c
c         Read data cards
c         ---------------
         CALL GFFGO
c
c         Open an output data file
c         ------------------------
         OPEN (UNIT=IKINE, STATUS='NEW', RECL=915)
c
c         Initialize data structures
c         --------------------------
         CALL GZINIT
c
c         Define the geometrical set-up
c         -----------------------------
         CALL UGEOM
c
c         Prints standard Particle and Material data
c         ------------------------------------------
         CALL GPPART(0)
         CALL GPMATE(0)
c
         CALL GGCLOS                    ! End of Geometry Initialization
c
c         Compute cross-section and energy loss tables
c         --------------------------------------------
         CALL GPHYSI
c
         PKINE(6) = PKINE(2)            ! initial energy at the first event
c
         WRITE(LOUT,888) TIMINT, TIMEND, ITIME
 888     FORMAT(' TIMINIT = ',G, ' TIMEND = ',G, 'ITIME = ',I)
```

```
C
      RETURN
      END
C
C*****************************************************************************
C
      SUBROUTINE UGEOM
C
         INCLUDE 'gbeven.inc'
         INCLUDE 'geantcom.inc'
C
C. *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
C  (VERSION M - 18-MAR-1988)
C
C ***          Define user geometry set up
C
         DIMENSION PAR(8)
         INTEGER ISTR
         CHARACTER*4 STR
         EQUIVALENCE (ISTR,STR)
C
C *** POLYSTYRENE PARAMETERS - PPDB 1986 - CH                          ***
C
         DIMENSION APS(2),ZPS(2),WPS(2)
         DATA APS/ 12.01 ,  1.01 /
         DATA ZPS/  6.0  ,  1.0  /
         DATA WPS/  1.0  ,  1.0  /
C
C ***    Defines USER particular materials                      ***
C        -------------------------------
         CALL GPART
         CALL GMATE
         CALL GSMIXT(17,'POLYSTYRENE$',APS,ZPS,1.032,-2,WPS)
C
C *** PPDB 1986 - USES CH AS FORMULA FOR Z & A - 43.8 G/CM2 RAD L    ***
C
C ***          Defines USER tracking media parameters                ***
C              --------------------------------------
         FIELDM =  0.0
         IFIELD =  0
         TMAXFD =  0.0
         DMAXMS =  0.50
         DEEMAX =  0.20
         EPSIL  =  0.0001
         STMIN  =  0.0001
C
      CALL GSTMED( 3,'DENSE - LEAD$'        ,  13 , 0 ,   IFIELD,
     +                FIELDM,TMAXFD,DMAXMS,DEEMAX, EPSIL, STMIN, 0 , 0 )
      CALL GSTMED( 2,'SCINT - POLYSTYRENE$' , 17 , 1 ,    IFIELD,
     +                FIELDM,TMAXFD,DMAXMS,DEEMAX, EPSIL, STMIN, 0 , 0 )
      CALL GSTMED( 1,'OUTSIDE - VACUUM$'    , 16 , 0 ,    IFIELD,
     +                FIELDM,TMAXFD,DMAXMS,DEEMAX, EPSIL, STMIN, 0 , 0 )
C
C***      Prints the tracking medium parameters                   ***
C         -------------------------------------
      CALL GPTMED(0)
C
C ***    Defines USER'S VOLUMES                                  ***
C        ----------------------
      XX = 100.0
      YY = 150.0
C
C *** 5/10/88 - NEW SCINTILLATOR DESIGN: ASSUME .05 CM LEAD PLATES    ***
C *** INTERLEAVED WITH 0.5 CM SCINTILLATORS, AND USING 50 LAYERS      ***
C *** OR ABOUT 5 RADIATION LENGTHS OF LEAD (2.8 CM) ==> 27.5 CM       ***
C
```

```
      SCINZ = 0.25
C *** SCINTILLATORS - .5 CM THICK -> 0.25 CM HALF WIDTH                *** 
C
      PLATZ = 0.025
C *** LEAD PLATES - RAD L = 0.56 CM -> 1.78 RAD L IN 1 CM              *** 
c
C        Define Shower Counter Mother Volume
c        ----------------------------------
      SHOWZ = -PKINE(7)*(SCINZ + PLATZ)
      PAR(1) = XX
      PAR(2) = YY
      PAR(3) = ABS(SHOWZ)
c
         CALL GSVOLU('SHOW', 'BOX ',  1, PAR, 3, IVOLU)
C
C***     Define Scintillator Volumes
C        ---------------------------
      PAR(1) = XX
      PAR(2) = YY
      PAR(3) = SCINZ
      IMAXD  = PKINE(7)
c
         CALL GSVOLU('SCIN', 'BOX ', 2, PAR, 3, IVOLU)
c
C***     Define Lead Volumes
C        -------------------
      PAR(1) = XX
      PAR(2) = YY
      PAR(3) = PLATZ
      IMAXD  = PKINE(7)
c
         CALL GSVOLU('LEAD', 'BOX ', 3, PAR, 3, IVOLU)
c
C ***    Position volumes                          ***
C        ----------------
      ZZPA = SHOWZ
      IMAXD = PKINE(7)
C
         DO I = 1, IMAXD
            IF (I .EQ. 1) ZZPA = ZZPA - SCINZ
            ZZPA = ZZPA + PLATZ + SCINZ
c
            CALL GSPOS('LEAD', I, 'SHOW', 0.0, 0.0, ZZPA, 0, 'ONLY')
c
            ZZPA = ZZPA + SCINZ + PLATZ
C
            CALL GSPOS('SCIN', I, 'SHOW', 0.0, 0.0, ZZPA, 0, 'ONLY')
         END DO
c
c***     Prints the volume parameters                          ***
c        ----------------------------
      CALL GPVOLU(0)
c
         DO IB=1,3
            CALL GSTPAR(IB,'CUTGAM',0.0001)
            CALL GSTPAR(IB,'CUTELE',0.0001)
            CALL GSTPAR(IB,'CUTNEU',0.001)
            CALL GSTPAR(IB,'CUTHAD',0.001)
            CALL GSTPAR(IB,'CUTMUO',0.001)
            CALL GSTPAR(IB,'BCUTE ',CUTGAM)
            CALL GSTPAR(IB,'BCUTM ',CUTGAM)
            CALL GSTPAR(IB,'DCUTE ',10000.0)
            CALL GSTPAR(IB,'DCUTM ',10000.0)
            CALL GSTPAR(IB,'PPCUTM',0.001)
            CALL GSTPAR(IB,'PAIR ',1.0)
            CALL GSTPAR(IB,'COMP ',1.0)
```

```
            CALL GSTPAR(IB,'PHOT ',1.0)
            CALL GSTPAR(IB,'PFIS ',1.0)
            CALL GSTPAR(IB,'DRAY ',1.0)
            CALL GSTPAR(IB,'ANNI ',1.0)
            CALL GSTPAR(IB,'BREM ',1.0)
            CALL GSTPAR(IB,'HADR ',1.0)
            CALL GSTPAR(IB,'MUNU ',1.0)
            CALL GSTPAR(IB,'DCAY ',1.0)
            CALL GSTPAR(IB,'LOSS ',1.0)
            CALL GSTPAR(IB,'MULS ',1.0)
c            CALL GSTPAR(IB,'GHEISHA',0.0)
         END DO
c
         PKINE(10) = SHOWZ
c
      RETURN
      END
c
c_____________________________________________________________________
c
c***                  Produces event dumps
c                     --------------------
C        Initialized control variables
C             pkine(1) = particle type
C             pkine(2) = first energy
C             pkine(3) = last energy
C             pkine(4) = number of energy values (LOG scale)
C             pkine(5) = Delta(Z) step  (typically .55)
C             pkine(6) = current primary energy
C             pkine(7) = number of shower calorimeter detectors
C             pkine(8) = scintillator energy increment (typically .00005)
C             pkine(9) = Delta(R) step (typically 0.1)
C             pkine(10)= z initial
C        ikine    = Output file number
C.     *
C.     *       Generates Kinematics for primary track
C.     *
      SUBROUTINE GUKINE
c
         INCLUDE 'gbeven.inc'
         INCLUDE 'geantcom.inc'
c
         DIMENSION VERTEX(3), PLAB(3)
         DIMENSION NAMTMP(5)
         DIMENSION UU(3)
         DATA VERTEX/3*0.0/
         DATA PLAB  /3*0.0/
c
         DATA LBUG/.FALSE./
c
         JQINT = 0
         LINTQ = .FALSE.
         QSSEC = 0
c
         NRANDO = 0
         NBIT2 = NBIT/2
            CALL SBYT(NRNDM(1),NRANDO,NBIT2 + 1,NBIT2)
            CALL SBYT(NRNDM(2),NRANDO,        1,NBIT2)
            CALL RDMIN(NRANDO)
c
         IF (PKINE(4).GT.1.0) THEN
            QFACT=(PKINE(3)/PKINE(2))**(1.0/(PKINE(4)-1.0))
         ELSE
            QFACT=1.0
         END IF
c
```

```
          QNEVE=FLOAT(IFIX(FLOAT(NEVENT)/PKINE(4)))
          IF ((NUMEVE(X).EQ.1).AND.(IEVENT.NE.1)) THEN
             PKINE(6)=PKINE(6)*QFACT
          END IF
C
          IF (LBUG) THEN
             IF (JMOD(IEVENT,IFIX(QNEVE)).EQ.1) THEN
                WRITE(IKINE,100) IKINE, (PKINE(I),I=1,10)
 100            FORMAT(1H ,'>>KINE= ',I8,5E12.3/1H ,16X,5E12.3)
             END IF
          END IF
C
          JCASE = 99
C
          VERTEX(1) = 0.0
          VERTEX(2) = 0.0
          VERTEX(3) = PKINE(10)
          PLAB(3)   = 0.0
          ITYPE     = PKINE(1)
          EKKIN     = PKINE(6)
C
          DO I=1, IQDETS
             QZ(I)=0.0
             SUME(I) = 0.0
             SUMER(I) = 0.0
          END DO
C
          RR = EKKIN + AMASS
          RR = SQRT( RR**2 - AMASS**2 )
C
          CALL GSVERT(VERTEX,0,0,0,0,NVERT)
C
          PLAB(1) = 0.0
          PLAB(2) = 0.0
          PLAB(3) = RR
C
          CALL GSKINE(PLAB,ITYPE,NVERT,0,0,IZYXNT)
C
          IF (LBUG) THEN
             WRITE (IKINE,500) IEVENT, NRNDM(1), NRNDM(2)
 500         FORMAT(1H ,'***************'/
     +              1H ,'EVENT = ',I6,'*','     NRNDM ',2I/
     +              1H ,'***************')
          END IF
C
       RETURN
       END
C
c.....................................................................
c
       INTEGER FUNCTION NUMEVE(X)
c
          INCLUDE 'gbeven.inc'
          INCLUDE 'geantcom.inc'
c
          QNEVE=FLOAT(IFIX(FLOAT(NEVENT)/PKINE(4)))
          JQEV=FLOAT(JMOD(IEVENT,IFIX(QNEVE)))
          IF (JQEV.EQ.0) THEN
             JQEV=IFIX(QNEVE)
          END IF
c
          NUMEVE=JQEV
c
       RETURN
       END
C
```

```
C. *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
c
      SUBROUTINE GUTREV
c
         INCLUDE 'gbeven.inc'
         INCLUDE 'geantcom.inc'
c
         CALL GTREVE
c
      RETURN
      END
c
c...............................................................................
c
      SUBROUTINE GUTRAK
c
         INCLUDE 'gbeven.inc'
         INCLUDE 'geantcom.inc'
c
         IF (LBUG) CALL PRTRAK
c
         CALL GTRACK
c
      RETURN
      END
c
c...............................................................................
c
      SUBROUTINE GUSTEP
c
         INCLUDE 'gbeven.inc'
         INCLUDE 'geantcom.inc'
c
         CALL GSKING(0)
c
         XGETOT = GETOT
c
         QDZ = PKINE(5)
         IQZONE = NUMBER(2)          ! NUMBER - Volume copy numbers at each level
c
         IF (IQZONE.GT.(IQDETS-2)) IQZONE=IQDETS
         IF (IQZONE.LT.1) IQZONE=IQDETS-1
         IF (NMAT.EQ.17) THEN                     ! NMAT - Current material number
            QZ(IQZONE) = QZ(IQZONE) + DESTEP
            R = SQRT( VECT(1)**2 + VECT(2)**2 )
            SUME(IQZONE) = SUME(IQZONE) + DESTEP
            SUMER(IQZONE) = SUMER(IQZONE)  +  DESTEP * R
         END IF
c
         IF ((NGKINE.GT.0).AND.(.NOT.LINTQ)) THEN
            LINTQ = .TRUE.
            JQINT = IQZONE
         END IF
c
         IF (LBUG) CALL PRSTEP
c
         QSSEC = QSSEC + NGKINE
c
      RETURN
      END
c
c...............................................................................
c
      SUBROUTINE GUDIGI
c
         INCLUDE 'gbeven.inc'
```

```
         INCLUDE 'geantcom.inc'
c
      RETURN
      END
c
c.....................................................................
c
      SUBROUTINE GUOUT
c
         INCLUDE 'gbeven.inc'
         INCLUDE 'geantcom.inc'
c
         DE = PKINE(8)
         DR = PKINE(9)
c
         DO I = 1,IQDETS-2
            QZ(I) = ( QZ(I) / DE )
            IF ( SUME(I) .EQ. 0.0 ) SUME(I) = 1.0
            SUMER(I) = ( SUMER(I) / DR )
c
c        radial spread of the shower at each detector (RSPRED)
c        ----------------------------------------------------
            RSPRED(I) = SUMER(I) / ( SUME(I) * DR )
         END DO
c
         WRITE(IKINE,900) IFIX(PKINE(1)),PKINE(6),
     +        (JNINT(QZ(I)),I=1,IQDETS),  JQINT, QSSEC,
     +        (JNINT(RSPRED(I)),I=1,IQDETS-2)
 900     FORMAT(1H , I3, F7.2, 54I8/1H , 50I9)
c
         QSSEC = 0
         JQINT = 0
         LINTQ = .FALSE.
c
         QNEVE=FLOAT(IFIX(FLOAT(NEVENT)/PKINE(4)))
c
         IF (LBUG) THEN
            IF (NUMEVE(X).EQ.IFIX(QNEVE)) THEN
C              WRITE(IKINE,100) IKINE,(PKINE(I),I=1,10)
 100            FORMAT(1H ,'>>KINE= ',I8,5E12.3/1H ,16X,5E12.3)
            END IF
         END IF
c
      RETURN
      END
c
c_____________________________________________________________________
c
      SUBROUTINE UGLAST
c
         INCLUDE 'gbeven.inc'
         INCLUDE 'geantcom.inc'
c
         CLOSE(UNIT=IKINE)
         CALL GLAST
c
      RETURN
      END
c
c.....................................................................
c
      SUBROUTINE GUPHAD
c
         INCLUDE 'geantcom.inc'
c
         CALL GPGHEI
```

```
c
      RETURN
      END
c
cphphphphphphphphphphphphphphphphphphphphphphphphphphphphphphphphphphphph
c
      SUBROUTINE GUHADR
c
         INCLUDE 'geantcom.inc'
c
         CALL GHEISH
c
      RETURN
      END
c
chadhadhadhadhadhadhadhadhadhadhadhadhadhadhadhadhadhadhadhadhadhadhadhad
c
      SUBROUTINE PRSTEP
c
         INCLUDE 'gbeven.inc'
         INCLUDE 'geantcom.inc'
         data icnt/0/
c
         IUNIT = IKINE
c
         if ((icnt.eq.0).or.(icnt.eq.20)) then
            write(iunit,15)
15          format(1h ,
     +                'INWVOL ISTOP IUPD    X       Y        Z',
     +                '       GETOT     GEKIN    DESTEP',
     +                '      NMAT NAMAT  NMED NAMED  VCP# & NAM')
            icnt = 1
         else
            icnt = icnt + 1
         end if
c
         WRITE(IUNIT,20)INWVOL,ISTOP,IUPD,(VECT(I),I=1,3), GETOT, GEKIN,
     +                  DESTEP, NMAT, NAMATE(1), NUMED, NATMED(1),
     +                  NUMBER(2), NAMES(1)
20       format(1h ,
     +       3x,i1,6x,i1,4x,i1,3x,f7.3,1x,f7.3,1x,f7.3,1x,f9.3,1x,f9.3,
     +       2x,g11.4, 4x,i2, 2x, A4, 3x, i2, 4x, A4, 2x, i2, 2x, A4)
c
         IF (NGKINE .NE. 0) THEN
            WRITE(IUNIT,100) KCASE
 100        FORMAT(1H ,10x,'Mech2ndpart = ',A)
            WRITE(IUNIT,110) ((GKIN(J,K),J=4,5),K=1,NGKINE)
 110        FORMAT(1H ,10x,'Et,pid= ',2G11.3)
         END IF
c
      RETURN
      END
c
c                        ! INWVOL( ) - Track's position inside a volume
c                        ! ISTOP( ) - the behavior of particle
c                        ! IUPD( ) - change of medium or particle
c                        ! VECT( ) - Current track parameters
c                        ! GETOT  - Current particle total energy
c                        ! GEKIN  - Current particle kinetic energy
c                        ! KCASE  - Mechanism which has generated the
c                        !             secondary particles
c                        ! NGKINE - Number of generated secondaries
c                        ! GKIN   - Total energy
c                        ! DESTEP - Total energy lost in current step
c                        ! NMAT   - Current material number
c                        ! NAMATE - Name of current material
```

```
c                        ! NUMED  - Current tracking medium number
c                        ! NATMED - Name of current tracking medium
c                        ! NUMBER - Volume copy numbers at each level
c                        ! NAMES  - Volume names at each level
c
cprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprprpr
c
      SUBROUTINE PRTRAK
c
         INCLUDE 'gbeven.inc'
         INCLUDE 'geantcom.inc'
c
         IUNIT = IKINE
c
         WRITE (IUNIT,65) ISTAK,NTMSTO,IVERT,IPART,NAPART(1),NAPART(2),
     +                    CHARGE,AMASS
   65    FORMAT(1H0,'*** New Track: StkTr#= ',I3,' TrCnt= ',I4,' V#= ',
     +             I4,' Part#= ',I3,
     +                  ' ',2A4,' Charge= ',F5.0,' Mass= ',G12.4)
c
      RETURN
      END
c
                        ! ISTAK  - Current stack track number
c                       ! NTMSTO - Total # of tracks tracked in the
c                       !                       current event so far
c                       ! IVERT  - Current vertex number
c                       ! IPART  - current particle number
c                       ! NAPART - Number & Name of current particle
c                       ! AMASS  - Mass of current particle
c                       ! CHARGE - Charge of current particle
c
ctrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtrtr
```

```
      PARAMETER (IQDETS=52)
      REAL QZ(IQDETS), SUME(IQDETS), SUMER(IQDETS), RSPRED(IQDETS)
      LOGICAL LINTQ, LBUG
      INTEGER JQINT, QSSEC, IQZONE
      COMMON/USRCOM/QZ, SUME, SUMER, RSPRED, LINTQ, LBUG, JQINT, QSSEC,
     +              IQZONE
```

```
      PARAMETER (KWBANK=69000,KWWORK=5200,MXGKIN=100,MAXMEC=30)
      COMMON/GCBANK/NZEBRA,GVERSN,ZVERSN,IXSTOR,IXDIV,IXCONS,FENDQ(16)
     +             ,LMAIN,LR1,WS(KWBANK)
      DIMENSION IQ(2),Q(2),LQ(8000),IWS(2)
      EQUIVALENCE (Q(1),IQ(1),LQ(9)),(LQ(1),LMAIN),(IWS(1),WS(1))
      EQUIVALENCE (JCG,JGSTAT)
      COMMON/GCLINK/JDIGI ,JDRAW ,JHEAD ,JHITS ,JKINE ,JMATE ,JPART
     +       ,JROTM ,JRUNG ,JSET ,JSTAK ,JGSTAT ,JTMED ,JTRACK ,JVERTX
     +       ,JVOLUM ,JXYZ ,JGPAR ,JGPAR2 ,JSKLT
C
      COMMON/GCCUTS/CUTGAM,CUTELE,CUTNEU,CUTHAD,CUTMUO,BCUTE,BCUTM
     +             ,DCUTE ,DCUTM ,PPCUTM,TOFMAX,GCUTS(5)
C
      COMMON/GCFLAG/IDEBUG,IDEMIN,IDEMAX,ITEST,IDRUN,IDEVT,IEORUN
     +        ,IEOTRI,IEVENT,ISWIT(10),IFINIT(20),NEVENT,NRNDM(2)
C
      COMMON/GCKINE/IKINE,PKINE(10),ITRA,ISTAK,IVERT,IPART,ITRTYP
     +      ,NAPART(5),AMASS,CHARGE,TLIFE,VERT(3),PVERT(4),IPAOLD
C
      COMMON/GCKING/KCASE,NGKINE,GKIN(5,MXGKIN),TOFD(MXGKIN)
     +             ,IFLGK(MXGKIN)
C
      COMMON/GCLIST/NHSTA,NGET ,NSAVE,NSETS,NPRIN,NGEOM,NVIEW,NPLOT
     +       ,NSTAT,LHSTA(20),LGET (20),LSAVE(20),LSETS(20),LPRIN(20)
     +             ,LGEOM(20),LVIEW(20),LPLOT(20),LSTAT(20)
C
      COMMON/GCMATE/NMAT,NAMATE(5),A,Z,DENS,RADL,ABSL
C
      COMMON/GCNUM/NMATE ,NVOLUM ,NROTM ,NTMED ,NTMULT ,NTRACK
     +       ,NPART ,NSTMAX ,NVERTX ,NHEAD ,NBIT
C
      COMMON/GCNUMX/NALIVE ,NTMSTO
C
      COMMON/GCONST/PI,TWOPI ,PIBY2,DEGRAD,RADDEG,CLIGHT ,BIG,EMASS
C
      COMMON/GCONSX/EMMU ,PMASS ,AVO
C
      COMMON/GCPHYS/IPAIR, SPAIR, SLPAIR, ZINTPA, STEPPA
     +             ,ICOMP, SCOMP, SLCOMP, ZINTCO, STEPCO
     +             ,IPHOT, SPHOT, SLPHOT, ZINTPH, STEPPH
     +             ,IPFIS, SPFIS, SLPFIS, ZINTPF, STEPPF
     +             ,IDRAY, SDRAY, SLDRAY, ZINTDR, STEPDR
     +             ,IANNI, SANNI, SLANNI, ZINTAN, STEPAN
     +             ,IBREM, SBREM, SLBREM, ZINTBR, STEPBR
     +             ,IHADR, SHADR, SLHADR, ZINTHA, STEPHA
     +             ,IMUNU, SMUNU, SLMUNU, ZINTMU, STEPMU
     +             ,IDCAY, SDCAY, SLIFE , SUMLIF, DPHYS1
     +             ,ILOSS, SLOSS, SOLOSS, STLOSS, DPHYS2
     +             ,IMULS, SMULS, SOMULS, STMULS, DPHYS3
C
      COMMON/GCRZ1/NRECRZ, NRGET,NRSAVE,LRGET(20),LRSAVE(20)
      COMMON/GCRZ2/RZTAGS
      CHARACTER*8 RZTAGS(4)
C
      COMMON/GCSETS/IHSET,IHDET,ISET,IDET,IDTYPE,NVNAME,NUMBV(20)
C
      COMMON/GCTIME/TIMINT, TIMEND, ITIME, IGDATE, IGTIME
c
      COMMON/GCTMED/NUMED,NATMED(5),ISVOL,IFIELD,FIELDM,TMAXFD,STEMAX
     +      ,DEEMAX,EPSIL,STMIN,CFIELD,PREC,IUPD,ISTPAR,NUMOLD
C
      COMMON/GCTRAK/VECT(7),GETOT,GEKIN,VOUT(7),NMEC,LMEC(MAXMEC)
     + ,NAMEC(MAXMEC),NSTEP ,MAXNST,DESTEP,DESTEL,SAFETY,SLENG ,STEP
     + ,SNEXT ,SFIELD,TOFG  ,GEKRAT,UPWGHT,IGNEXT,INWVOL
     + ,ISTOP ,IGAUTO,ILOSL,IMULL,INGOTO,NLDOWN,NLEVIN,NLVSAV,ISTORY
     + ,IEKBIN
```

```
C
      COMMON/GCUNIT/LIN,LOUT,NUNITS,LUNITS(5)
      COMMON/GCMAIL/CHMAIL
      CHARACTER*132 CHMAIL
C
      COMMON/GCVOLU/NLEVEL,NAMES(15),NUMBER(15),
     +LVOLUM(15),LINDEX(15),INFROM,NLEVMX,NLDEV(15),LINMX(15),
     +GTRAN(3,15),GRMAT(10,15),GONLY(15),GLX(3)
```

```
C                                MYCOM.INC
C
C
C
      PARAMETER (NQZ=100 ,NQPART=50)
      INTEGER IQPART(NQPART) ,NQITRA
      REAL EZCE(NQZ) ,TEZ(NQZ) ,AVGEZ(NQZ) ,SIGZSQ(NQZ)
     +     ,STD(NQZ)
      COMMON/MYCOM/IQPART ,AQZ ,NQITRA




c*     NQZ    - number of Z divisions
c*     NQPART - particle number (from 1 to 48 and unwanted)
c*     IQPART - particle counter array (including unwanted)
c*     NQITRA -
c
c
c*     IPART  - current particle number
c*     ITRA   - current track number
c*     EZCE   - energy of each division of current event
c*     TEZ    - total energy of each division of all events
c*     AVGEZ  - average energy of each division
c*     SIGZSQ - summation of the square of energy of each division
c*     STD    - standard deviation
```

```
f77 -o px1 proj1.f -L/usr/u1/nasa/nasahds/v92a/lib \
-lariadne \
-lbvsl \
-lcojets \
-leurodec \
-lfritiof \
-lgeant315 \
-lkernlib \
-lpacklib \
-lgraflib \
-lgenlib \
-lpawlib \
-lgrafDGKS \
-lgrafGKS
```

```
f77 -o px2 proj2.f -L/usr/u1/nasa/nasahds/v92a/lib \
-lariadne \
-lbvsl \
-lcojets \
-leurodec \
-lfritiof \
-lgeant315 \
-lkernlib \
-lpacklib \
-lgraflib \
-lgenlib \
-lpawlib \
-lgrafDGKS \
-lgrafGKS
```

GEANT Input Data Files

The following files were used as data input to the GEANT code to control parameters of the run.

```
LIST
RNDM 469201751 195606229
TRIG 6000
COMP 1
PAIR 1
BREM 1
ANNI 1
PHOT 1
HADR 1
MULS 1
SWIT 101 102 107 108 110
CUTS 0.0001 0.0001
KINE 51 14.0 0.1 200.0 6.0 0.55 0.1 50.0 0.00005 0.1 0.0
TIME 100000.0 1.0 10000
END
```

```
LIST
RNDM 639100587 188572943
TRIG 6000
COMP 1
PAIR 1
BREM 1
ANNI 1
PHOT 1
HADR 1
MULS 1
SWIT 101 102 107 108 110
CUTS 0.0001 0.0001
KINE 52 2.0 0.1 200.0 6.0 0.55 0.1 50.0 0.00005 0.1 0.0
TIME 100000.0 1.0 10000
END
```

GEANT Output Run Log

The following listing presents the output run logs from the data file generation runs of the GEANT program.

```
 MZSTOR.  ZEBRA table base TAB(0) in /MZCC/ at adr    67373697     4040A81 HEX

 MZSTOR.  Initialize Store  0  in /GCBANK/
          with Store/Table at absolute adrs     67233619    67373697
                                         HEX     401E753     4040A81
                                         HEX    FFFDF486           0
                                relative adrs     -134010           0
          with     1 Str. in     2 Links in   5300 Low words in   99970 words.
          This store has a fence of   16 words.

 MZLOGL.  Set Log Level 0 for store  0
1*****  GEANT Version 3.1590 Released on Tuesday 07 April 1992 *****
0*****  Correction Cradle Version  3.1500
 *****  Library compiled on 920407 at 1656 *****

1           USER'S DIRECTIVES TO RUN THIS JOB
            ---------------------------------


 ***** DATA CARD CONTENT     LIST

 ***** DATA CARD CONTENT     RNDM 469201751 195606229

 ***** DATA CARD CONTENT     TRIG 6000

 ***** DATA CARD CONTENT     COMP 1

 ***** DATA CARD CONTENT     PAIR 1

 ***** DATA CARD CONTENT     BREM 1

 ***** DATA CARD CONTENT     ANNI 1

 ***** DATA CARD CONTENT     PHOT 1

 ***** DATA CARD CONTENT     HADR 1

 ***** DATA CARD CONTENT     MULS 1

 ***** DATA CARD CONTENT     SWIT 101 102 107 108 110

 ***** DATA CARD CONTENT     CUTS 0.0001 0.0001

 ***** DATA CARD CONTENT     KINE 50 14.0 0.1 200.0 6.0 0.55 0.1 50.0 0.0005 0.1
0.0
 ***** DATA CARD CONTENT     TIME 100000.0 1.0 10000

 ***** DATA CARD CONTENT     END


 MZDIV.   Initialize Division  Constant  in Store  0
          NW/NWMAX=   2000  80000,  MODE/KIND=  1  2
          Division 20 initialized.

 MZLINK.  Initialize Link Area  /GCLINK/  for Store  0 NL/NS=    20    20

 MZLINK.  Initialize Link Area  /GCSLNK/  for Store  0 NL/NS=   100   100
0================================================   TRACKING MEDIA   ========
==========================================
0TMED                          MATERIAL ISVOL IFIELD  FIELDM  TMAXFD  STEMAX
DEEMAX   EPSIL   STMIN

      1 OUTSIDE - VACUUM          16       0     0      0.00    0.00 -1.00
-1.000   0.000  -1.000
      2 SCINT - POLYSTYRENE       17       1     0      0.00    0.00 -1.00
```

```
-1.000   0.000  -1.000
      3 SHOWER - LEAD             13       0     0       0.00    0.00 -1.00
-1.000   0.000  -1.000
0================================================       VOLUMES       ========
========================================
0VOLUME NAME   NUMED SHAPE NPAR  PARAMETERS

      1 SHOW     1    BOX     3   0.100E+03 0.150E+03 0.138E+02
      2 SCIN     2    BOX     3   0.100E+03 0.150E+03 0.250E+00
      3 LEAD     3    BOX     3   0.100E+03 0.150E+03 0.250E-01
0================================================   Particle Types   ========
========================================
0Part                              Options        Mass    Charge    Life time
          User words

    1 GAMMA                          1       0.0000E+00     0.    0.10000E+16
    2 POSITRON                       2       0.5110E-03     1.    0.10000E+16
    3 ELECTRON                       2       0.5110E-03    -1.    0.10000E+16
    4 NEUTRINO                       3       0.0000E+00     0.    0.10000E+16
    5 MUON +                         5       0.1057E+00     1.    0.21970E-05
    6 MUON -                         5       0.1057E+00    -1.    0.21970E-05
    7 PION 0                         3       0.1350E+00     0.    0.84000E-16
    8 PION +                         4       0.1396E+00     1.    0.26030E-07
    9 PION -                         4       0.1396E+00    -1.    0.26030E-07
   10 KAON 0 LONG                    3       0.4977E+00     0.    0.51830E-07
   11 KAON +                         4       0.4936E+00     1.    0.12371E-07
   12 KAON -                         4       0.4936E+00    -1.    0.12371E-07
   13 NEUTRON                        3       0.9396E+00     0.    0.89600E+03
   14 PROTON                         4       0.9383E+00     1.    0.10000E+16
   15 ANTIPROTON                     4       0.9383E+00    -1.    0.10000E+16
   16 KAON 0 SHORT                   3       0.4977E+00     0.    0.89220E-10
   17 ETA                            3       0.5488E+00     0.    0.74797E-18
   18 LAMBDA                         3       0.1116E+01     0.    0.26310E-09
   19 SIGMA +                        4       0.1189E+01     1.    0.80000E-10
   20 SIGMA 0                        3       0.1193E+01     0.    0.74000E-19
   21 SIGMA -                        4       0.1197E+01    -1.    0.14790E-09
   22 XI 0                           3       0.1315E+01     0.    0.29000E-09
   23 XI -                           4       0.1321E+01    -1.    0.16390E-09
   24 OMEGA -                        4       0.1672E+01    -1.    0.82200E-10
   25 ANTINEUTRON                    3       0.9396E+00     0.    0.89600E+03
   26 ANTILAMBDA                     3       0.1116E+01     0.    0.26310E-09
   27 ANTISIGMA -                    4       0.1189E+01    -1.    0.80000E-10
   28 ANTISIGMA 0                    3       0.1193E+01     0.    0.74000E-19
   29 ANTISIGMA +                    4       0.1197E+01     1.    0.14790E-09
   30 ANTIXI 0                       3       0.1315E+01     0.    0.29000E-09
   31 ANTIXI +                       4       0.1321E+01     1.    0.16390E-09
   32 ANTIOMEGA +                    4       0.1672E+01     1.    0.82200E-10
   33 TAU +                          4       0.1784E+01     1.    0.30400E-12
   34 TAU -                          4       0.1784E+01    -1.    0.30400E-12
   35 D +                            4       0.1869E+01     1.    0.10620E-11
   36 D -                            4       0.1869E+01    -1.    0.10620E-11
   37 D 0                            3       0.1865E+01     0.    0.42800E-12
   38 ANTI D 0                       3       0.1865E+01     0.    0.42800E-12
   39 DS+                            4       0.1969E+01     1.    0.43600E-12
   40 DS-                            4       0.1969E+01    -1.    0.43600E-12
   41 LAMBDA C +                     4       0.2285E+01     1.    0.17900E-12
   42 W +                            4       0.8100E+02     1.    0.94000E-25
   43 W -                            4       0.8100E+02    -1.    0.94000E-25
   44 Z 0                            3       0.9240E+02     0.    0.77400E-25
   45 DEUTERON                       4       0.1876E+01     1.    0.10000E+16
   46 TRITON                         4       0.2814E+01     1.    0.10000E+16
   47 ALPHA                          4       0.3727E+01     2.    0.10000E+16
   48 GEANTINO                       6       0.0000E+00     0.    0.10000E+16
   49 HE3                            4       0.2814E+01     2.    0.10000E+16
0================================================     MATERIALS      ========
========================================
```

```
0MATERIAL                              A         Z      DENSITY  RADIAT L  ABSORP L
NMIXT
         1 HYDROGEN                    1.010     1.000     0.071 0.865E+03 0.790E+03
    1
         2 DEUTERIUM                   2.010     1.000     0.162 0.757E+03 0.342E+03
    1
         3 HELIUM                      4.000     2.000     0.125 0.755E+03 0.478E+03
    1
         4 LITHIUM                     6.940     3.000     0.534 0.155E+03 0.121E+03
    1
         5 BERILLIUM                   9.010     4.000     1.848 0.353E+02 0.367E+02
    1
         6 CARBON                     12.010     6.000     2.265 0.188E+02 0.499E+02
    1
         7 NITROGEN                   14.010     7.000     0.808 0.445E+02 0.994E+02
    1
         8 NEON                       20.180    10.000     1.207 0.240E+02 0.749E+02
    1
         9 ALUMINIUM                  26.980    13.000     2.700 0.890E+01 0.372E+02
    1
        10 IRON                       55.850    26.000     7.870 0.176E+01 0.171E+02
    1
        11 COPPER                     63.540    29.000     8.960 0.143E+01 0.148E+02
    1
        12 TUNGSTEN                  183.850    74.000    19.300 0.350E+00 0.103E+02
    1
        13 LEAD                      207.190    82.000    11.350 0.560E+00 0.185E+02
    1
        14 URANIUM                   238.030    92.000    18.950 0.320E+00 0.120E+02
    1
        15 AIR                        14.610     7.300     0.001 0.304E+05 0.675E+05
    1
        16 VACUUM                      0.000     0.000     0.000 0.100E+17 0.100E+17
    1
        17 POLYSTYRENE                11.157     5.612     1.032 0.420E+02 0.891E+02
    2     A       Z      W

         12.01    6.00  0.922

          1.01    1.00  0.078
1*************************************************************
 *                                                           *
 *    G E A N T  Version 3.1590      DATE/TIME 920804/ 901   *
 *                                                           *
 *                       R U N      1                       *
 *                                                           *
 *************************************************************
 *                                                           *
 *      Data structure   Date    Time     GVERSN     ZVERSN   *
 *      --------------   ----    ----     ------     ------   *
 *                                                           *
 *           INIT        920804   901     3.1590      3.68    *
 *                                                           *
 *           KINE        920804   901     3.1590      3.68    *
 *                                                           *
 *           HITS        920804   901     3.1590      3.68    *
 *                                                           *
 *           DIGI        920804   901     3.1590      3.68    *
 *                                                           *
 *     Random number seeds:      469201751    195606229      *
 *     --------------------                                  *
 *                                                           *
 *-----------------------------------------------------------*
 *                                                           *
 *              Standard TPAR for this run are               *
```

```
 *                 ------------------------------                *
 *                                                               *
 *  CUTGAM=100.00 keV  CUTELE=100.00 keV  CUTNEU= 10.00 MeV *
 *  CUTHAD= 10.00 MeV  CUTMUO= 10.00 MeV                         *
 *  BCUTE =100.00 keV  BCUTM =100.00 keV                         *
 *  DCUTE = 10.00 TeV  DCUTM = 10.00 TeV  PPCUTM= 10.00 MeV *
 *  IPAIR =         1.  ICOMP =         1.  IPHOT =         1. *
 *  IPFIS =         0.  IDRAY =         0.  IANNI =         1. *
 *  IBREM =         1.  IHADR =         1.  IMUNU =         1. *
 *  IDCAY =         1.  ILOSS =         2.  IMULS =         1. *
 *  IRAYL =         0.                                           *
 *                                                               *
 *     Special TPAR for TMED   1   OUTSIDE - VACUUM              *
 *     -------------------------                                 *
 *  CUTGAM=100.00 keV  CUTELE=100.00 keV  CUTNEU=  1.00 MeV *
 *  CUTHAD=  1.00 MeV  CUTMUO=  1.00 MeV                         *
 *  BCUTE =100.00 keV  BCUTM =100.00 keV                         *
 *  DCUTE = 10.00 TeV  DCUTM = 10.00 TeV  PPCUTM=  2.04 MeV *
 *  IPAIR =         0.  ICOMP =         0.  IPHOT =         0. *
 *  IPFIS =         0.  IDRAY =         0.  IANNI =         0. *
 *  IBREM =         0.  IHADR =         0.  IMUNU =         0. *
 *  IDCAY =         1.  ILOSS =         0.  IMULS =         0. *
 *  IRAYL =         0.                                           *
 *                                                               *
 *                                                               *
 *     Special TPAR for TMED   2   SCINT - POLYSTYRENE           *
 *     -------------------------                                 *
 *  CUTGAM=100.00 keV  CUTELE=100.00 keV  CUTNEU=  1.00 MeV *
 *  CUTHAD=  1.00 MeV  CUTMUO=  1.00 MeV                         *
 *  BCUTE =100.00 keV  BCUTM =100.00 keV                         *
 *  DCUTE = 10.00 TeV  DCUTM = 10.00 TeV  PPCUTM=  2.04 MeV *
 *  IPAIR =         1.  ICOMP =         1.  IPHOT =         1. *
 *  IPFIS =         1.  IDRAY =         1.  IANNI =         1. *
 *  IBREM =         1.  IHADR =         1.  IMUNU =         1. *
 *  IDCAY =         1.  ILOSS =         1.  IMULS =         1. *
 *  IRAYL =         0.                                           *
 *                                                               *
 *                                                               *
 *     Special TPAR for TMED   3   SHOWER - LEAD                 *
 *     -------------------------                                 *
 *  CUTGAM=100.00 keV  CUTELE=100.00 keV  CUTNEU=  1.00 MeV *
 *  CUTHAD=  1.00 MeV  CUTMUO=  1.00 MeV                         *
 *  BCUTE =100.00 keV  BCUTM =100.00 keV                         *
 *  DCUTE = 10.00 TeV  DCUTM = 10.00 TeV  PPCUTM=  2.04 MeV *
 *  IPAIR =         1.  ICOMP =         1.  IPHOT =         1. *
 *  IPFIS =         1.  IDRAY =         1.  IANNI =         1. *
 *  IBREM =         1.  IHADR =         1.  IMUNU =         1. *
 *  IDCAY =         1.  ILOSS =         1.  IMULS =         1. *
 *  IRAYL =         0.                                           *
 *                                                               *
 *                                                               *
 ***************************************************************


 TIMINIT =    100000.0     TIMEND =    1.000000    ITIME =        10000
1         **** NUMBER OF EVENTS PROCESSED =  6000
          **** RANDOM NUMBER GENERATOR AFTER LAST COMPLETE EVENT   1847995733  1
730209912
          **** TIME TO PROCESS ONE EVENT IS =    5.7531 SECONDS


 MZEND.   Usage statistics for  1 dynamic stores.

     Store  0 /GCBANK/
     -----------------
```

Division		Mode	Position	Max-size	Number of times Wiped	User-GC	Auto-GC	Pushd	Redcd
1	QDIV1	0	3	0	0	0	0	0	0
2	QDIV2	1	76100	135	6000	0	0	0	0
19	system	1	76500	328	0	0	0	0	0
20	Constant	1	99968	21543	0	1	1	0	0

```
 MZSTOR.  ZEBRA table base TAB(0) in /MZCC/ at adr    67373865     4040B29 HEX

 MZSTOR.  Initialize Store  0  in /GCBANK/
          with Store/Table at absolute adrs    67233787    67373865
                                         HEX     401E7FB     4040B29
                                         HEX    FFFDF486           0
                                relative adrs     -134010           0
          with     1 Str. in     2 Links in   5300 Low words in   99970 words.
          This store has a fence of   16 words.

 MZLOGL.  Set Log Level 0 for store  0
1*****  GEANT Version 3.1590 Released on Tuesday 07 April 1992 *****
0*****  Correction Cradle Version  3.1500
 *****  Library compiled on 920407 at 1656 *****

1           USER'S DIRECTIVES TO RUN THIS JOB
            ---------------------------------


 ***** DATA CARD CONTENT     LIST

 ***** DATA CARD CONTENT     RNDM 639100587 188572943

 ***** DATA CARD CONTENT     TRIG 6000

 ***** DATA CARD CONTENT     COMP 1

 ***** DATA CARD CONTENT     PAIR 1

 ***** DATA CARD CONTENT     BREM 1

 ***** DATA CARD CONTENT     ANNI 1

 ***** DATA CARD CONTENT     PHOT 1

 ***** DATA CARD CONTENT     HADR 1

 ***** DATA CARD CONTENT     MULS 1

 ***** DATA CARD CONTENT     SWIT 101 102 107 108 110

 ***** DATA CARD CONTENT     CUTS 0.0001 0.0001

 ***** DATA CARD CONTENT     KINE 52 2.0 0.1 200.0 6.0 0.55 0.1 50.0 0.00005 0.1
0.0
 ***** DATA CARD CONTENT     TIME 100000.0 1.0 10000

 ***** DATA CARD CONTENT     END


 MZDIV.   Initialize Division  Constant  in Store  0
          NW/NWMAX=   2000  80000,  MODE/KIND=  1  2
          Division 20 initialized.

 MZLINK.  Initialize Link Area  /GCLINK/  for Store  0 NL/NS=    20    20

 MZLINK.  Initialize Link Area  /GCSLNK/  for Store  0 NL/NS=   100   100
0================================================   TRACKING MEDIA   ========
==========================================
0TMED                          MATERIAL ISVOL IFIELD  FIELDM  TMAXFD  STEMAX
DEEMAX   EPSIL   STMIN

      1 OUTSIDE - VACUUM          16       0     0      0.00    0.00 -1.00
-1.000   0.000  -1.000
      2 SCINT - POLYSTYRENE       17       1     0      0.00    0.00 -1.00
```

```
 -1.000   0.000  -1.000
     3 DENSE - LEAD                13       0       0       0.00     0.00 -1.00
 -1.000   0.000  -1.000
0===================================================      VOLUMES       ========
==========================================
```

0VOLUME	NAME	NUMED	SHAPE	NPAR	PARAMETERS		
1	SHOW	1	BOX	3	0.100E+03	0.150E+03	0.138E+02
2	SCIN	2	BOX	3	0.100E+03	0.150E+03	0.250E+00
3	LEAD	3	BOX	3	0.100E+03	0.150E+03	0.250E-01

```
0===================================================   Particle Types    ========
==========================================
```

0Part	User words	Options	Mass	Charge	Life time
1	GAMMA	1	0.0000E+00	0.	0.10000E+16
2	POSITRON	2	0.5110E-03	1.	0.10000E+16
3	ELECTRON	2	0.5110E-03	-1.	0.10000E+16
4	NEUTRINO	3	0.0000E+00	0.	0.10000E+16
5	MUON +	5	0.1057E+00	1.	0.21970E-05
6	MUON -	5	0.1057E+00	-1.	0.21970E-05
7	PION 0	3	0.1350E+00	0.	0.84000E-16
8	PION +	4	0.1396E+00	1.	0.26030E-07
9	PION -	4	0.1396E+00	-1.	0.26030E-07
10	KAON 0 LONG	3	0.4977E+00	0.	0.51830E-07
11	KAON +	4	0.4936E+00	1.	0.12371E-07
12	KAON -	4	0.4936E+00	-1.	0.12371E-07
13	NEUTRON	3	0.9396E+00	0.	0.89600E+03
14	PROTON	4	0.9383E+00	1.	0.10000E+16
15	ANTIPROTON	4	0.9383E+00	-1.	0.10000E+16
16	KAON 0 SHORT	3	0.4977E+00	0.	0.89220E-10
17	ETA	3	0.5488E+00	0.	0.74797E-18
18	LAMBDA	3	0.1116E+01	0.	0.26310E-09
19	SIGMA +	4	0.1189E+01	1.	0.80000E-10
20	SIGMA 0	3	0.1193E+01	0.	0.74000E-19
21	SIGMA -	4	0.1197E+01	-1.	0.14790E-09
22	XI 0	3	0.1315E+01	0.	0.29000E-09
23	XI -	4	0.1321E+01	-1.	0.16390E-09
24	OMEGA -	4	0.1672E+01	-1.	0.82200E-10
25	ANTINEUTRON	3	0.9396E+00	0.	0.89600E+03
26	ANTILAMBDA	3	0.1116E+01	0.	0.26310E-09
27	ANTISIGMA -	4	0.1189E+01	-1.	0.80000E-10
28	ANTISIGMA 0	3	0.1193E+01	0.	0.74000E-19
29	ANTISIGMA +	4	0.1197E+01	1.	0.14790E-09
30	ANTIXI 0	3	0.1315E+01	0.	0.29000E-09
31	ANTIXI +	4	0.1321E+01	1.	0.16390E-09
32	ANTIOMEGA +	4	0.1672E+01	1.	0.82200E-10
33	TAU +	4	0.1784E+01	1.	0.30400E-12
34	TAU -	4	0.1784E+01	-1.	0.30400E-12
35	D +	4	0.1869E+01	1.	0.10620E-11
36	D -	4	0.1869E+01	-1.	0.10620E-11
37	D 0	3	0.1865E+01	0.	0.42800E-12
38	ANTI D 0	3	0.1865E+01	0.	0.42800E-12
39	DS+	4	0.1969E+01	1.	0.43600E-12
40	DS-	4	0.1969E+01	-1.	0.43600E-12
41	LAMBDA C +	4	0.2285E+01	1.	0.17900E-12
42	W +	4	0.8100E+02	1.	0.94000E-25
43	W -	4	0.8100E+02	-1.	0.94000E-25
44	Z 0	3	0.9240E+02	0.	0.77400E-25
45	DEUTERON	4	0.1876E+01	1.	0.10000E+16
46	TRITON	4	0.2814E+01	1.	0.10000E+16
47	ALPHA	4	0.3727E+01	2.	0.10000E+16
48	GEANTINO	6	0.0000E+00	0.	0.10000E+16
49	HE3	4	0.2814E+01	2.	0.10000E+16

```
0===================================================     MATERIALS      ========
==========================================
```

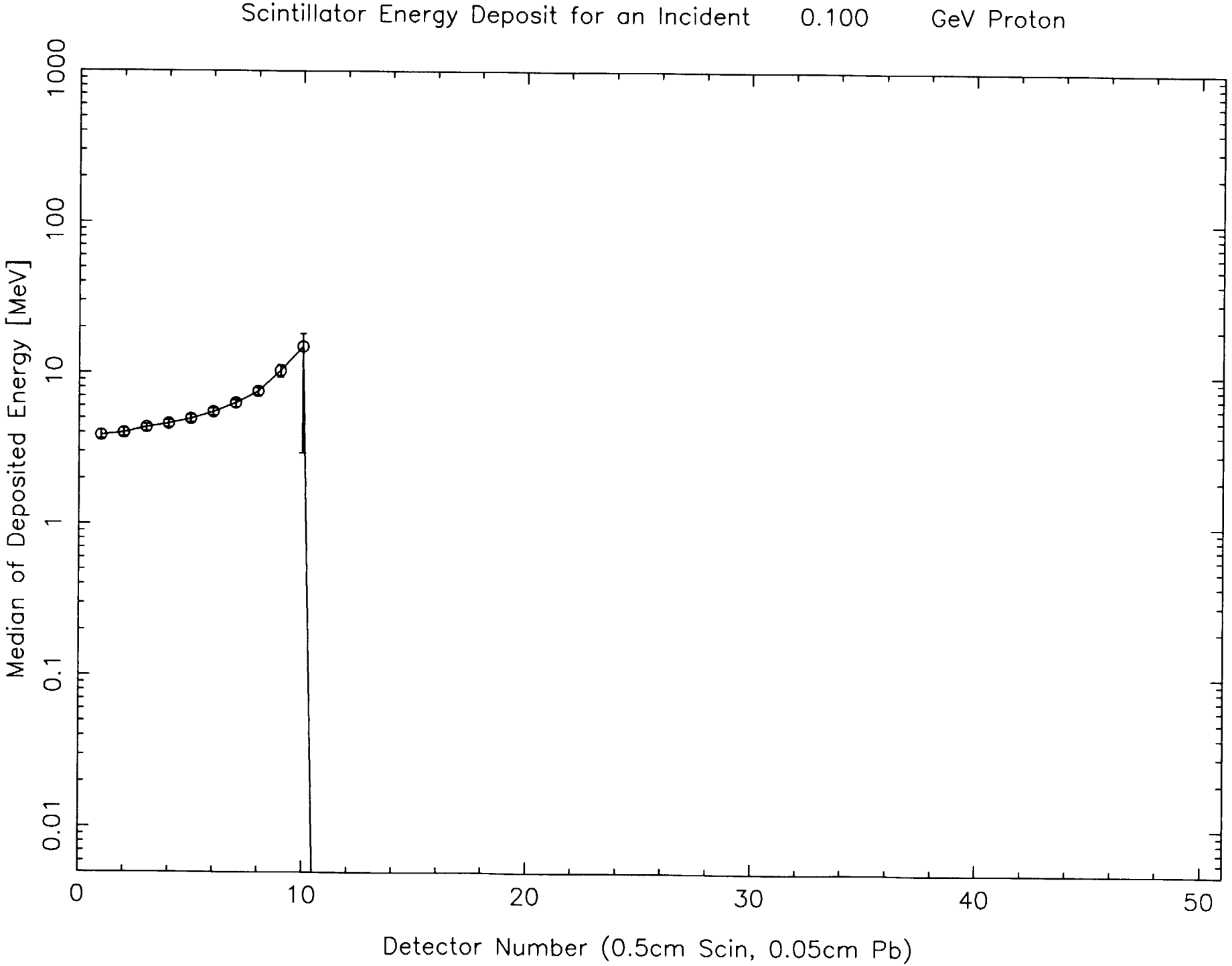
```
0MATERIAL                              A         Z      DENSITY  RADIAT L  ABSORP L
NMIXT

        1 HYDROGEN                    1.010     1.000     0.071 0.865E+03 0.790E+03
   1
        2 DEUTERIUM                   2.010     1.000     0.162 0.757E+03 0.342E+03
   1
        3 HELIUM                      4.000     2.000     0.125 0.755E+03 0.478E+03
   1
        4 LITHIUM                     6.940     3.000     0.534 0.155E+03 0.121E+03
   1
        5 BERILLIUM                   9.010     4.000     1.848 0.353E+02 0.367E+02
   1
        6 CARBON                     12.010     6.000     2.265 0.188E+02 0.499E+02
   1
        7 NITROGEN                   14.010     7.000     0.808 0.445E+02 0.994E+02
   1
        8 NEON                       20.180    10.000     1.207 0.240E+02 0.749E+02
   1
        9 ALUMINIUM                  26.980    13.000     2.700 0.890E+01 0.372E+02
   1
       10 IRON                       55.850    26.000     7.870 0.176E+01 0.171E+02
   1
       11 COPPER                     63.540    29.000     8.960 0.143E+01 0.148E+02
   1
       12 TUNGSTEN                  183.850    74.000    19.300 0.350E+00 0.103E+02
   1
       13 LEAD                      207.190    82.000    11.350 0.560E+00 0.185E+02
   1
       14 URANIUM                   238.030    92.000    18.950 0.320E+00 0.120E+02
   1
       15 AIR                        14.610     7.300     0.001 0.304E+05 0.675E+05
   1
       16 VACUUM                      0.000     0.000     0.000 0.100E+17 0.100E+17
   1
       17 POLYSTYRENE                11.157     5.612     1.032 0.420E+02 0.891E+02
   2     A      Z     W

        12.01   6.00  0.922

         1.01   1.00  0.078
1*************************************************************
 *                                                           *
 *    G E A N T  Version 3.1590      DATE/TIME 920925/1634   *
 *                                                           *
 *                      R U N      1                         *
 *                                                           *
 *************************************************************
 *                                                           *
 *      Data structure   Date   Time    GVERSN    ZVERSN    *
 *      --------------   ----   ----    ------    ------    *
 *                                                           *
 *           INIT       920925  1634    3.1590     3.68     *
 *                                                           *
 *           KINE       920925  1634    3.1590     3.68     *
 *                                                           *
 *           HITS       920925  1634    3.1590     3.68     *
 *                                                           *
 *           DIGI       920925  1634    3.1590     3.68     *
 *                                                           *
 *     Random number seeds:     639100587    188572943      *
 *     --------------------                                  *
 *                                                           *
 *-----------------------------------------------------------*
 *                                                           *
 *              Standard TPAR for this run are               *
```

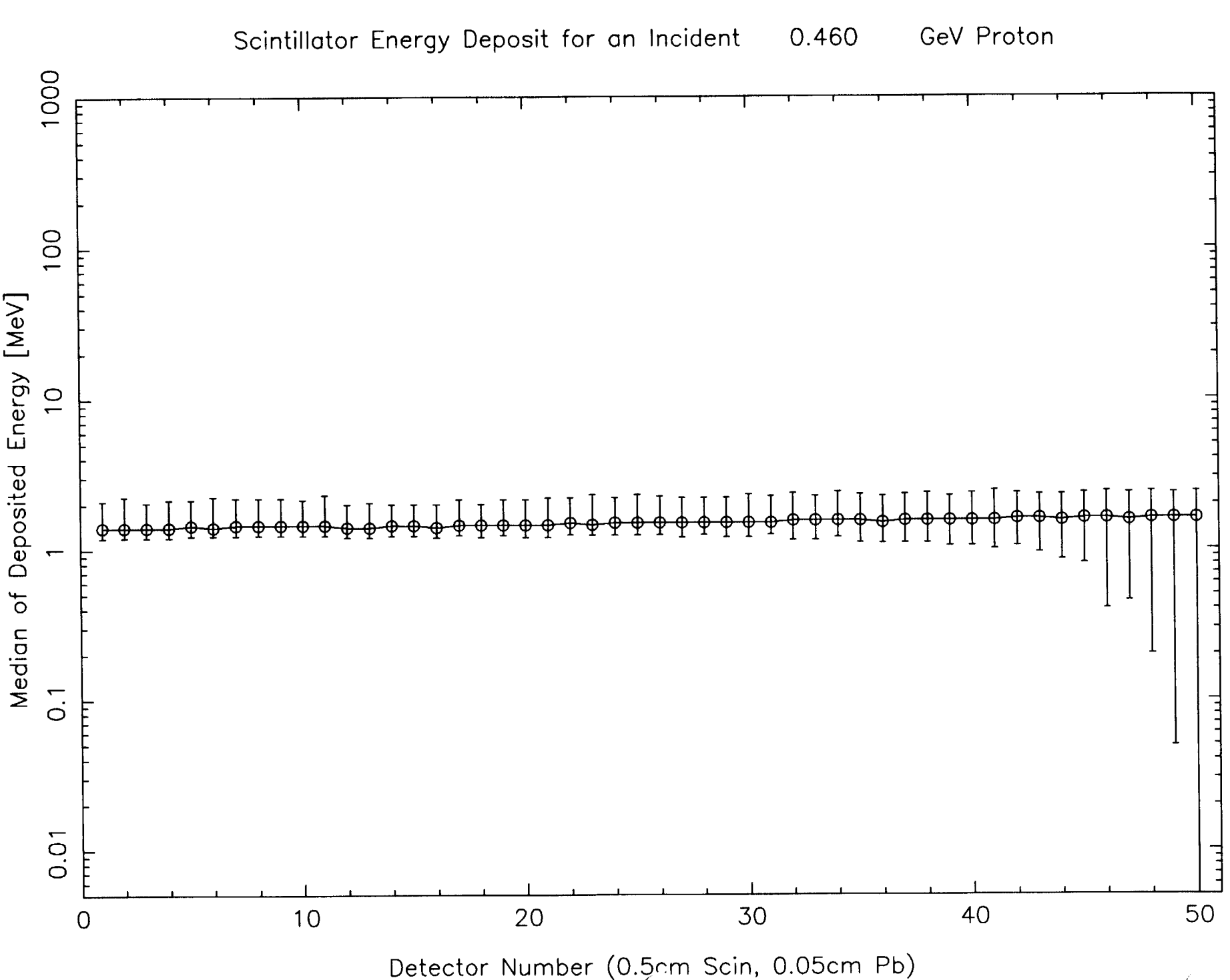
```
 *              ------------------------------                    *
 *                                                                *
 *   CUTGAM=100.00 keV  CUTELE=100.00 keV  CUTNEU= 10.00 MeV     *
 *   CUTHAD= 10.00 MeV  CUTMUO= 10.00 MeV                         *
 *   BCUTE =100.00 keV  BCUTM =100.00 keV                         *
 *   DCUTE = 10.00 TeV  DCUTM = 10.00 TeV  PPCUTM= 10.00 MeV     *
 *   IPAIR =        1.  ICOMP =        1.  IPHOT =        1.     *
 *   IPFIS =        0.  IDRAY =        0.  IANNI =        1.     *
 *   IBREM =        1.  IHADR =        1.  IMUNU =        1.     *
 *   IDCAY =        1.  ILOSS =        2.  IMULS =        1.     *
 *   IRAYL =        0.                                            *
 *                                                                *
 *     Special TPAR for TMED   1   OUTSIDE - VACUUM               *
 *     -------------------------                                  *
 *   CUTGAM=100.00 keV  CUTELE=100.00 keV  CUTNEU=  1.00 MeV     *
 *   CUTHAD=  1.00 MeV  CUTMUO=  1.00 MeV                         *
 *   BCUTE =100.00 keV  BCUTM =100.00 keV                         *
 *   DCUTE = 10.00 TeV  DCUTM = 10.00 TeV  PPCUTM=  2.04 MeV     *
 *   IPAIR =        0.  ICOMP =        0.  IPHOT =        0.     *
 *   IPFIS =        0.  IDRAY =        0.  IANNI =        0.     *
 *   IBREM =        0.  IHADR =        0.  IMUNU =        0.     *
 *   IDCAY =        1.  ILOSS =        0.  IMULS =        0.     *
 *   IRAYL =        0.                                            *
 *                                                                *
 *                                                                *
 *     Special TPAR for TMED   2   SCINT - POLYSTYRENE            *
 *     -------------------------                                  *
 *   CUTGAM=100.00 keV  CUTELE=100.00 keV  CUTNEU=  1.00 MeV     *
 *   CUTHAD=  1.00 MeV  CUTMUO=  1.00 MeV                         *
 *   BCUTE =100.00 keV  BCUTM =100.00 keV                         *
 *   DCUTE = 10.00 TeV  DCUTM = 10.00 TeV  PPCUTM=  2.04 MeV     *
 *   IPAIR =        1.  ICOMP =        1.  IPHOT =        1.     *
 *   IPFIS =        1.  IDRAY =        1.  IANNI =        1.     *
 *   IBREM =        1.  IHADR =        1.  IMUNU =        1.     *
 *   IDCAY =        1.  ILOSS =        1.  IMULS =        1.     *
 *   IRAYL =        0.                                            *
 *                                                                *
 *                                                                *
 *     Special TPAR for TMED   3   DENSE - LEAD                   *
 *     -------------------------                                  *
 *   CUTGAM=100.00 keV  CUTELE=100.00 keV  CUTNEU=  1.00 MeV     *
 *   CUTHAD=  1.00 MeV  CUTMUO=  1.00 MeV                         *
 *   BCUTE =100.00 keV  BCUTM =100.00 keV                         *
 *   DCUTE = 10.00 TeV  DCUTM = 10.00 TeV  PPCUTM=  2.04 MeV     *
 *   IPAIR =        1.  ICOMP =        1.  IPHOT =        1.     *
 *   IPFIS =        1.  IDRAY =        1.  IANNI =        1.     *
 *   IBREM =        1.  IHADR =        1.  IMUNU =        1.     *
 *   IDCAY =        1.  ILOSS =        1.  IMULS =        1.     *
 *   IRAYL =        0.                                            *
 *                                                                *
 *                                                                *
 ******************************************************************


 TIMINIT =    100000.0    TIMEND =    1.000000    ITIME =        10000
1          **** NUMBER OF EVENTS PROCESSED =  6000
           **** RANDOM NUMBER GENERATOR AFTER LAST COMPLETE EVENT   1362650369
985392229
           **** TIME TO PROCESS ONE EVENT IS =   52.2568 SECONDS


 MZEND.   Usage statistics for  1 dynamic stores.

     Store  0 /GCBANK/
     -----------------
```

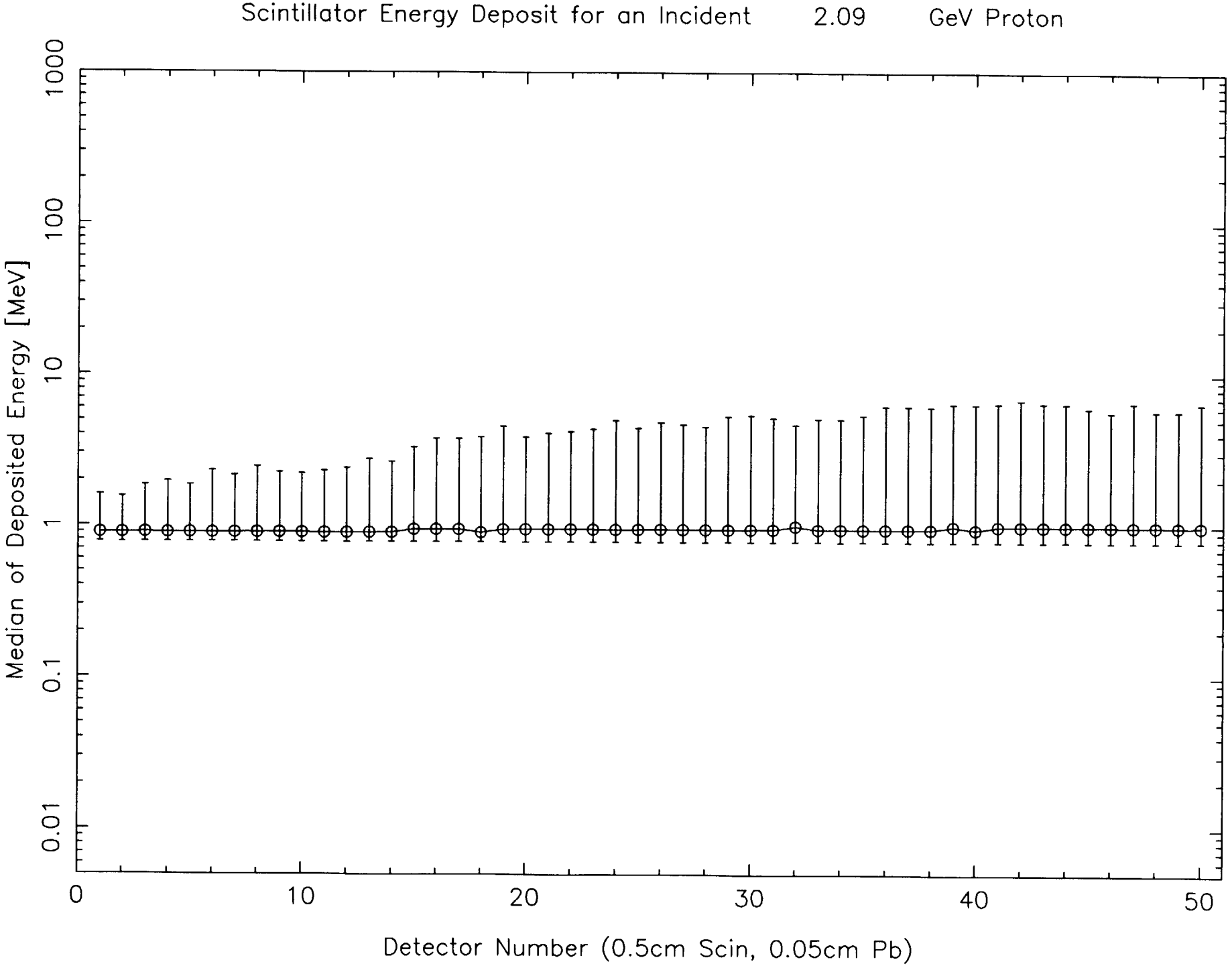
Division		Mode	Position	Max-size	Number of times Wiped	User-GC	Auto-GC	Pushd	Redcd
1	QDIV1	0	3	0	0	0	0	0	0
2	QDIV2	1	76100	135	6000	0	0	0	0
19	system	1	76500	328	0	0	0	0	0
20	Constant	1	99968	21543	0	1	1	0	0

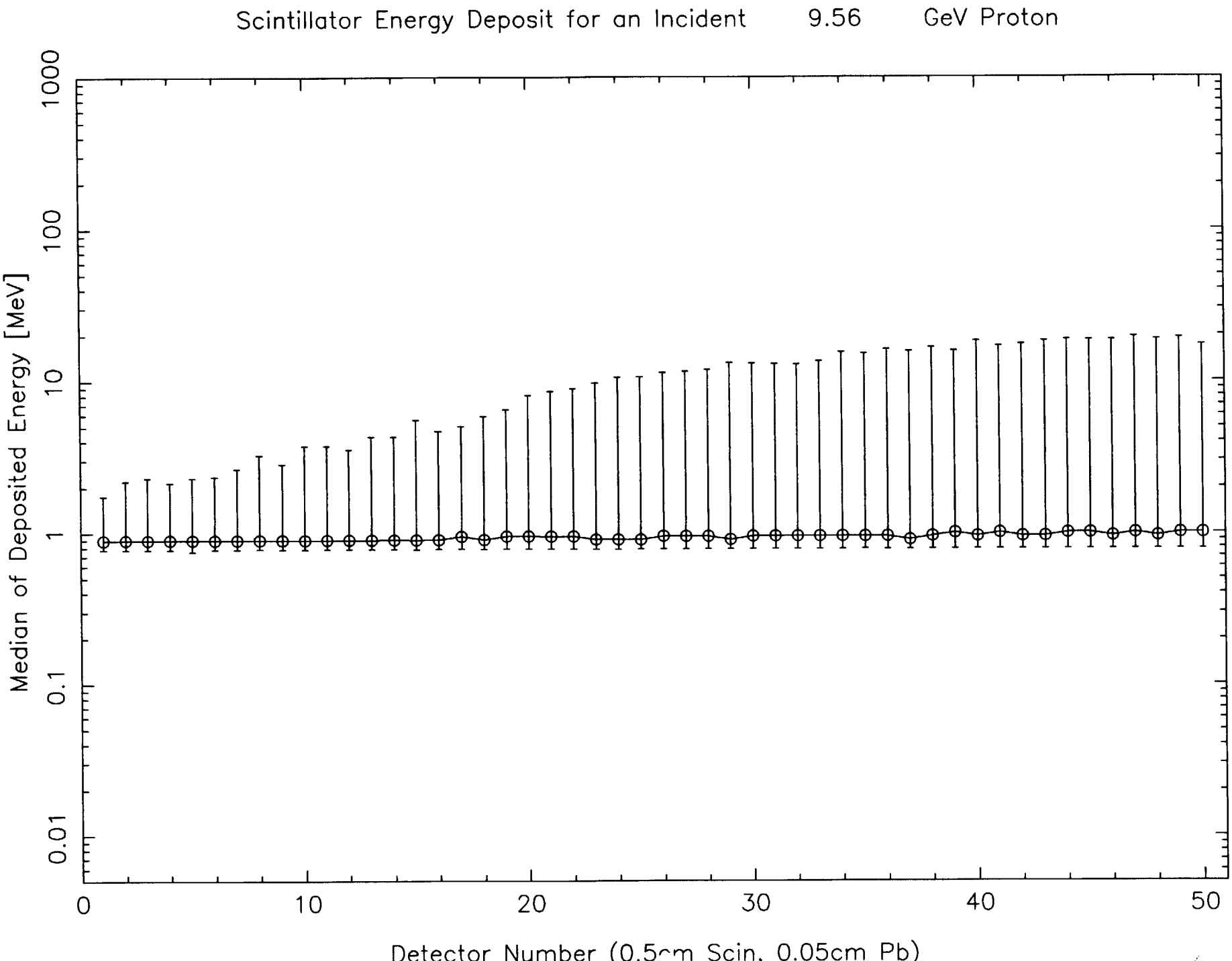
Plots of Scintillator Energy Deposit

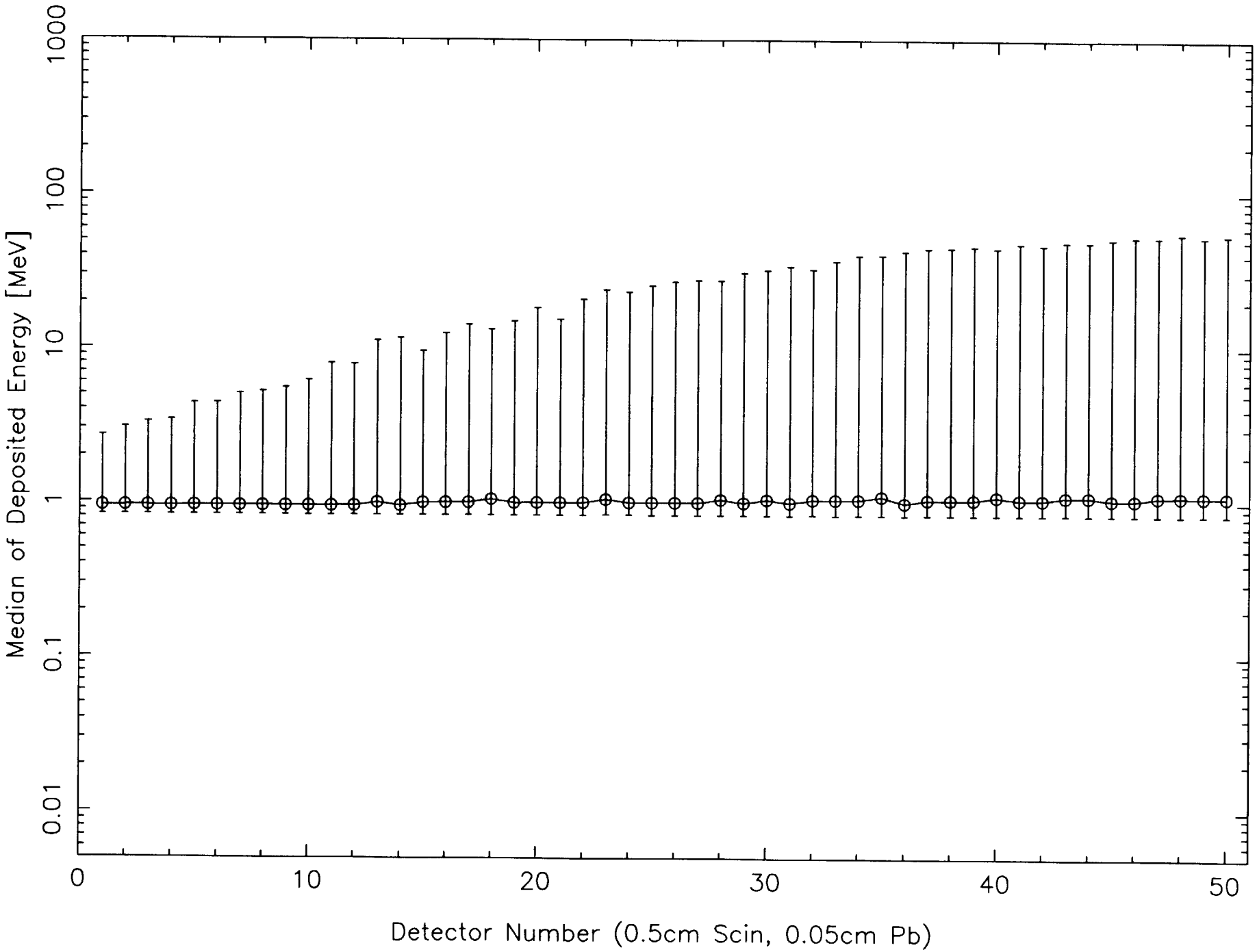
The following plots show GEANT simulated shower results for the energy deposited in the scintillator by protons and positrons for 6 different incident energies.

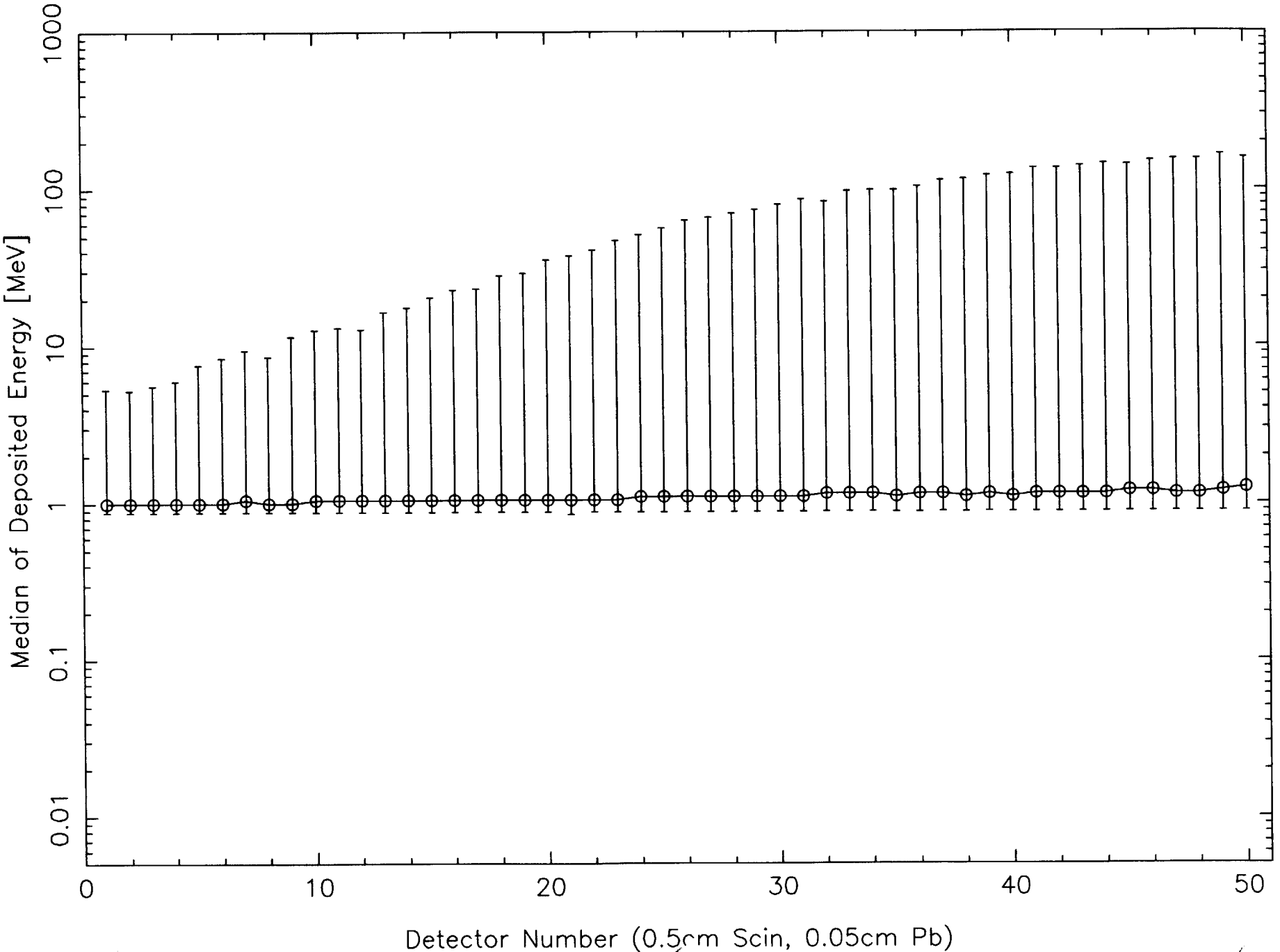

Scintillator Energy Deposit for an Incident 0.100 GeV Proton
Median of Deposited Energy [MeV]
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

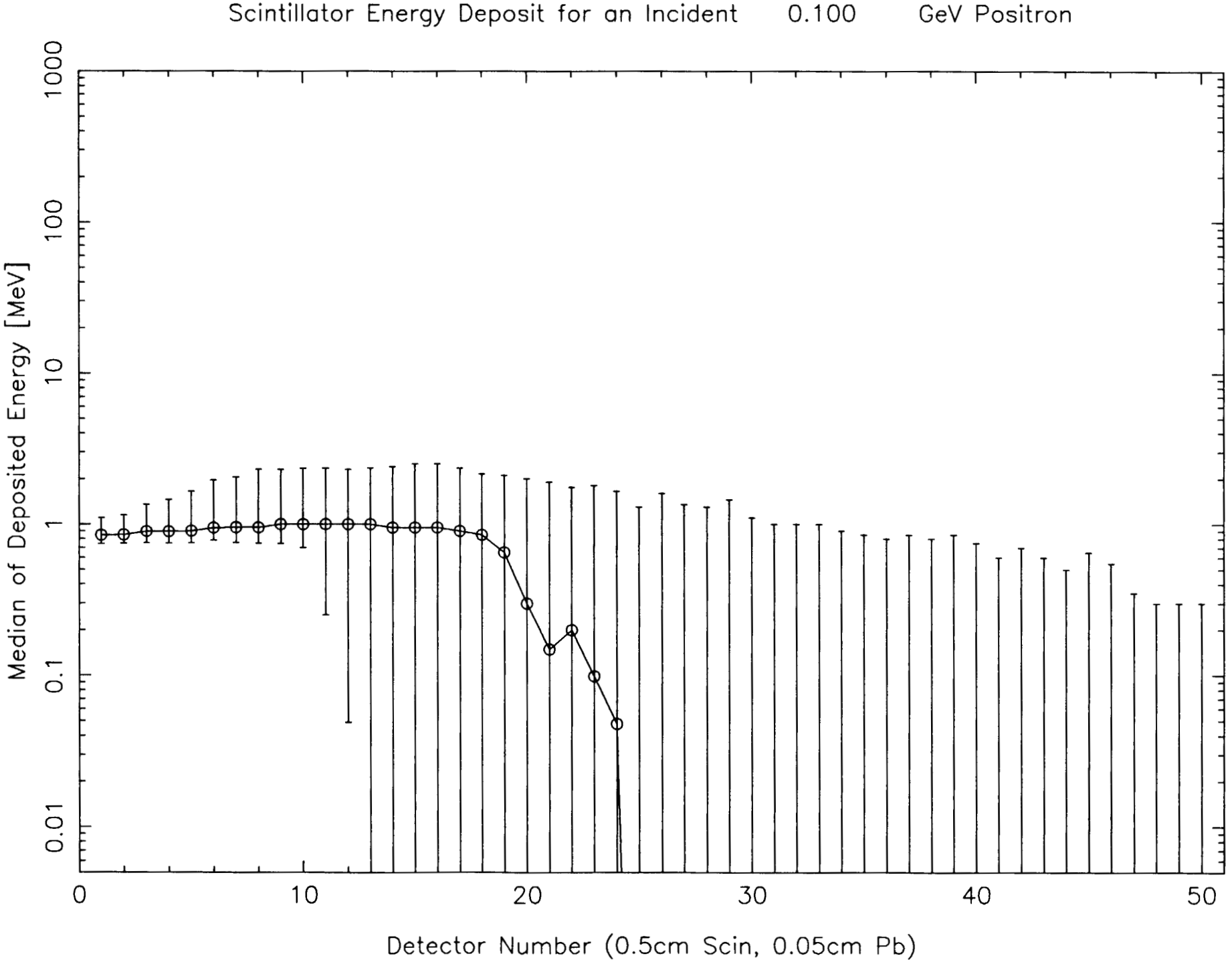

Scintillator Energy Deposit for an Incident 0.460 GeV Proton
Median of Deposited Energy [MeV]
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

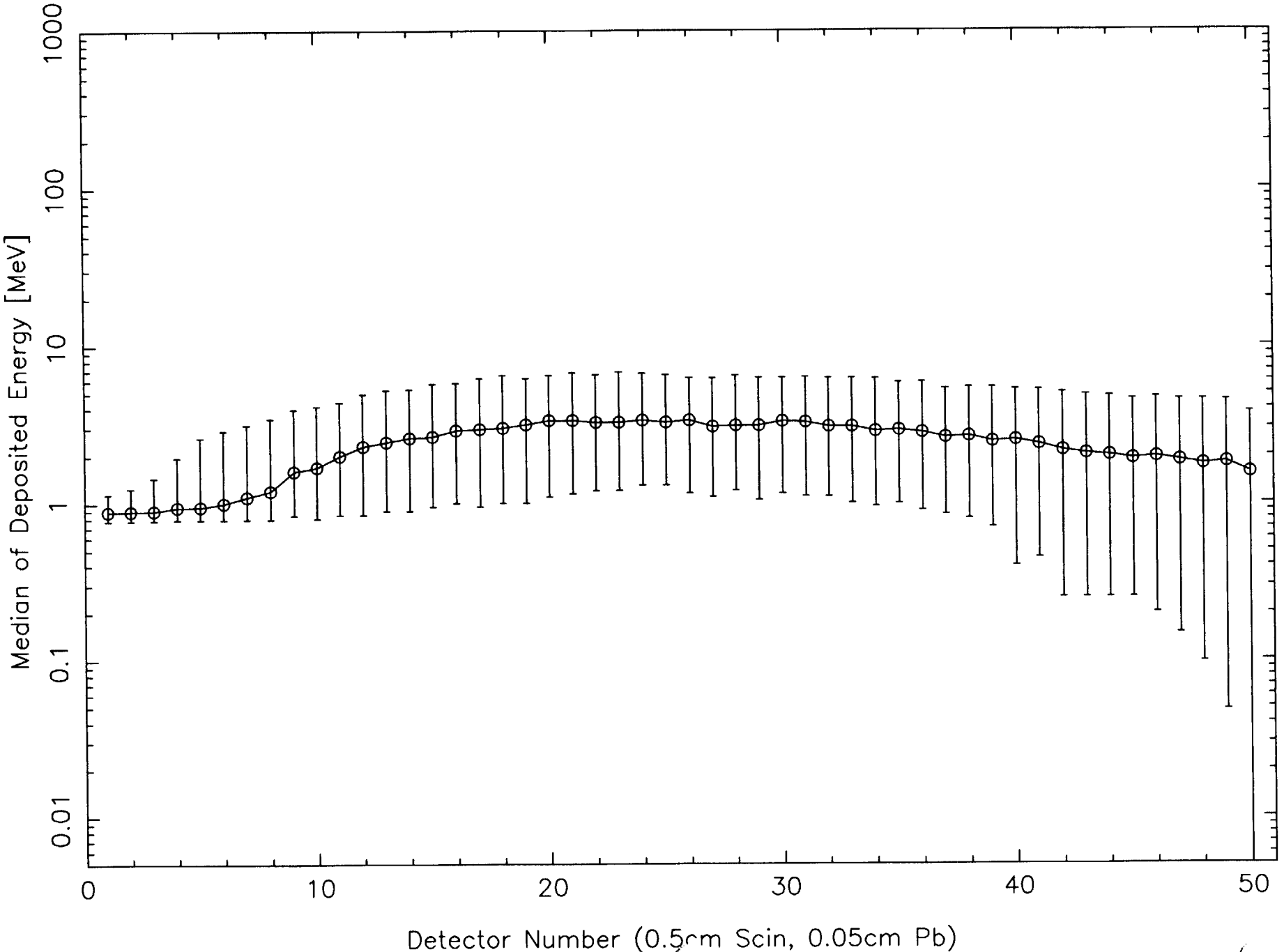

Scintillator Energy Deposit for an Incident 2.09 GeV Proton
Median of Deposited Energy [MeV]
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

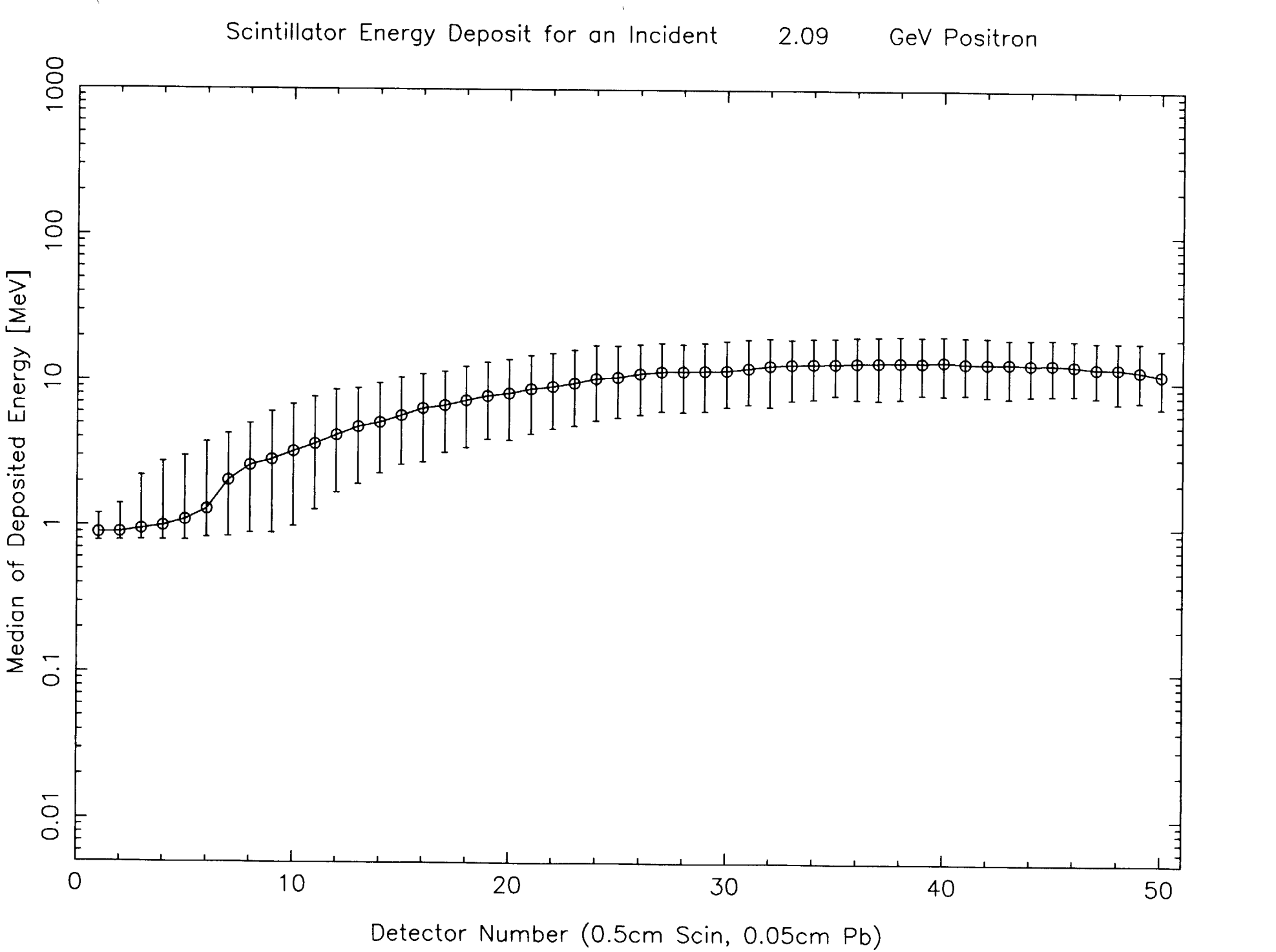

Scintillator Energy Deposit for an Incident 9.56 GeV Proton
Median of Deposited Energy [MeV]
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
Detector Number (0.5cm Scin. 0.05cm Pb)

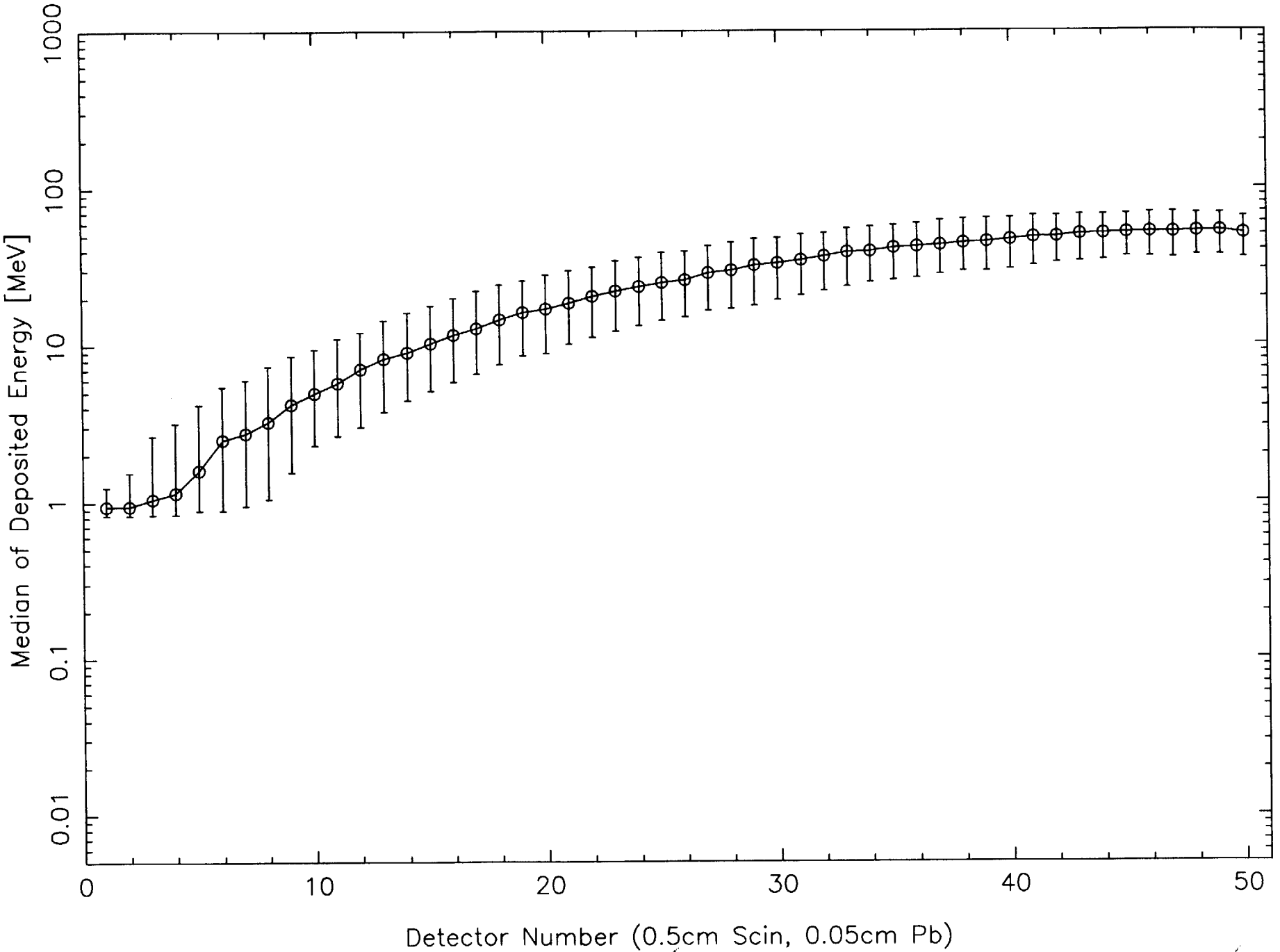

Scintillator Energy Deposit for an Incident 43.7 GeV Proton
Median of Deposited Energy [MeV]
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

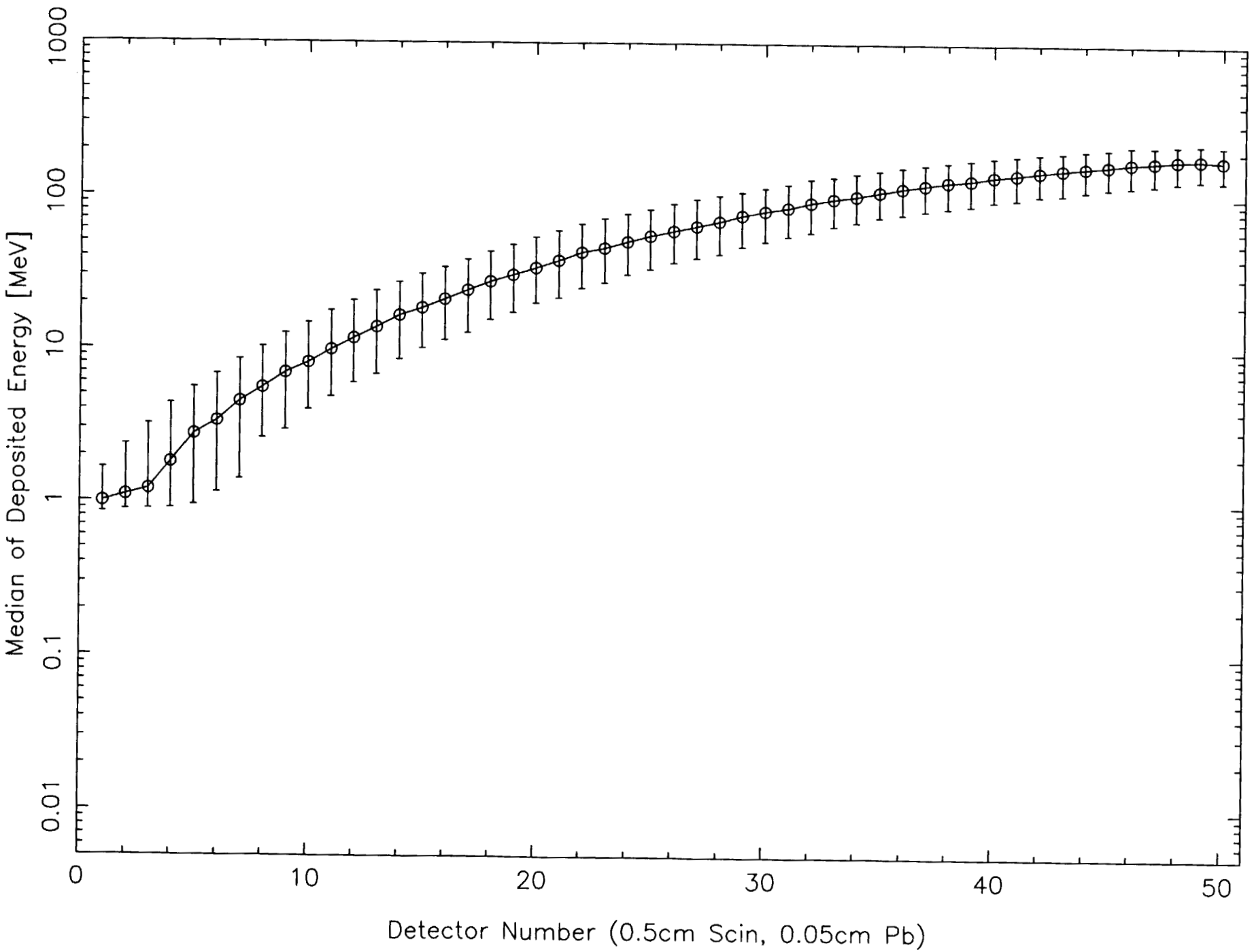

Scintillator Energy Deposit for an Incident 200. GeV Proton
Median of Deposited Energy [MeV]
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

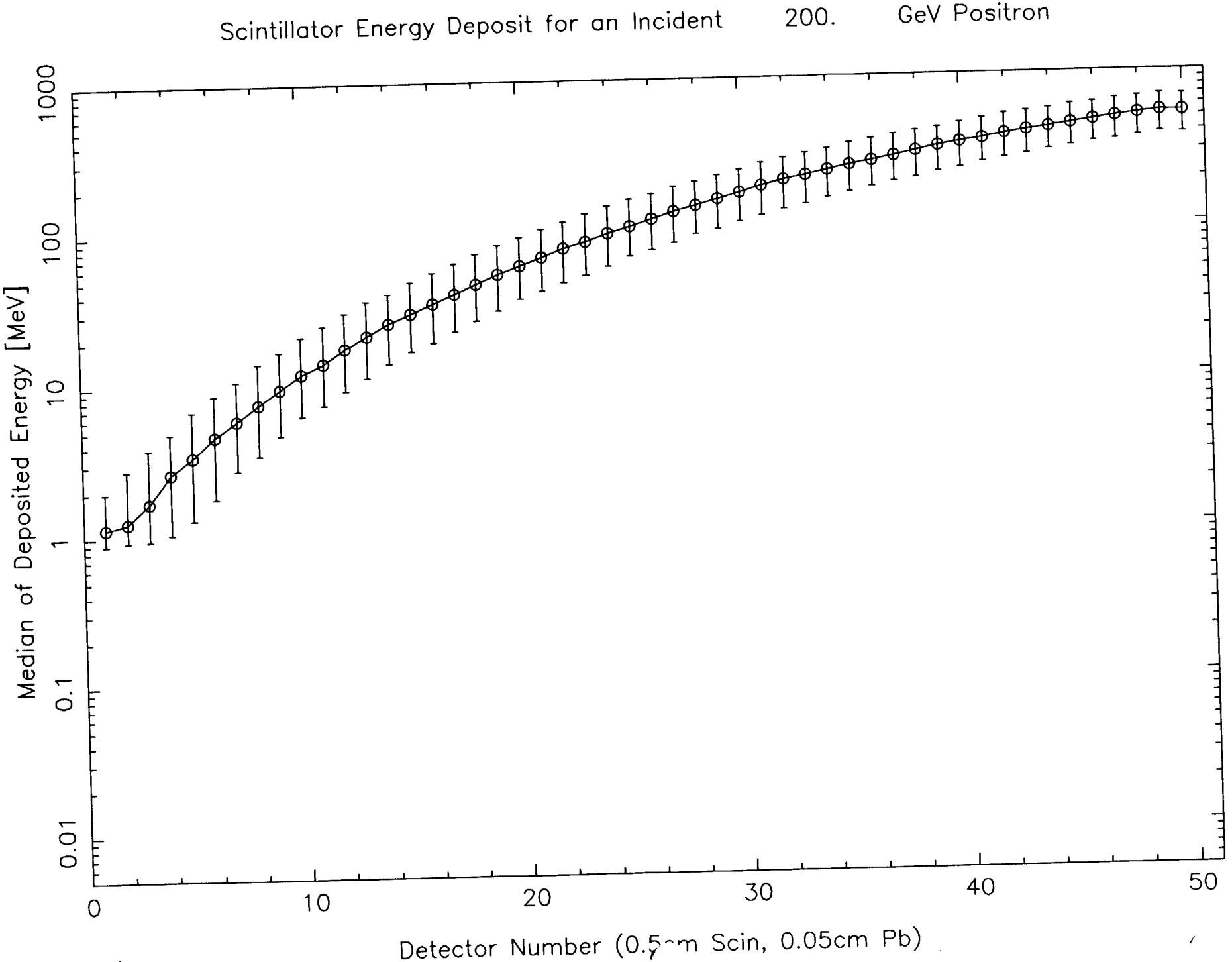

Scintillator Energy Deposit for an Incident 0.100 GeV Positron
Median of Deposited Energy [MeV]
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)


Scintillator Energy Deposit for an Incident 0.460 GeV Positron
Median of Deposited Energy [MeV]
0.01
0.1
1
10
100
1000
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)


Scintillator Energy Deposit for an Incident 2.09 GeV Positron
Median of Deposited Energy [MeV]
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

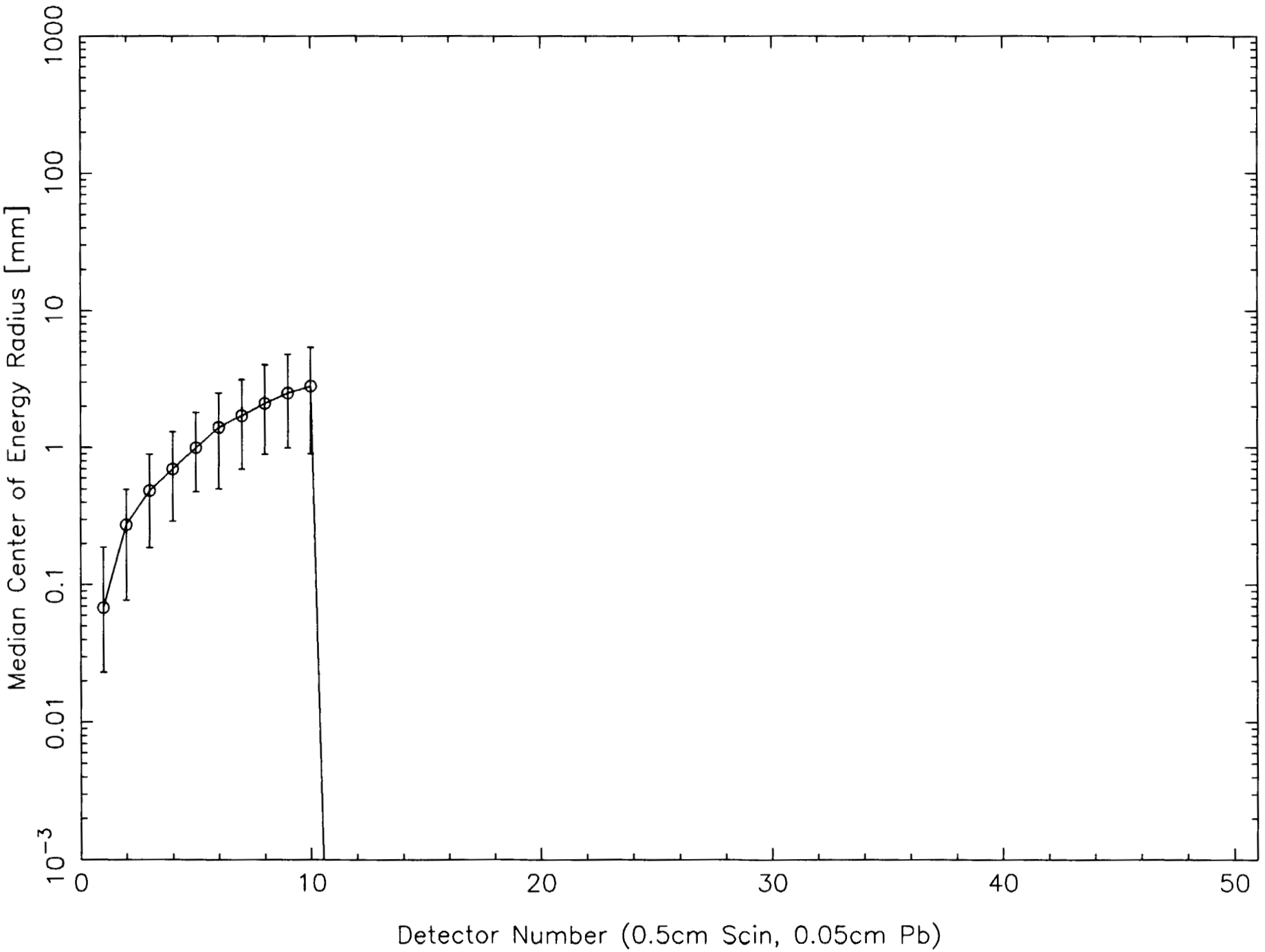

Scintillator Energy Deposit for an Incident 9.56 GeV Positron
Median of Deposited Energy [MeV]
0.01
0.1
1
10
100
1000
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

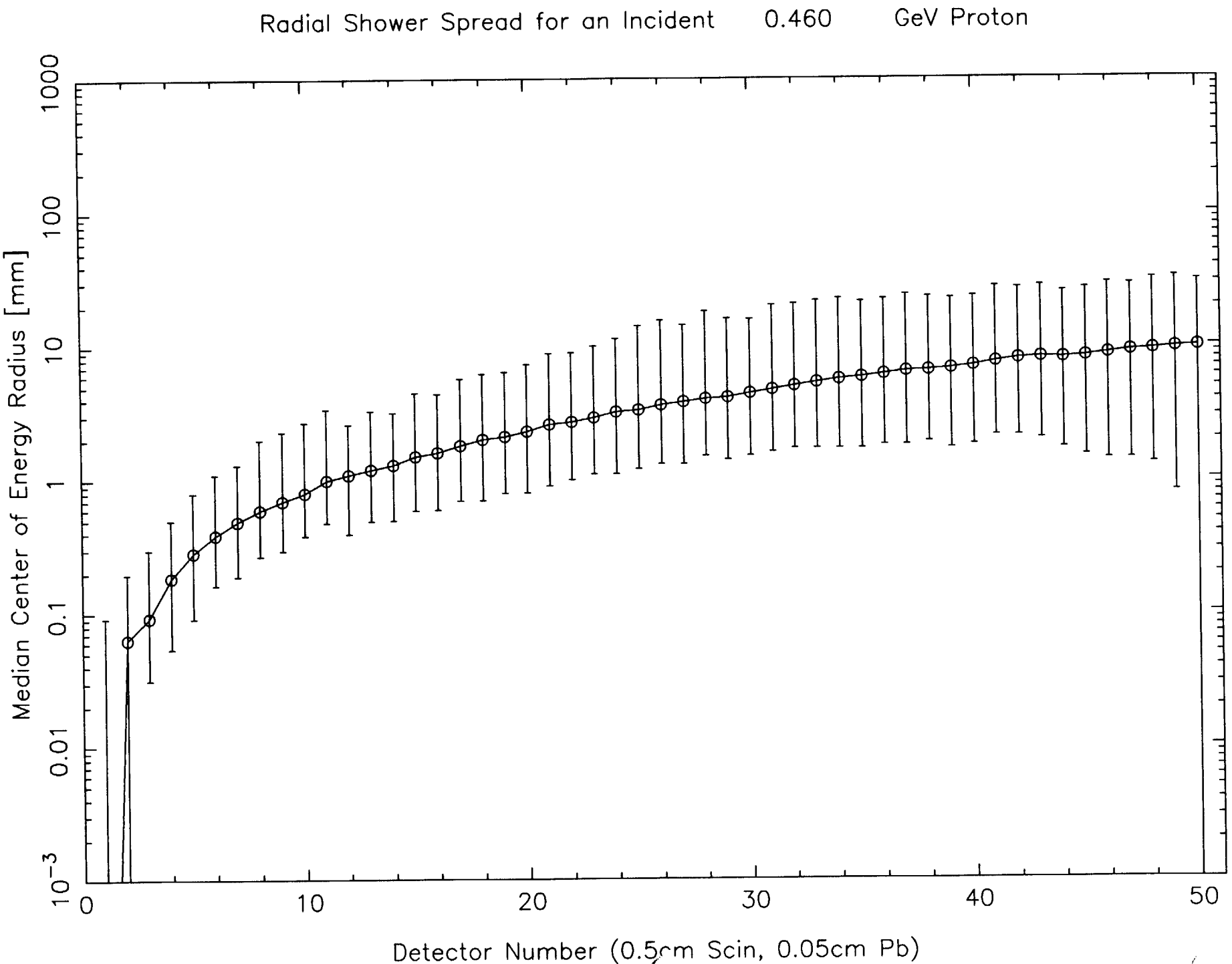

Scintillator Energy Deposit for an Incident 43.7 GeV Positron
Median of Deposited Energy [MeV]
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

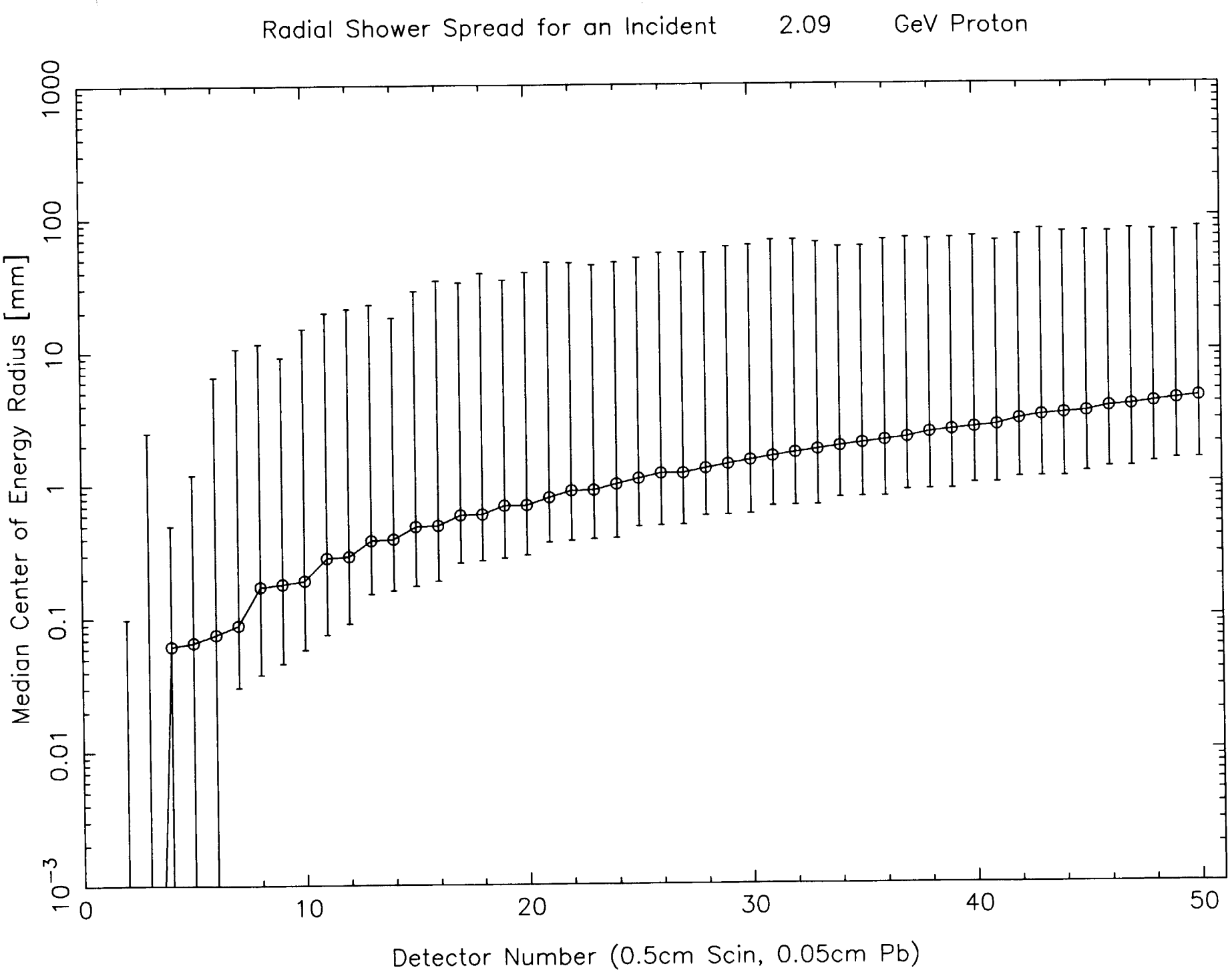

Scintillator Energy Deposit for an Incident 200. GeV Positron
Median of Deposited Energy [MeV]
0.01
0.1
1
10
100
1000
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

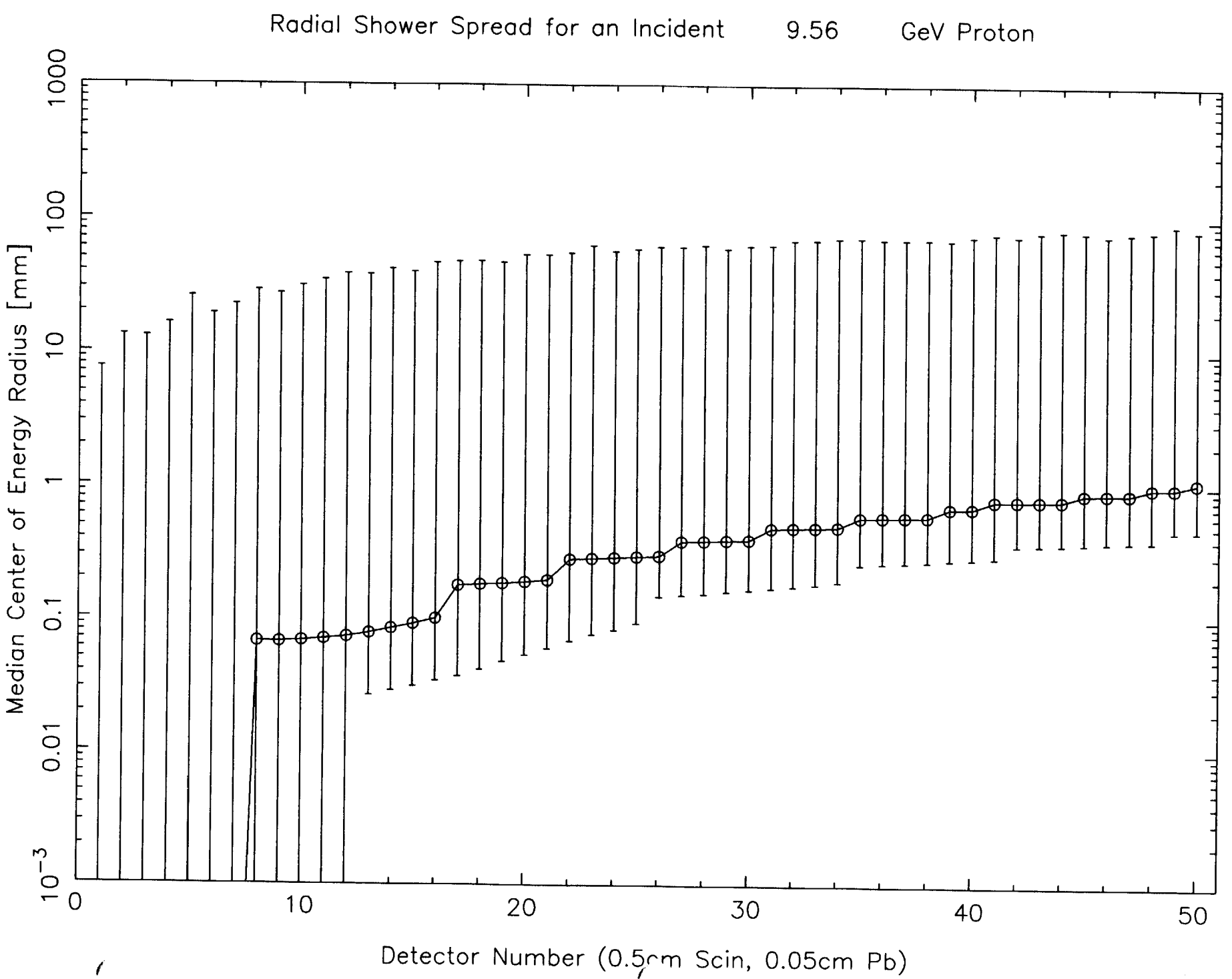
Plots of Radial Shower Spread

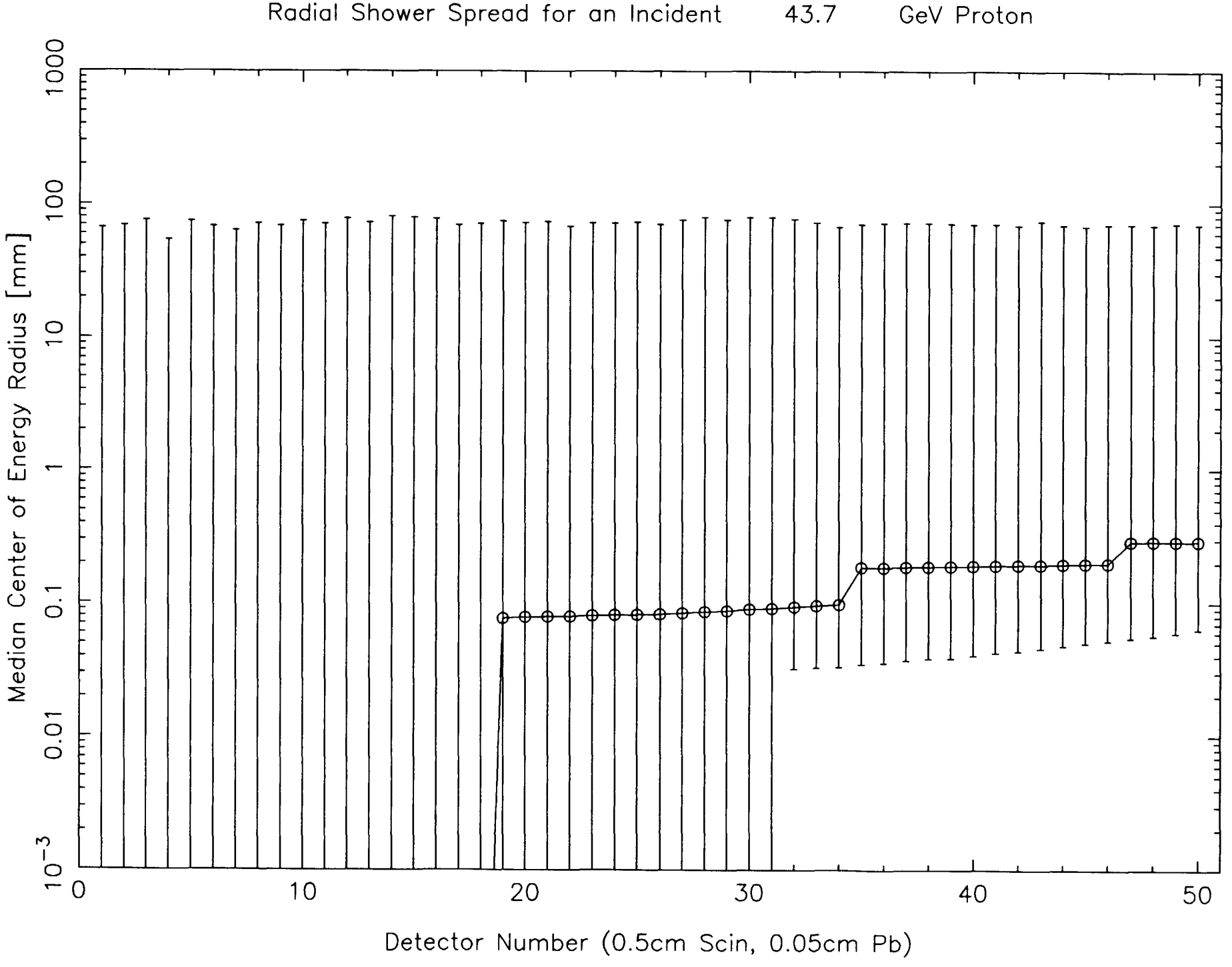
The following plots show GEANT simulated shower results for the radial shower spread of protons and positrons for 6 different incident energies.

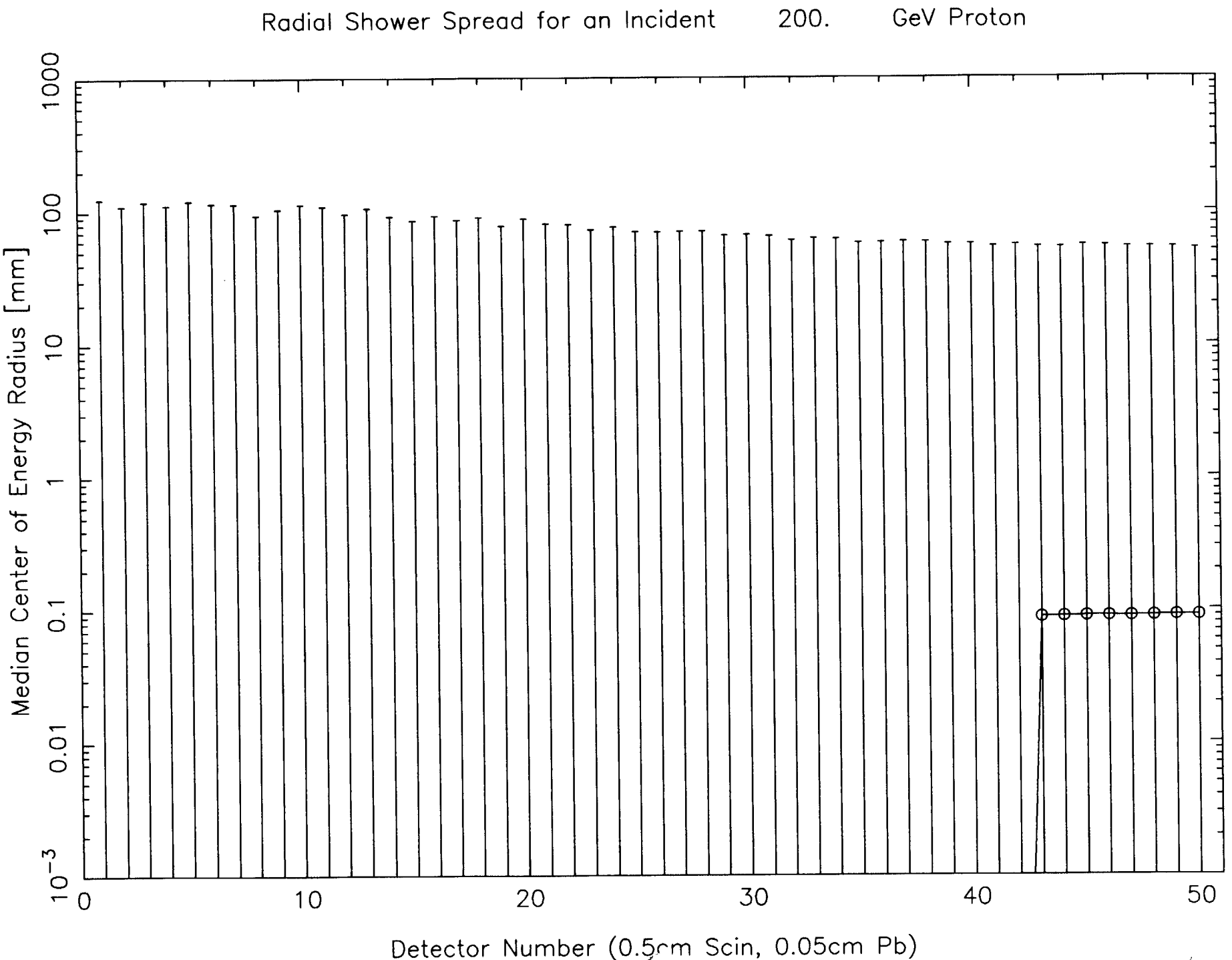

Radial Shower Spread for an Incident 0.100 GeV Proton
Median Center of Energy Radius [mm]
1000
100
10
1
0.1
0.01
10^{-3}
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

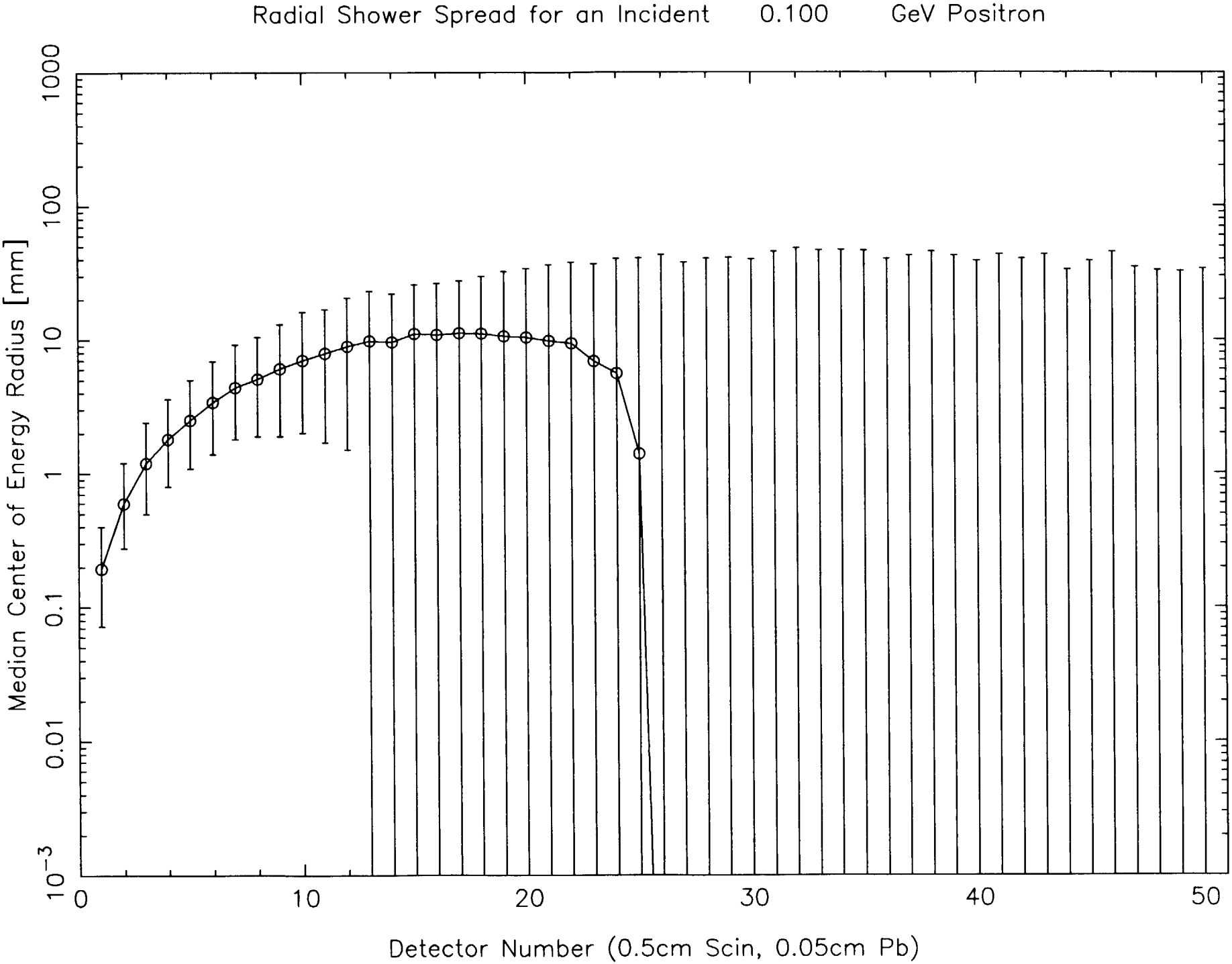

Radial Shower Spread for an Incident 0.460 GeV Proton
Median Center of Energy Radius [mm]
1000
100
10
1
0.1
0.01
10^{-3}
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

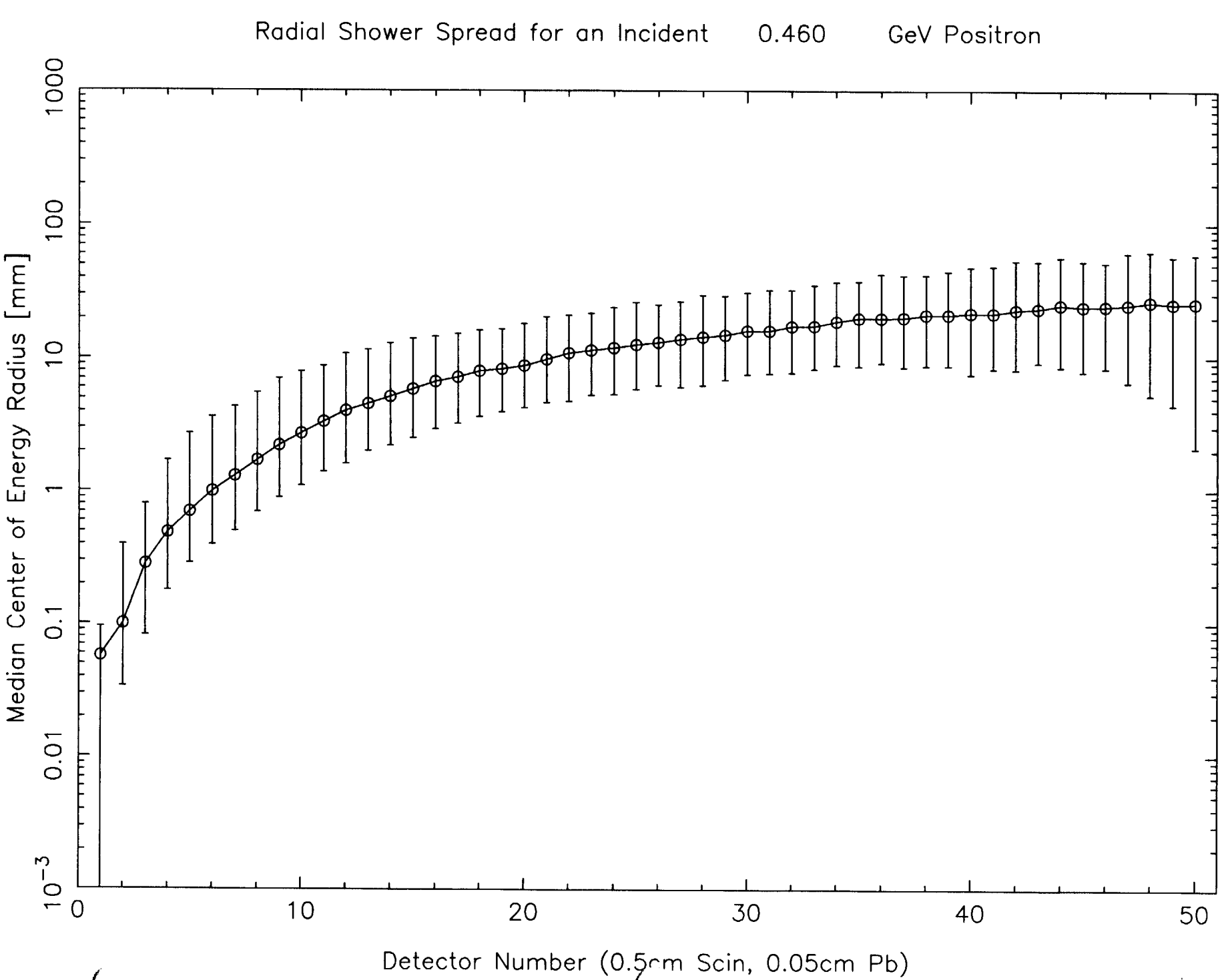

Radial Shower Spread for an Incident 2.09 GeV Proton
Median Center of Energy Radius [mm]
1000
100
10
1
0.1
0.01
10^{-3}
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

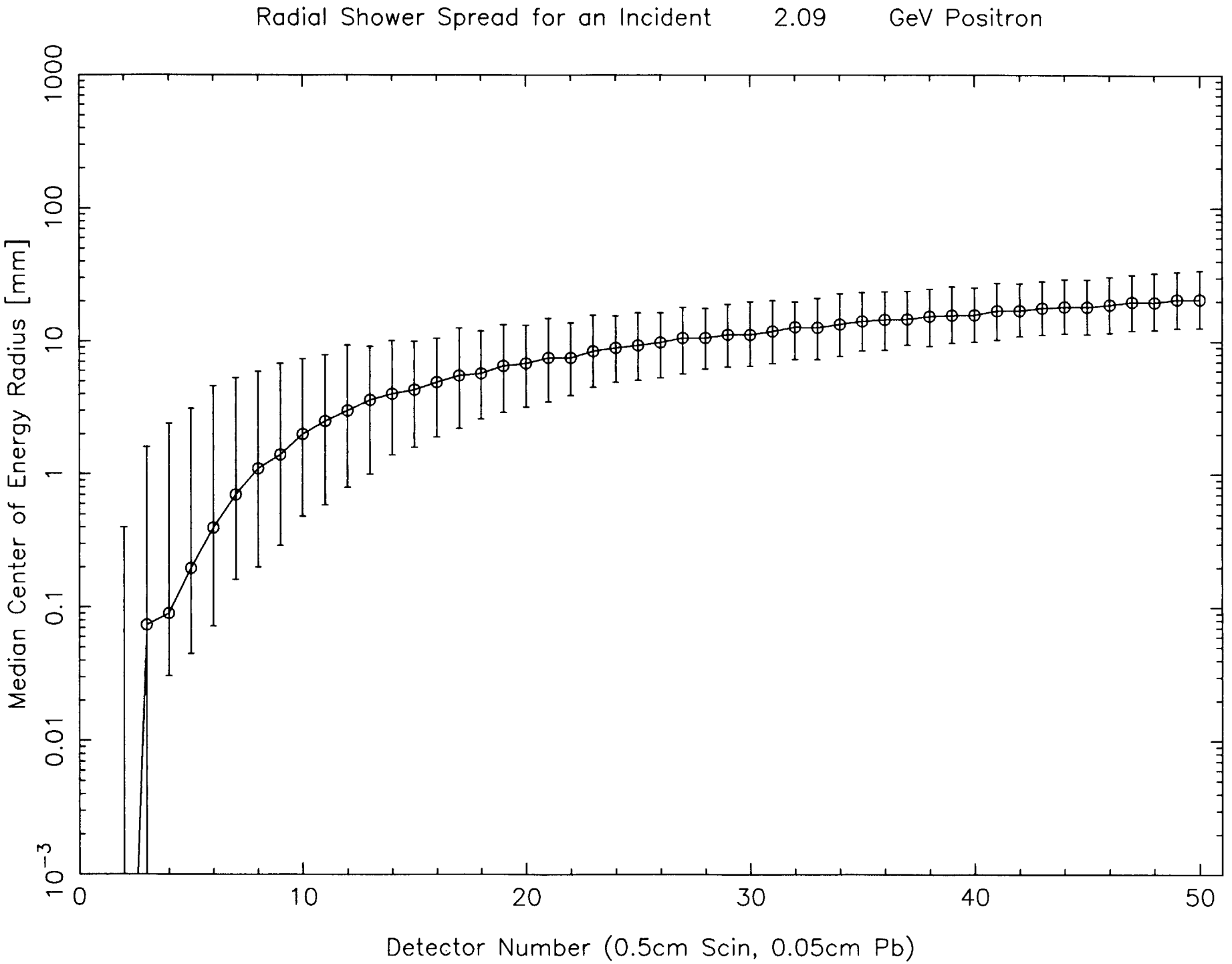

Radial Shower Spread for an Incident 9.56 GeV Proton
Median Center of Energy Radius [mm]
1000
100
10
1
0.1
0.01
10^{-3}
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

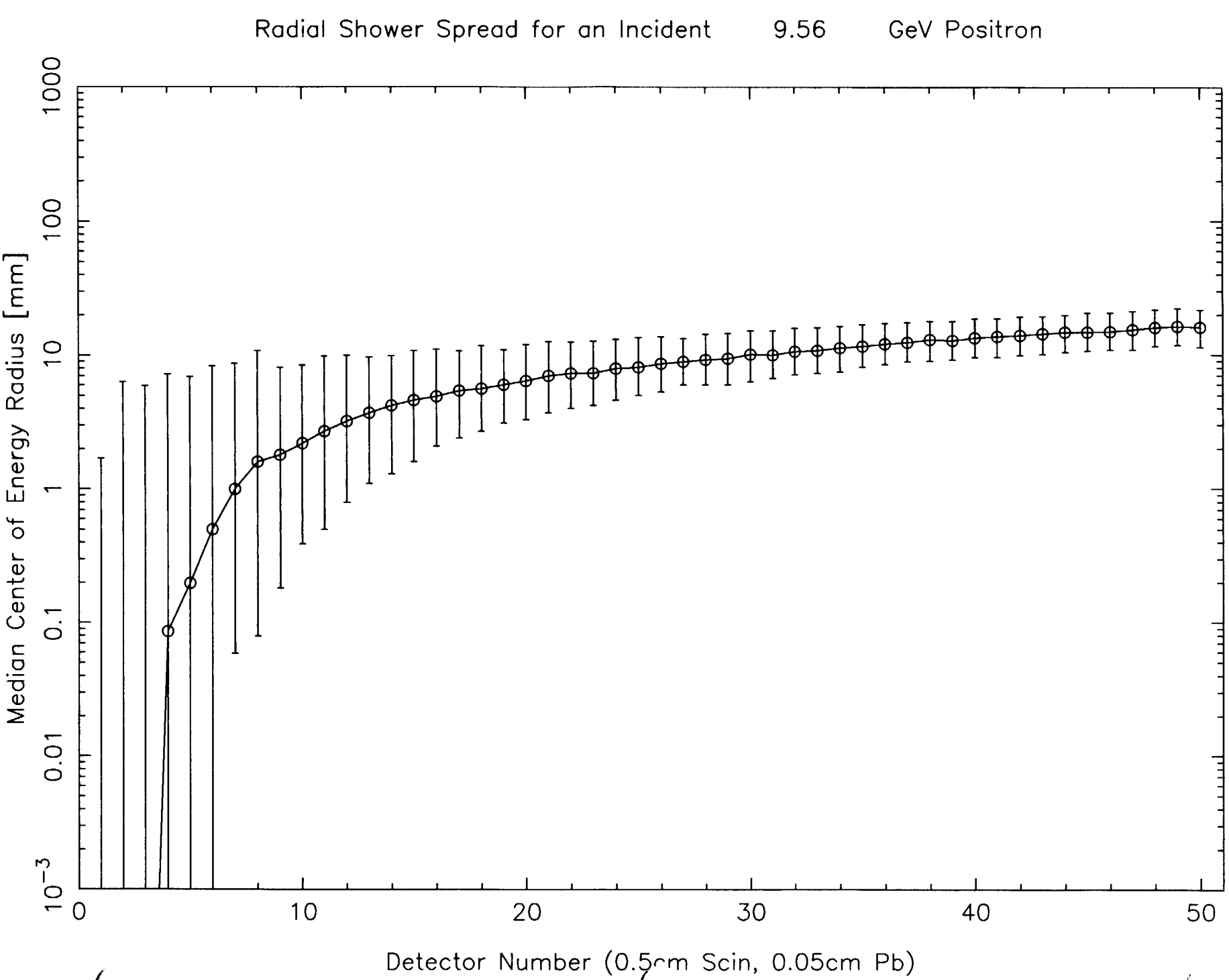

Radial Shower Spread for an Incident 43.7 GeV Proton
Median Center of Energy Radius [mm]
1000
100
10
1
0.1
0.01
10^{-3}
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

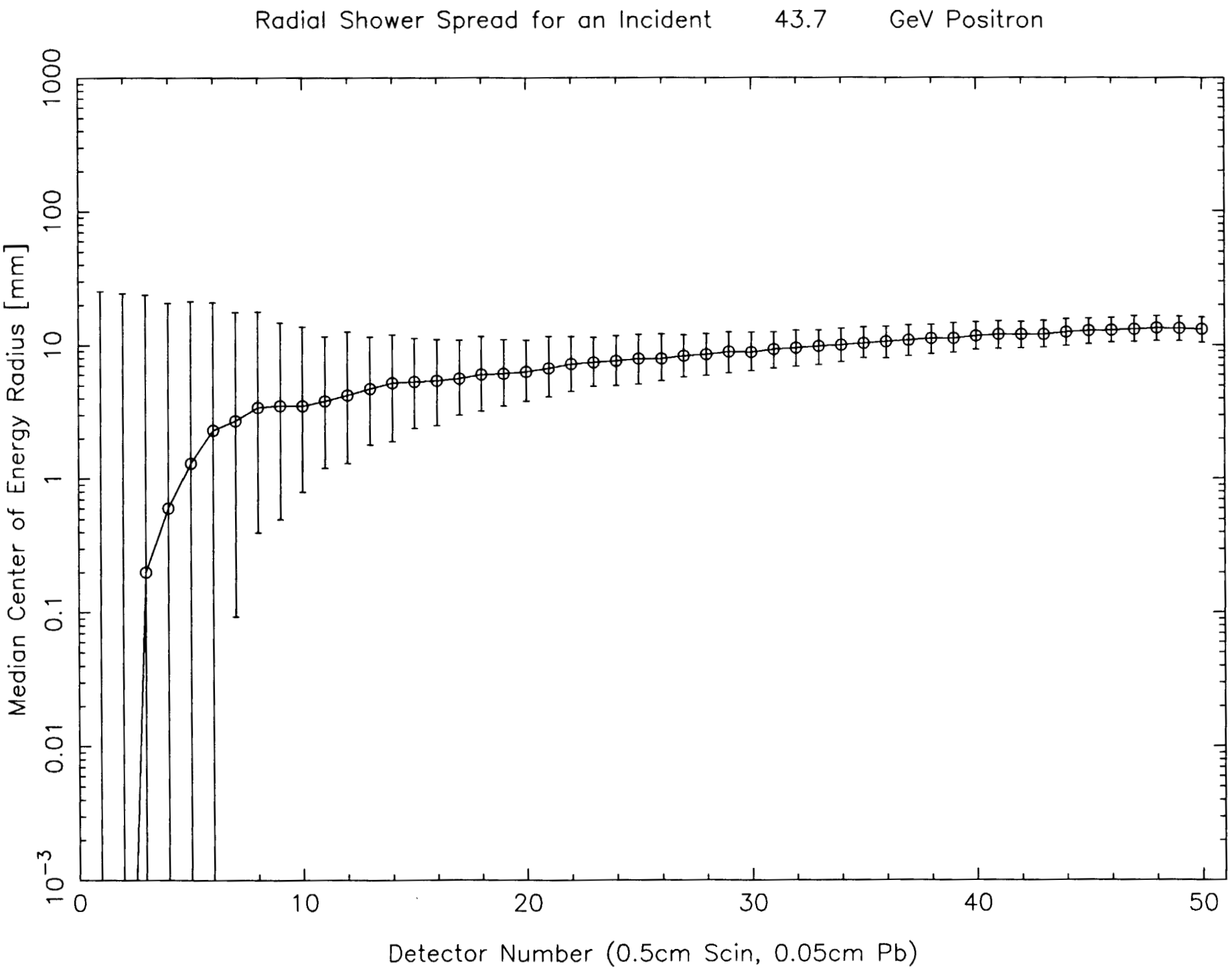

Radial Shower Spread for an Incident 200. GeV Proton
Median Center of Energy Radius [mm]
1000
100
10
1
0.1
0.01
10^{-3}
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)

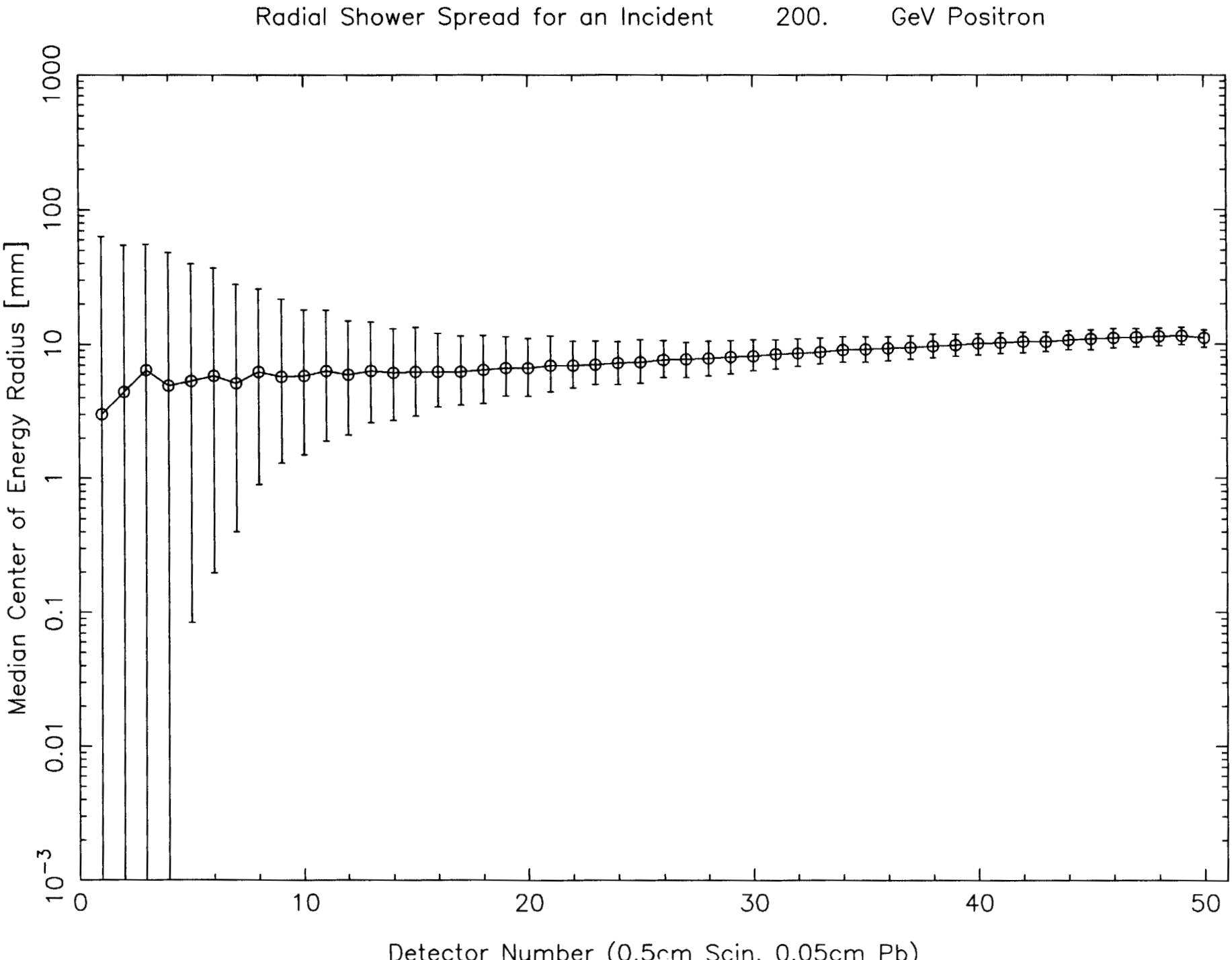

Radial Shower Spread for an Incident 0.100 GeV Positron
Median Center of Energy Radius [mm]
1000
100
10
1
0.1
0.01
10^{-3}
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)


Radial Shower Spread for an Incident 0.460 GeV Positron
Median Center of Energy Radius [mm]
1000
100
10
1
0.1
0.01
10^{-3}
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)


Radial Shower Spread for an Incident 2.09 GeV Positron
Median Center of Energy Radius [mm]
1000
100
10
1
0.1
0.01
10^{-3}
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)


Radial Shower Spread for an Incident 9.56 GeV Positron
Median Center of Energy Radius [mm]
1000
100
10
1
0.1
0.01
10^{-3}
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)


Radial Shower Spread for an Incident 43.7 GeV Positron
Median Center of Energy Radius [mm]
1000
100
10
1
0.1
0.01
10^{-3}
0
10
20
30
40
50
Detector Number (0.5cm Scin, 0.05cm Pb)


Radial Shower Spread for an Incident 200. GeV Positron
Median Center of Energy Radius [mm]
1000
100
10
1
0.1
0.01
10^{-3}
0
10
20
30
40
50
Detector Number (0.5cm Scin. 0.05cm Pb)

Listing of Cluster Analysis Program

The following listing presents the current source code that does the clustering analysis.

```
c-------------------------------------------------
      program cl92
      include 'cl92.inc'

      t0 = ctime()
      call init
      call doit
      call endit

      stop
      end
c-------------------------------------------------
      subroutine ddist(ie,klog,kdet,kmeth,kscal)
      include 'cl92.inc'

      krow(1) = ie ! -  -  -  -  - index of 'unidentified' event
c  -  -  -  -  -  -  -  -  -  -  - Log scaling of data
      if (klog.eq.1) then
        xlog = alog10(2.0)
      else if (klog.eq.2) then
        xlog = 1.0
      else
        xlog = alog10(50.0)
      end if
      do idet = 1,kdet
        if (klog.eq.0) then
          x(1,idet) = edet(idet,ie)
          y(1,idet) = rdet(idet,ie)
        else
          xe = edet(idet,ie)
          if (xe.eq.0.0) xe = 1.0e-10
          x(1,idet) = alog10(xe)/xlog
          ye = rdet(idet,ie)
          if (ye.eq.0.0) ye = 1.0e-10
          y(1,idet) = alog10(ye)/xlog
        end if
      end do ! idet

      do jx = 2,mx
        ifcat = ((jx-1)/mcev) + 1
        je = jint(floatj(nevten)*rnunf())+1+
     +                    (ifcat-1)*nevten
        krow(jx) = je ! index of a standard event
        do idet = 1,kdet
          if (klog.eq.0) then
            x(jx,idet) = edet(idet,je)
            y(jx,idet) = rdet(idet,je)
          else
          xe = edet(idet,je)
          if (xe.eq.0.0) xe = 1.0e-10
          x(jx,idet) = alog10(xe)/xlog
          ye = rdet(idet,je)
          if (ye.eq.0.0) ye = 1.0e-10
          y(jx,idet) = alog10(ye)/xlog
          end if
        end do ! idet
      end do ! jx

c  -  -  -  -  -  -  -  -  -  -  - Normalizing of data
      if (kscal.eq.1) then !----- Mean and Standard Deviation
        xndet = floatj(kdet)
        do jx = 1,mx
          sumx  = 0.0
          sumy  = 0.0
          sumx2 = 0.0
          sumy2 = 0.0
```

```
      do idet = 1,kdet
        xx=x(jx,idet)
        sumx = sumx+xx
        sumx2 = sumx2 + xx*xx
        yy=y(jx,idet)
        sumy = sumy+yy
        sumy2 = sumy2 + yy*yy
      end do ! idet
      xavg = sumx/xndet
      yavg = sumy/xndet
      xstd = sqrt( (sumx2/xndet) - xavg*xavg)
      if (xstd.eq.0.0) xstd = 0.5
      ystd = sqrt( (sumy2/xndet) - yavg*yavg)
      if (ystd.eq.0.0) ystd = 0.5
      do idet = 1,kdet
        x(jx,idet) = (x(jx,idet)-xavg)/xstd
        y(jx,idet) = (y(jx,idet)-yavg)/ystd
      end do ! idet
    end do !jx
  else if (kscal.eq.2) then !----- Range
    do jx = 1,mx
      xmin = x(1,1)
      xmax = x(1,1)
      ymin = y(1,1)
      ymax = y(1,1)
      do idet = 1,kdet
        xx=x(jx,idet)
        xmin = amin1(xmin,xx)
        xmax = amax1(xmax,xx)
        yy=y(jx,idet)
        ymin = amin1(ymin,yy)
        ymax = amax1(ymax,yy)
      end do ! idet
      xx = abs(xmax-xmin)
      if (xx.eq.0.0) xx = 0.5
      yy = abs(ymax-ymin)
      if (yy.eq.0.0) yy = 0.5
      do idet = 1,kdet
        x(jx,idet) = (x(jx,idet)-xmin)/xx
        y(jx,idet) = (y(jx,idet)-ymin)/yy
      end do ! idet
    end do ! jx
  end if

  d(1,1) = 1.0e37
  d(1,2) = 1.0e37
  do jx = 2,mx
    d(jx,1) = 0.0
    d(jx,2) = 0.0
    if (kmeth.eq.0) then !----- Euclidean Distance
      sx12 = 0.0
      sy12 = 0.0
      do idet = 1,kdet
        x1 = x(1,idet)
        x2 = x(jx,idet)
        y1 = y(1,idet)
        y2 = y(jx,idet)
        sx12 = sx12+(x1-x2)*(x1-x2)
        sy12 = sy12+(y1-y2)*(y1-y2)
      end do ! idet
      d(jx,1) = sqrt(sx12)
      d(jx,2) = sqrt(sy12)
    else if (kmeth.eq.1) then !----- Sum of absolute differences
      sx = 0.0
      sy = 0.0
      do idet = 1,kdet
```

```
        x1 = x(1,idet)
        x2 = x(jx,idet)
        sx = sx+abs(x1-x2)
        y1 = y(1,idet)
        y2 = y(jx,idet)
        sy = sy+abs(y1-y2)
      end do ! idet
      d(jx,1) = sx
      d(jx,2) = sy
    else if (kmeth.eq.2) then !----- Maximum difference
      xmax = 0.0
      ymax = 0.0
      do idet = 1,kdet
        x1 = x(1,idet)
        x2 = x(jx,idet)
        dx = abs(x1-x2)
        xmax = amax1(xmax,dx)
        y1 = y(1,idet)
        y2 = y(jx,idet)
        dy = abs(y1-y2)
        ymax = amax1(ymax,dy)
      end do ! idet
      d(jx,1) = xmax
      d(jx,2) = ymax
    else if (kmeth.eq.3) then !----- Coefficient of Shape
      sx12 = 0.0
      sx = 0.0
      sx1 = 0.0
      sx2 = 0.0
      sy12 = 0.0
      sy = 0.0
      xn = floatj(kdet)
      do idet = 1,kdet
        x1 = x(1,idet)
        x2 = x(jx,idet)
        sx = sx+(x1-x2)
        sx12 = sx12+(x1-x2)*(x1-x2)
        y1 = y(1,idet)
        y2 = y(jx,idet)
        sy = sy+(y1-y2)
        sy12 = sy12+(y1-y2)*(y1-y2)
      end do ! idet
      sx12 = sx12/xn
      sy12 = sy12/xn
      d(jx,1) = sqrt((xn/(xn-1.0))*
     +                (sx12-(1.0/(xn*xn))*(sx*sx)))
      d(jx,2) = sqrt((xn/(xn-1.0))*
     +                (sy12-(1.0/(xn*xn))*(sy*sy)))
    else if (kmeth.eq.4) then !----- Cosine of angle between vectors
      sx11 = 0.0
      sx22 = 0.0
      sx12 = 0.0
      sy11 = 0.0
      sy22 = 0.0
      sy12 = 0.0
      do idet = 1,kdet
        x1 = x(1,idet)
        x2 = x(jx,idet)
        sx11 = sx11+x1*x1
        sx22 = sx22+x2*x2
        sx12 = sx12+x1*x2
        y1 = y(1,idet)
        y2 = y(jx,idet)
        sy11 = sy11+y1*y1
        sy22 = sy22+y2*y2
        sy12 = sy12+y1*y2
```

```
      end do ! idet
      sx11 = sqrt(sx11)
      if (sx11.le.0.0) sx11 = 1.0e-5
      sx22 = sqrt(sx22)
      if (sx22.le.0.0) sx22 = 1.0e-5
      sy11 = sqrt(sy11)
      if (sy11.le.0.0) sy11 = 1.0e-5
      sy22 = sqrt(sy22)
      if (sy22.le.0.0) sy22 = 1.0e-5
      d(jx,1) = 1.0-(sx12/(sx11*sx22))
      d(jx,2) = 1.0-(sy12/(sy11*sy22))
    else if (kmeth.eq.5) then !----- Curtis - Bray Coefficient
      sxa = 0.0
      sx = 0.0
      sya = 0.0
      sy = 0.0
      do idet = 1,kdet
        x1 = x(1,idet)
        x2 = x(jx,idet)
        sx = sx + (x1-x2)
        sxa = sxa+abs(x1-x2)
        y1 = y(1,idet)
        y2 = y(jx,idet)
        sy = sy + (y1-y2)
        sya = sya+abs(y1-y2)
      end do ! idet
      if (sx.eq.0.0) sx = 1.0e-5
      d(jx,1) = sxa/sx
      if (sy.eq.0.0) sy = 1.0e-5
      d(jx,2) = sya/sy
    else if (kmeth.eq.6) then !----- Correlation Coefficient
      sx1 = 0.0
      sx2 = 0.0
      sx11 = 0.0
      sx22 = 0.0
      sx12 = 0.0
      sy1 = 0.0
      sy2 = 0.0
      sy11 = 0.0
      sy22 = 0.0
      sy12 = 0.0
      xn = floatj(kdet)
      do idet = 1,kdet
        x1 = x(1,idet)
        x2 = x(jx,idet)
        sx1 = sx1 + x1
        sx2 = sx2 + x2
        sx11 = sx11+x1*x1
        sx22 = sx22+x2*x2
        sx12 = sx12+x1*x2
        y1 = y(1,idet)
        y2 = y(jx,idet)
        sy1 = sy1 + y1
        sy2 = sy2 + y2
        sy11 = sy11+y1*y1
        sy22 = sy22+y2*y2
        sy12 = sy12+y1*y2
      end do ! idet
      sx11 = (sx11-(sx1*sx1/xn))
      if (sx11.le.0.0) sx11 = 1.0e-5
      sx11 = sqrt(sx11)
      sx22 = (sx22-(sx2*sx2/xn))
      if (sx22.le.0.0) sx22 = 1.0e-5
      sx22 = sqrt(sx22)
      dx = (sx12-(sx1*sx2/xn))
      d(jx,1) = 1.0 - (dx/(sx11*sx22))
```

```
      sy11 = (sy11-(sy1*sy1/xn))
      if (sy11.le.0.0) sy11 = 1.0e-5
      sy11 = sqrt(sy11)
      sy22 = (sy22-(sy2*sy2/xn))
      if (sy22.le.0.0) sy22 = 1.0e-5
      sy22 = sqrt(sy22)
      dy = (sy12-(sy1*sy2/xn))
      d(jx,2) = 1.0-(dy/(sy11*sy22))
    else if (kmeth.eq.7) then !----- Abs. value of Correlation Coef.
      sx1 = 0.0
      sx2 = 0.0
      sx11 = 0.0
      sx22 = 0.0
      sx12 = 0.0
      sy1 = 0.0
      sy2 = 0.0
      sy11 = 0.0
      sy22 = 0.0
      sy12 = 0.0
      xn = floatj(kdet)
      do idet = 1,kdet
        x1 = x(1,idet)
        x2 = x(jx,idet)
        sx1 = sx1 + x1
        sx2 = sx2 + x2
        sx11 = sx11+x1*x1
        sx22 = sx22+x2*x2
        sx12 = sx12+x1*x2
        y1 = y(1,idet)
        y2 = y(jx,idet)
        sy1 = sy1 + y1
        sy2 = sy2 + y2
        sy11 = sy11+y1*y1
        sy22 = sy22+y2*y2
        sy12 = sy12+y1*y2
      end do ! idet
      sx11 = (sx11-(sx1*sx1/xn))
      if (sx11.le.0.0) sx11 = 1.0e-5
      sx11 = sqrt(sx11)
      sx22 = (sx22-(sx2*sx2/xn))
      if (sx22.le.0.0) sx22 = 1.0e-5
      sx22 = sqrt(sx22)
      dx = (sx12-(sx1*sx2/xn))
      d(jx,1) = 1.0-abs(dx/(sx11*sx22))
      sy11 = (sy11-(sy1*sy1/xn))
      if (sy11.le.0.0) sy11 = 1.0e-5
      sy11 = sqrt(sy11)
      sy22 = (sy22-(sy2*sy2/xn))
      if (sy22.le.0.0) sy22 = 1.0e-5
      sy22 = sqrt(sy22)
      dy = (sy12-(sy1*sy2/xn))
      if (dy.eq.0.0) dy = 1.0E-10
      d(jx,2) = 1.0-abs(dy/(sy11*sy22))
    else if (kmeth.eq.8) then !----- Tally of identical values
      sx = 0.0
      sy = 0.0
      do idet = 1,kdet
        x1 = x(1,idet)
        x2 = x(jx,idet)
        if (x1.eq.x2) sx = sx+1.0
        y1 = y(1,idet)
        y2 = y(jx,idet)
        if (y1.eq.y2) sy = sy+1.0
      end do ! idet
      if (sx.eq.0.0) sx = 1.0e-10
      d(jx,1) = 1.0/sx
```

```
      if (sy.eq.0.0) sy = 1.0e-10
      d(jx,2) = 1.0/sy
    else if (kmeth.eq.9) then !----- ChiSquared Test
      sx12 = 0.0
      sy12 = 0.0
      do idet = 1,kdet
        x1 = x(1,idet)
        x2 = x(jx,idet)
        sx = x1 + x2
        if (sx.eq.0.0) sx = 1.0e-5
        y1 = y(1,idet)
        y2 = y(jx,idet)
        sy = y1 + y2
        if (sy.eq.0.0) sy = 1.0e-5
        sx12 = sx12+(((x1-x2)*(x1-x2))/sx)
        sy12 = sy12+(((y1-y2)*(y1-y2))/sy)
      end do ! idet
      d(jx,1) = sqrt(sx12)
      d(jx,2) = sqrt(sy12)
    else if (kmeth.eq.10) then !----- Tally of identical values
      sx = 0.0
      sy = 0.0
      do idet = 1,kdet
        x1 = x(1,idet)
        x1sd = sqrt(abs(x1))
        if (x1sd.eq.0.0) x1sd = 1.0
        x2 = x(jx,idet)
        if ((x2.ge.(x1-x1sd)).and.(x2.le.(x1+x1sd))) sx = sx+1.0
        y1 = y(1,idet)
        y1sd = sqrt(abs(y1))
        if (y1sd.eq.0.0) y1sd = 1.0
        y2 = y(jx,idet)
        if ((y2.ge.(y1-y1sd)).and.(y2.le.(y1+y1sd))) sy = sy+1.0
      end do ! idet
      if (sx.eq.0.0) sx = 1.0e-10
      d(jx,1) = 1.0/sx
      if (sy.eq.0.0) sy = 1.0e-10
      d(jx,2) = 1.0/sy
    else if (kmeth.eq.11) then ! ----- Canberra Metric Coef.
      sx = 0.0
      sy = 0.0
      xn = kdet
      do idet = 1,kdet
        x1 = x(1,idet)
        x2 = x(jx,idet)
        sx = sx + abs(x1-x2)/(x1+x2)
        y1 = y(1,idet)
        y2 = y(jx,idet)
        sy = sy + abs(y1-y2)/(y1+y2)
      end do ! idet
      d(jx,1) = (1/xn)*sx
      d(jx,2) = (1/xn)*sy
    end if
    if (jx.eq.2) then
       d1min = d(jx,1)
       d1max = d(jx,1)
       d1sum = d(jx,1)
       d1sum2 = d(jx,1)*d(jx,1)
       d2min = d(jx,2)
       d2max = d(jx,2)
       d2sum = d(jx,2)
       d2sum2 = d(jx,2)*d(jx,2)
    else
       d1min = amin1(d1min,d(jx,1))
       d1max = amax1(d1max,d(jx,1))
       d1sum = d1sum+d(jx,1)
```

```
            d1sum2 = d1sum2+d(jx,1)*d(jx,1)
            d2min = amin1(d2min,d(jx,2))
            d2max = amax1(d2max,d(jx,2))
            d2sum = d2sum+d(jx,2)
            d2sum2 = d2sum2+d(jx,2)*d(jx,2)
          end if
        end do ! jx
        d1avg = d1sum/floatj(mx-1)
        d1std = ((d1sum2/floatj(mx-1)) - d1avg*d1avg)
        if (d1std.le.0.0) d1std = 0.0
        d1std = sqrt(d1std)
        if (d1std.eq.0.0) d1std = 1.0e-5
        d2avg = d2sum/floatj(mx-1)
        d2std = ((d2sum2/floatj(mx-1)) - d2avg*d2avg)
        if (d2std.le.0.0) d2std = 0.0
        d2std = sqrt(d2std)
        if (d2std.le.0.0) d2std = 1.0e-5
        diff1 = d1max-d1min
        if (diff1.le.0.0) diff1 = 1.0
        diff2 = d2max-d2min
        if (diff2.le.0.0) diff2 = 1.0
        do jx = 2,mx
           d1 = (d(jx,1)-d1min)/diff1
           d2 = (d(jx,2)-d2min)/diff2
           d(jx,3) = d1+d2
           d1 = (d(jx,1)-d1avg)/d1std
           d2 = (d(jx,2)-d2avg)/d2std
           d(jx,4) = d1+d2
        end do ! jx

        return
        end
c-------------------------------------------------
        subroutine doit
        include 'c192.inc'

        do kopt = mx1opt,mx2opt
          klog  = jlog(kopt)
          kmeth = jmeth(kopt)
          kscal = jscal(kopt)
          call prcnt('DOIT  ',kopt-mx1opt+1,mx2opt-mx1opt+1)
          do kdet = 5,mdet,5
            kdet5 = kdet/5
            do ie = 1,nevten
              lrow(ie) = .false.
            end do ! ie
            do ix = 1,mx
              incat = ((ix-1)/mcev) + 1
10            continue
              ie = jint(floatj(nevten)*rnunf())+1+(incat-1)*nevten
              if (lrow(ie)) go to 10
              call ddist(ie,klog,kdet,kmeth,kscal)
              do knv = 1,mvote
                 call lowest(inv(knv))
                 call majvot(inv(knv))
                 kpro = 0
                 kpos = 0
                 catpro = 0.0
                 catpos = 0.0
                 do ier = 1,mer
                   if (ncat(ier).le.mener) then
                     kpro = kpro + 1
                     catpro = catpro + floatj(ncat(ier))
                   else
                     kpos = kpos + 1
                     catpos = catpos + floatj(ncat(ier))
```

```
                  end if
                end do ! ier
                if (kpro.gt.kpos) then
                   nc = jnint( catpro/floatj(kpro) )
                   vot(nc,incat,kdet5,kopt,knv)=
     +                  vot(nc,incat,kdet5,kopt,knv)+1.0
                else if (kpro.lt.kpos) then
                   nc = jnint( catpos/floatj(kpos) )
                   vot(nc,incat,kdet5,kopt,knv)=
     +                  vot(nc,incat,kdet5,kopt,knv)+1.0
                else
                   nc = jnint( catpro/floatj(kpro) )
                   vot(nc,incat,kdet5,kopt,knv)=
     +                  vot(nc,incat,kdet5,kopt,knv)+0.5
                   nc = jnint( catpos/floatj(kpos) )
                   vot(nc,incat,kdet5,kopt,knv)=
     +                  vot(nc,incat,kdet5,kopt,knv)+0.5
                end if
              end do ! knv
            end do !ix
          end do !kdet
        end do !kopt

        return
        end
c-------------------------------------------------
        subroutine endit
        include 'cl92.inc'

        do kopt = mx1opt,mx2opt
          do kicat = 1,mcat
            do kdet5 = 1,mdet5
              do kvote = 1,mvote
                sumprv = 0.0
                sumpov = 0.0
                do kvcat = 1,mcat
                  if (kvcat.le.mener) then
                    sumprv=sumprv+vot(kvcat,kicat,kdet5,kopt,kvote)
                  else
                    sumpov=sumpov+vot(kvcat,kicat,kdet5,kopt,kvote)
                  end if
                end do ! kvcat
                sumtot = sumprv+sumpov
                if (sumtot.le.0.0) sumtot = 1.0
                if (kicat.le.mener) then
                  vot(mcat+1,kicat,kdet5,kopt,kvote)=
     +                  sumprv*100.0/sumtot
                else
                  vot(mcat+1,kicat,kdet5,kopt,kvote)=
     +                  sumpov*100.0/sumtot
                end if
                do kvcat = 1,mcat
                  xv = vot(kvcat,kicat,kdet5,kopt,kvote)
                  vot(kvcat,kicat,kdet5,kopt,kvote)=xv*100.0/sumtot
                end do ! kener
              end do ! kvote
            end do ! kdet5
          end do ! kcat
        end do ! kopt

c       do kopt = mx1opt,mx2opt
c         call prcnt('ENDIT ',kopt-mx1opt+1,mx2opt-mx1opt+1)
c         write(20,10)
c10       format(1h1,
c     +      'InCat M/S/L  Dets  Voters  #PikPro  #PikPos  %ProID',
c     +      '   %PosID  %CPar&En')
```

```
c20       format(1h ,1x,i2,1x,3(1x,i1),2x,i2,4x,i3,4x,f7.0,2x,f7.0,1x,
c     +           f8.2,1x,f8.2,1x,f8.2)
c         do kcat = 1,mcat
c           do kdet = 5,mdet,5
c             kdet5 = kdet/5
c             do ivote = 1,mvote
c               sumprv = 0.0
c               sumpov = 0.0
c               do iener = 1,mener
c                 sumprv = sumprv + vot(iener,kcat,kdet5,kopt,ivote)
c                 sumpov = sumpov + vot(iener+6,kcat,kdet5,kopt,ivote)
c               end do ! iener
c               pcntpr = sumprv
c               pcntpo = sumpov
c               pcntpe = vot(kcat,kcat,kdet5,kopt,ivote)
c               write(20,20) kcat,jmeth(kopt),jscal(kopt),jlog(kopt),
c     +                      kdet,inv(ivote),sumprv,sumpov,pcntpr,pcntpo,
c     +                      pcntpe
c               write(21,20) kcat,jmeth(kopt),jscal(kopt),jlog(kopt),
c     +                      kdet,inv(ivote),sumprv,sumpov,pcntpr,
c     +                      pcntpo,pcntpe
c             end do ! ivote
c           end do ! kdet
c         end do ! kcat
c       end do ! kopt

        do kopt = mx1opt,mx2opt
          call prcnt('ENDIT ',kopt-mx1opt+1,mx2opt-mx1opt+1)
          do kvote = 1,mvote
            call rdsidp
            do ivcat = 1,mcat+1
              do iicat = 1,mcat
                do idet5 = 1,mdet5
                  xv = vot(ivcat,iicat,idet5,kopt,kvote)
                  call xysidp(xv,idet5,iicat,ivcat)
                end do ! idet5
              end do ! iicat
            end do ! ivcat
            call prsidp(kopt,kvote)
          end do ! kvote
        end do ! kopt

        t1 = ctime()
        write(20,30) (t1-t0)
30      format(1h ,'Total CPU Time (seconds) = ',G12.4)
        close(unit=20)
c       close(unit=21)

        return
        end
c-------------------------------------------------
        SUBROUTINE ILIMIT(i,ilo,ihi)
        if (i.lt.ilo) then
          i = ilo
        else if (i.gt.ihi) then
          i = ihi
        end if
        return
        end
c-------------------------------------------------
        subroutine ffeed(iunit)
        write(iunit,10)
10      format(1H1)
        return
        end
c-------------------------------------------------
```

```
      SUBROUTINE GETFIL
      INCLUDE 'cl92.inc'

      FN='CL92RPT.IN'
      OPEN(UNIT=92,FILE=FN,ACCESS='SEQUENTIAL',STATUS='OLD',
     &     READONLY)
10    CONTINUE
         READ(92,20,END=99,ERR=99) S80
20       FORMAT(A80)
         WRITE(20,30) S80
30       FORMAT(1H ,A80)
      GO TO 10
99    CONTINUE
      CALL FFEED(20)
      CLOSE(UNIT=92)

      FN='CL92.FOR'
      OPEN(UNIT=92,FILE=FN,ACCESS='SEQUENTIAL',STATUS='OLD',
     &     READONLY)
      WRITE(20,100)
100   FORMAT(1H ,'<CL92.FOR> FILE ----------------------')
110   CONTINUE
         READ(92,20,END=199,ERR=199) S80
         WRITE(20,30) S80
      GO TO 110
199   CONTINUE
      CALL FFEED(20)
      CLOSE(UNIT=92)

      FN='CL92.INC'
      OPEN(UNIT=92,FILE=FN,ACCESS='SEQUENTIAL',STATUS='OLD',
     &     READONLY)
      WRITE(20,200)
200   FORMAT(1H ,'<CL92.INC> FILE ----------------------')
210   CONTINUE
         READ(92,20,END=299,ERR=299) S80
         WRITE(20,30) S80
      GO TO 210
299   CONTINUE
      CALL FFEED(20)
      CLOSE(UNIT=92)

      return
      end
c---------------------------------------------
      subroutine getdat
      include 'cl92.inc'

      ISKIP = 54-MDET
      FN='USER$DISK25:[NASA_SNYDER.SUBRAMANIAN.APPL]FOR51.DAT'
      OPEN(UNIT=92,FILE=FN,ACCESS='SEQUENTIAL',STATUS='OLD',
     &     RECL=915,READONLY)
      DO I = 1,NROW
         READ(92,*) Z,Z,(EDET(J,I),J=1,MDET),(Z,J=1,ISKIP)
         READ(92,*) (RDET(J,I),J=1,MDET)
      END DO
      CLOSE(UNIT=92)

      FN='USER$DISK25:[NASA_SNYDER.SUBRAMANIAN.APPL]FOR52.DAT'
      OPEN(UNIT=92,FILE=FN,ACCESS='SEQUENTIAL',STATUS='OLD',
     &     RECL=915,READONLY)
      DO I = 1,NROW
         READ(92,*) Z,Z,(EDET(J,I+NROW),J=1,MDET),(Z,J=1,ISKIP)
         READ(92,*) (RDET(J,I+NROW),J=1,MDET)
      END DO
      CLOSE(UNIT=92)
```

```
      return
      end

C-----------------------------------------------------
      subroutine prcnt(s6,icnt,imax)
      character s6*6
      integer icnt,imax
      x = floatj(icnt)*100.0/floatj(imax)
      open(unit=99,status='NEW')
      write(99,10) s6,x
10    format(' CL92 Subroutine ',A6,': ',F8.2,'% Complete')
      close(unit=99)
      return
      end
c-----------------------------------------------------
      subroutine init
      include 'cl92.inc'

      t0 = ctime()
      call umach(-2,20)
      open(unit=20,file='CL92RPT.OUT',status='NEW')
c      open(unit=21,file='CL92DAT.OUT',status='NEW')
      iseed = 0
      call rnset(iseed)
      call getfil
      call initvo
      call getdat

      return
      end
c-----------------------------------------------------
      subroutine initvo
      include 'cl92.inc'

      do i1 = 1,mcat
        do i2 = 1,mcat
          do i3 = 1,mdet5
            do i4 = 1,mopt
              do i5 = 1,mvote
                vot(i1,i2,i3,i4,i5) = 0.0
              end do ! i5
            end do !i4
          end do !i3
        end do !i2
      end do !i1

      return
      end
c-----------------------------------------------------
      subroutine lowest(nxlow)
      include 'cl92.inc'

      do ier = 1,mer
        do i = 1,mx
          dd(i,ier) = d(i,ier)
        end do ! i
        do ixlow = 1,nxlow
          xmin = amach(2)
          do ix = 1,mx
            if (dd(ix,ier).LT.xmin) then
              dlow(ixlow,ier) = dd(ix,ier)
              xmin = dd(ix,ier)
              idlow(ixlow,ier) = ix
            end if
          end do !ix
```

```
            dd(idlow(ixlow,ier),ier) = amach(2)
          end do !ixlow
        end do ! ier

        return
        end
 c------------------------------------------
        subroutine majvot(nv)
        include 'cl92.inc'

        do ier = 1,mer
          do i = 1,mcat
            icnt(i) = 0
          end do ! i
          ipro = 0
          do jv = 1,nv
            iiv = idlow(jv,ier)
            do icat = 1,mcat
              jrlo = (icat-1)*mcev+1
              jrhi = icat*mcev
              if ((iiv.ge.jrlo).and.(iiv.le.jrhi)) then
                icnt(icat) = icnt(icat) + 1
                if (icat.le.6) then
                  ipro = ipro + 1
                else
                  ipro = ipro - 1
                end if
                go to 10
              end if
            end do !icat
 10         continue
          end do !iv
          mxcnt = 0
          if (ipro.eq.0) then
            mincat = 1
            maxcat = 12
          else if (ipro.gt.0) then
            mincat = 1
            maxcat = 6
          else if (ipro.lt.0) then
            mincat = 7
            maxcat = 12
          end if
          sumcat = 0.0
          sumcnt = 0.0
          do icat = mincat,maxcat
            sumcat = sumcat+floatj(icat*icnt(icat))
            sumcnt = sumcnt+floatj(icnt(icat))
            if (icnt(icat).gt.mxcnt) then
              mxcnt = icnt(icat)
              ncat(ier) = icat
              wcat(ier) = floatj(mxcnt)
            end if
          end do ! icat
          icat = jnint(sumcat/sumcnt)
        end do ! ier

        return
        end
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
        SUBROUTINE PRSIDP(iopt,ivote)
        INCLUDE 'CL92.INC'

        IPAGE = IPAGE + 1
        ENCODE(8,5,CNUM) IPAGE
 5      FORMAT('#',I6,'/')
```

```
      CALL FFEED(20)
      WRITE(20,20) CNUM,smeth(jmeth(iopt)+1),sscal(jscal(iopt)+1),
     + slog(jlog(iopt)+1),ssam(ivote)
20    FORMAT(1H ,'DATA SUMMARY PLOT: ',A8/1h ,4A12)
      DO I = 1,MSIDP
         WRITE(20,10) SIDP(I)
10       FORMAT(1H ,A78)
      END DO

      RETURN
      END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
      SUBROUTINE RDSIDP
      INCLUDE 'CL92.INC'

      FN='CL92IDP.IN'
      OPEN(UNIT=92,FILE=FN,ACCESS='SEQUENTIAL',STATUS='OLD',
     &     READONLY)
      DO I = 1,MSIDP
         READ(92,800) SIDP(I)
800      FORMAT(A78)
      END DO
      CLOSE(UNIT=92)

      RETURN
      END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
      SUBROUTINE XYSIDP(PERCNT,IPLOT,IX,IY)
      INCLUDE 'CL92.INC'

      CALL ILIMIT(IPLOT,1,10)
      CALL ILIMIT(IX,1,12)
      CALL ILIMIT(IY,1,13)
      IF ((IPLOT.GE.1).AND.(IPLOT.LE.5)) THEN
         IXOFF = (IPLOT-1)*15 + 2
         IYOFF = 18
      ELSE IF ((IPLOT.GE.6).AND.(IPLOT.LE.10)) THEN
         IXOFF = (IPLOT-6)*15 + 2
         IYOFF = 39
      ELSE
         RETURN
      END IF
      ICX = IXOFF + IX
      ICY = IYOFF - IY
      IF (PERCNT.LT.90.0) THEN
         SYM = CHAR( 48 + JINT(PERCNT/10.0) )
      ELSE
         SYM = CHAR( 65 + JINT( (PERCNT-90.0) ) )
      END IF
      SIDP(ICY)(ICX:ICX) = SYM

      RETURN
      END
```

```
c  Reference texts:
c     Cluster Analysis For Researchers (CAFR), H. Charles Romesburg
      parameter (nevten=1000,mdet=50,mener=6,nrow=mener*nevten,
     +           mpe=2,mer=4,nrow2=nevten*mener*mpe,mclus=24,mopt=60,
     +           mcat=mener*mpe,mcev=200,mx=mcev*mcat,mdet5=mdet/5,
     +           mvote=5,mlog=4,mlow=200,mindex=5,mnplot=20,mipoff=3,
     +           msidp = 43)
      character fn*80,s80*80,title*80,xlabel*80,ylabel*80,
     +          scat(mcat)*6,sdet(mdet5)*8,ssam(5)*9,sid(3)*7,
     +          smeth(12)*5,sscal(3)*6,slog(4)*4,sidp(msidp)*78,
     +          sym*1
      integer iseed,idlow(mlow,mer),icnt(mcat),numrun,kopt,inv(5),
     +        jmeth(mopt),jscal(mopt),jlog(mopt),iedet(mx),
     +        ip(mipoff+mindex,mnplot),imx(mindex),mx1opt,mx2opt,
     +        krow(mx),ncat(mer),wcat(mer)
      logical lrow(nrow2),lfast
      real edet(mdet,nrow2),rdet(mdet,nrow2),
     +        x(mx,mdet),y(mx,mdet),d(mx,mer),dlow(mlow,mer),
     +        xp(mnplot),yp(mnplot),
     +        vot(mcat+1,mcat,mdet5,mopt,mvote),t0,t1,dd(mx,mer)
c                  ^     ^     ^      ^      ^
c                  |     |     |      |      |
c                  |     |     |      |      --- voter population
c                  |     |     |      --- run option catagory
c                  |     |     --- (number of active detectors)/5
c                  |     --- incident particle catagory (1-12)
c                  --- catagory decided by vote (1-12)
      common /clcom/ fn,s80,title,xlabel,ylabel,
     +               scat,sdet,ssam,sid,
     +               smeth,sscal,slog,sidp,sym,
     +               iseed,idlow,icnt,numrun,kopt,inv,
     +               jmeth,jscal,jlog,iedet,
     +               ip,imx,mx1opt,mx2opt,krow,
     +               lrow,ncat,wcat,
     +               edet,rdet,x,d,dlow,
     +               xp,yp,
     +               vot,t0,t1
      data mx1opt,mx2opt/1,12/
      data lfast/.true./
      data imx /
     +          12, 12, 5, 60, 5
     +        /
      data ip /
     +          3, 2, 2, 1, 1, 1, 1, 1,
     +          3, 2, 2, 2, 1, 1, 1, 2,
     +          3, 2, 2, 3, 1, 1, 1, 3,
     +          3, 2, 2, 1, 1, 1, 1, 4,
     +          3, 2, 2, 2, 1, 1, 1, 5,
     +          3, 2, 2, 3, 1, 2, 1, 1,
     +          3, 2, 2, 1, 1, 2, 1, 2,
     +          3, 2, 2, 2, 1, 2, 1, 3,
     +          3, 2, 2, 3, 1, 2, 1, 4,
     +          3, 2, 2, 1, 1, 2, 1, 5,
     +          3, 2, 2, 2, 1, 3, 1, 1,
     +          3, 2, 2, 3, 1, 3, 1, 2,
     +          3, 2, 2, 1, 1, 3, 1, 3,
     +          3, 2, 2, 2, 1, 3, 1, 4,
     +          3, 2, 2, 3, 1, 3, 1, 5,
     +          3, 2, 2, 1, 1, 4, 1, 1,
     +          3, 2, 2, 2, 1, 4, 1, 2,
     +          3, 2, 2, 3, 1, 4, 1, 3,
     +          3, 2, 2, 1, 1, 4, 1, 4,
     +          3, 2, 2, 2, 1, 4, 1, 5
c                 ^  ^  ^  ^  ^  ^  ^  ^
c                 |  |  |  |  |  |  |  |
c                 |  |  |  |  |  |  |  --- voter population catagory (1-5)
```

```
c                |  |  |  |  |  |  ------ Analysis options (1-60)
c                |  |  |  |  |  ---------- (# of active detectors)/5
c                |  |  |  |  ------------- Incident particle catagory (1-12)
c                |  |  |  ---------------- % of particles
c                |  |  |                     1 - % protons
c                |  |  |                     2 - % positrons
c                |  |  |                     3 - % correct particle and energy
c                |  |  ------------------- Graph axes setup options
c                |  ---------------------- Curve variable index # (1-5)
c                ------------------------- X-Axes variable index # (1-5)
      +         /
       data m1opt,m2opt/1,mopt/
       data jmeth/
      +            0,1,2,3, 4,5,6,7, 8,9,10,11,
      +            0,1,2,5, 6,8,0,1, 2,5,6,8,
      +            2,2,2,2, 2,2,2,2, 2,2,2,2,
      +            3,3,3,3, 4,4,4,4, 5,5,5,5,
      +            6,6,6,6, 7,7,7,7, 8,8,8,8
      +           /
       data smeth/
      +           'Eucl/','SumD/','MaxD/','ShaC/','Cosi/',
      +           'BCCo/','Corr/','ACor/','XMat/','ChiS/',
      +           'EMat/','CanC/'
      +           /
c     jmeth options
c       0 - Euclidean distance (CAFR, p96)
c       1 - Sum of absolute differences
c       2 - Maximum difference
c       3 - Coefficient of shape (CAFR, p99)
c       4 - Cosine of angle between vectors (CAFR, p100)
c       5 - Bray-Curtis coefficient (CAFR, p102)
c       6 - Correlation coefficient (CAFR, p101)
c       7 - Absolute value of correlation coefficient
c       8 - Number of exact matches
c       9 - ChiSquare
c      10 - Number of matches within error bounds
c      11 - Canberra Metric Coefficient (CAFR p101)
       data jscal/
      +            0,0,0,0, 0,0,0,0, 0,0,0,0,
      +            1,1,1,1, 1,1,1,1, 1,1,1,1,
      +            2,2,2,2, 2,2,2,2, 2,2,2,2,
      +            0,0,0,0, 0,0,0,0, 0,0,0,0,
      +            0,0,0,0, 0,0,0,0, 0,0,0,0
      +           /
       data sscal/
      +           'NoSca/','AvSca/','PrSca/'
      +           /
c     jscal options
c       0 - No scaling
c       1 - Mean and standard deviation scaling (CAFR, p78)
c       2 - Proportional scaling (CAFR, p83)
       data jlog/
      +           0,0,0,0, 0,0,0,0, 0,0,0,0,
      +           1,1,1,1, 1,1,1,1, 1,1,1,1,
      +           2,2,2,2, 2,2,2,2, 2,2,2,2,
      +           0,1,2,3, 0,1,2,3, 0,1,2,3,
      +           0,1,2,3, 0,1,2,3, 0,1,2,3
      +          /
       data slog /
      +            'NoL/','L02/','L10/','L50/'
      +           /
c     jlog options
c       0 - Use raw data
c       1 - Use LOG2 of raw data
c       2 - Use LOG10 of raw data
c       3 - Use LOG50 of raw data
```

```
 data scat /
+            'Cat01/','Cat02/','Cat03/',
+            'Cat04/','Cat05/','Cat06/',
+            'Cat07/','Cat08/','Cat09/',
+            'Cat10/','Cat11/','Cat12/'
+           /
 data sdet /
+            '05 Dets/','10 Dets/','15 Dets/','20 Dets/',
+            '25 Dets/','30 Dets/','35 Dets/','40 Dets/',
+            '45 Dets/','50 Dets/'
+            /
 data inv/3,5,10,15,20/
 data ssam /
+            '003 Vote/','005 Vote/','010 Vote/',
+            '015 Vote/','020 Vote/'
+           /
 data sid /
+            'ProVo/', 'PosVo/','CPEVo/'
+         /
```

Listing Of Likelihood Analysis Program

The following listing presents the current source code for the likelihood analysis.

```
      PROGRAM LH92
      INCLUDE 'LH92.INC'

      CALL INIT
      CALL DOIT
      CALL ENDIT

      STOP
      END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
      SUBROUTINE DOIT
      INCLUDE 'LH92.INC'

      IPAGE = 0
      XLE10 = ALOG(10.0)
      DO KOPT = K1OPT,K2OPT
        call zersum
        LFIT = KFIT(KOPT)
        LSCALE = KSCA(KOPT)
        DO KFCAT = 1,MCAT ! Fit catagory (1-12)
          ii = KFCAT+(KOPT-K1OPT)*MCAT
          im = MCAT*(K2OPT-K1OPT+1)
          call prcnt('DOIT  ',ii,im)
          DO KDET = 5,MDET,5 ! Number of active detectors
            LDET = KDET
            KDET5 = KDET/5
            DO KICAT = 1,MCAT ! Incident particle catagory
              DO JROW = 1,NEVTEN ! Incident particle event #
                JKROW = JROW + (KICAT-1)*NEVTEN
                DO ier = 1,MER
                  rinc = 1.0
                  if (ier.eq.3) rinc = 2.0
                  DO JDET = 1,KDET
                    if (ier.le.2) then
                      PP=FPROB(KFCAT,JDET,JKROW,ier)
                      PPL(JDET,ier) = PP/XLE10
                      PE=FPROB(KFCAT,JDET,JKROW,ier)
                      PEL(JDET,ier) = PE/XLE10
                    else if (ier.eq.3) then
                      ppl(jdet,ier) = ppl(jdet,1)+ppl(jdet,2)
                      pel(jdet,ier) = pel(jdet,1)+pel(jdet,2)
                    end if
                  END DO !JDET
                  DO JDECID = 1,MDECID ! Identification methods
                    IF (JDECID.EQ.1) THEN
                      LLHPR = 0.0
                      LLHPO = 0.0
                      DO JDET = 1,KDET
                        LLHPR=LLHPR+PPL(JDET,ier)
                        LLHPO=LLHPO+PEL(JDET,ier)
                      END DO ! JDET
                      XPL = LLHPR - LLHPO
                      IF ((XPL.GT.0.0).AND.(JPE.EQ.1)) THEN
                        R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)=
     +                   R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)
     +                   +rinc
                      ELSE IF ((XPL.GT.0.0).AND.(JPE.EQ.2)) THEN
                        R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)=
     +                   R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)
     +                   +rinc
                      ELSE IF ((XPL.LT.0.0).AND.(JPE.EQ.1)) THEN
                        R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)=
     +                   R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)
     +                      +rinc
                      ELSE IF ((XPL.LT.0.0).AND.(JPE.EQ.2)) THEN
```

```
                    R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)=
     +               R(KFCAT,KICAT,KDET5,LFIT,LSCALE,
     +                JDECID)+rinc
                  END IF
                ELSE IF (JDECID.EQ.2) THEN ! Detector MajVote
                  CALL MVOTE(KDET,PPL(1,ier),PEL(1,ier),IPART)
                  IF ((IPART.EQ.1).AND.(JPE.EQ.1)) THEN
                    R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)=
     +               R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)
     +               +rinc
                  ELSE IF ((IPART.EQ.1).AND.(JPE.EQ.2)) THEN
                    R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)=
     +               R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)
     +                +rinc
                  ELSE IF ((IPART.EQ.2).AND.(JPE.EQ.1)) THEN
                    R(KFCAT,KICAT,KDET5,LFIT,LSCALE,
     +               JDECID)=
     +               R(KFCAT,KICAT,KDET5,LFIT,LSCALE,
     +               JDECID)+rinc
                  ELSE IF ((IPART.EQ.2).AND.(JPE.EQ.2)) THEN
                    R(KFCAT,KICAT,KDET5,LFIT,LSCALE,
     +               JDECID)=
     +               R(KFCAT,KICAT,KDET5,LFIT,LSCALE,
     +               JDECID)+rinc
                  END IF
                ELSE IF (JDECID.EQ.3) THEN
                  XHI = ALOG10(1.0+FRAC)
                  XLO = ALOG10(1.0-FRAC)
                  LLHPR = 0.0
                  LLHPO = 0.0
                  DO JDET = 1,KDET
                    XD = PPL(JDET,ier)-PEL(JDET,ier)
                    IF (((XD.GT.XHI).OR.(XD.LT.XLO)).AND.
     +                   ((PPL(JDET,ier).GT.PMIN).OR.
     +                    (PEL(JDET,ier).GT.PMIN))) THEN
                      LLHPR=LLHPR+PPL(JDET,ier)
                      LLHPO=LLHPO+PEL(JDET,ier)
                    END IF
                  END DO ! JDET
                  XPL = LLHPR - LLHPO
                  IF ((XPL.GT.0.0).AND.(JPE.EQ.1)) THEN
                    R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)=
     +               R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)
     +               +rinc
                  ELSE IF ((XPL.GT.0.0).AND.(JPE.EQ.2)) THEN
                    R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)=
     +               R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)
     +               +rinc
                  ELSE IF ((XPL.LT.0.0).AND.(JPE.EQ.1)) THEN
                    R(KFCAT,KICAT,KDET5,LFIT,LSCALE,
     +               JDECID)=
     +               R(KFCAT,KICAT,KDET5,LFIT,LSCALE,
     +                JDECID)+rinc
                  ELSE IF ((XPL.LT.0.0).AND.(JPE.EQ.2)) THEN
                    R(KFCAT,KICAT,KDET5,LFIT,LSCALE,
     +                JDECID)=
     +               R(KFCAT,KICAT,KDET5,LFIT,LSCALE,
     +                JDECID)+rinc
                  END IF
                ELSE IF (JDECID.EQ.4) THEN ! Detector MajVote
                  XHI = ALOG10(1.0+FRAC)
                  XLO = ALOG10(1.0-FRAC)
                  JDET1 = 0
                  DO JDET = 1,KDET
                    XD = PPL(JDET,ier)-PEL(JDET,ier)
                    IF (((XD.GT.XHI).OR.(XD.LT.XLO)).AND.
```

```
     +                     ((PPL(JDET,ier).GT.PMIN).OR.
     +                      (PEL(JDET,ier).GT.PMIN))) THEN
                          JDET1 = JDET1+1
                          XPPL(JDET1) = PPL(JDET,ier)
                          XPEL(JDET1) = PEL(JDET,ier)
                        END IF
                      END DO ! JDET
                      CALL MVOTE(JDET1,XPPL,XPEL,IPART)
                      IF ((IPART.EQ.1).AND.(JPE.EQ.1)) THEN
                        R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)=
     +                   R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)
     +                   +rinc
                      ELSE IF ((IPART.EQ.1).AND.(JPE.EQ.2)) THEN
                        R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)=
     +                   R(KFCAT,KICAT,KDET5,LFIT,LSCALE,JDECID)
     +                   +rinc
                      ELSE IF ((IPART.EQ.2).AND.(JPE.EQ.1)) THEN
                        R(KFCAT,KICAT,KDET5,LFIT,LSCALE,
     +                   JDECID)=
     +                  R(KFCAT,KICAT,KDET5,LFIT,LSCALE,
     +                   JDECID)+rinc
                      ELSE IF ((IPART.EQ.2).AND.(JPE.EQ.2)) THEN
                        R(KFCAT,KICAT,KDET5,LFIT,LSCALE,
     +                    JDECID)=
     +                   R(KFCAT,KICAT,KDET5,LFIT,LSCALE,
     +                    JDECID)+rinc
                      END IF
                    END IF
                  END DO !JDECID
                END DO ! ier
              END DO !JROW
              KDET5 = KDET/5
            END DO !KICAT
C
          END DO !KDET
        END DO !KFCAT
      END DO ! KOPT


      RETURN
      END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
      SUBROUTINE ENDIT
      INCLUDE 'LH92.INC'

      DO KOPT = K1OPT,K2OPT
        IFIT = KFIT(KOPT)
        ISCALE = KSCA(KOPT)
        DO IICAT = 1,MCAT ! Incident catagory
          DO IDET = 5,MDET,5
            IDET5 = IDET/5
            DO I = 1,MDECID
              SUMPRO = 0.0
              SUMPOS = 0.0
              DO JEN = 1,MEN ! Fit Energy
                SUMPRO = SUMPRO +
     +                   R(JEN,IICAT,IDET5,IFIT,ISCALE,I)
                SUMPOS = SUMPOS +
     +                   R(MEN+JEN,IEN,IDET5,IFIT,ISCALE,I)
              END DO ! JEN
              SUMR(I) = SUMPOS + SUMPRO
              IF (SUMR(I).LE.0.0) SUMR(I) = 1.0
              DO IFCAT = 1,MCAT
                R(IFCAT,IICAT,IDET5,IFIT,ISCALE,I)=
     +            R(IFCAT,IICAT,IDET5,IFIT,ISCALE,I)
     +             *100.0/SUMR(I)
```

```
            END DO ! IFCAT
            IF (IICAT.LE.MEN) THEN
              R(MCAT+1,IICAT,IDET5,IFIT,ISCALE,I)=
     +             SUMPRO*100.0/SUMR(I)
            ELSE
              R(MCAT+1,IICAT,IDET5,IFIT,ISCALE,I)=
     +           SUMPOS*100.0/SUMR(I)
            END IF
          END DO ! I
        END DO ! IDET
      END DO ! IICAT
    END DO ! KOPT

    DO KOPT = K1OPT,K2OPT
      IFIT = KFIT(KOPT)
      ISCALE = KSCA(KOPT)
      do i = 1,MDECID
        call rdsidp
        DO IICAT = 1,MCAT
          DO IFCAT = 1,MCAT+1
            DO IDET = 5,MDET,5
              IDET5 = IDET/5
              rr = R(IFCAT,IICAT,IDET5,IFIT,ISCALE,I)
              call xysidp(rr,idet5,iicat,ifcat)
            END DO ! IDET
          END DO ! IFCAT
        END DO ! IICAT
        call prsidp(ifit,iscale,i)
      end do !i
    END DO ! KOPT

    CLOSE(UNIT=21)
    CLOSE(UNIT=22)
    T1 = CTIME()
    WRITE(20,50) T1-T0
50  FORMAT(1H ,'Total CPU Time (Sec) = ',G12.4)
    CLOSE(UNIT=20)

    RETURN
    END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
    REAL FUNCTION FPROB(IFCAT,IDET,JEVT,IER)
    INCLUDE 'LH92.INC'
    DOUBLE PRECISION S1,S2,XE,XNIE

    NIE = 0
    PI = 4.0*ATAN(1.0)
    DO IEVTEN = 1,NEVTEN
      IEVT = IEVTEN+(IFCAT-1)*NEVTEN
      IF (LSCALE.EQ.1) THEN
        if (ier.eq.1) then
          IE(IEVTEN) = JNINT(EDET(IDET,IEVT))
        else if (ier.eq.2) then
          IE(IEVTEN) = JNINT(RDET(IDET,IEVT))
        end if
        NIE = NEVTEN
      ELSE
        IF (IDET.NE.1) THEN
          if (ier.eq.1) then
            YEDET(1) = EDET(IDET-1,IEVT)
            XEDET(1) = EDET(IDET-1,JEVT)
          else if (ier.eq.2) then
            YEDET(1) = RDET(IDET-1,IEVT)
            XEDET(1) = RDET(IDET-1,JEVT)
          end if
          DEDET(1) = FWIND*SQRT(XEDET(1))
```

```
      ELSE
        DEDET(1) = -1.0
      END IF
      IF (IDET.NE.LDET) THEN
        if (ier.eq.1) then
          YEDET(2) = EDET(IDET+1,IEVT)
          XEDET(2) = EDET(IDET+1,JEVT)
        else if (ier.eq.2) then
          YEDET(2) = RDET(IDET+1,IEVT)
          XEDET(2) = RDET(IDET+1,JEVT)
        end if
        DEDET(2) = FWIND*SQRT(XEDET(2))
      ELSE
        DEDET(2) = -1.0
      END IF
      IF ((ABS(YEDET(1)-XEDET(1)).LE.DEDET(1)).OR.
     +    (ABS(YEDET(2)-XEDET(2)).LE.DEDET(2))) THEN
        NIE = NIE+1
        IF ((ABS(YEDET(1)-XEDET(1)).LE.DEDET(1)).AND.
     +      (ABS(YEDET(2)-XEDET(2)).GT.DEDET(2))) THEN
          XE = XEDET(1)
          YE = YEDET(1)
        ELSE IF ((ABS(YEDET(1)-XEDET(1)).GT.DEDET(1)).AND.
     +    (ABS(YEDET(2)-XEDET(2)).LE.DEDET(2))) THEN
          XE = XEDET(2)
          YE = YEDET(2)
        ELSE
          XE = (XEDET(1)+XEDET(2))/2.0
          YE = (YEDET(1)+YEDET(2))/2.0
        END IF
        IF (LSCALE.EQ.2) THEN
          DX = 0
        ELSE IF (LSCALE.EQ.3) THEN
          DX = XE-YE
        ELSE IF (LSCALE.EQ.4) THEN
          IF (XE.EQ.0.0) XE = 1.0E-5
          if (ier.eq.1) then
            DX = ((XE-YE)/XE)*EDET(IDET,IEVT)
          else if (ier.eq.2) then
            DX = ((XE-YE)/XE)*RDET(IDET,IEVT)
          end if
        END IF
        if (ier.eq.1) then
          IE(NIE) = JNINT(EDET(IDET,IEVT)+DX)
        else if (ier.eq.2) then
          IE(NIE) = JNINT(RDET(IDET,IEVT)+DX)
        end if
        IF (IE(NIE).LT.0) IE(NIE) = 0
      END IF
    END IF
  END DO ! IEVTEN
  IF (NIE.LE.0) then
     NIE = 1
     if (ier.eq.1) then
       IE(NIE) = JNINT(EDET(IDET,JEVT))
     else if (ier.eq.2) then
       IE(NIE) = JNINT(RDET(IDET,JEVT))
     end if
  END IF
  JNIE = JNINT(ALOG10(FLOATJ(NIE))/ALOG10(2.0)) + 1
  CALL ILIMIT(JNIE,1,10)
  NNIE(IDET,JNIE) = NNIE(IDET,JNIE) + 1
  IF (NIE.GT.0) THEN
    if (ier.eq.1) then
      IEDET = JNINT(EDET(IDET,JEVT))
    else if (ier.eq.2) then
```

```
            IEDET = JNINT(RDET(IDET,JEVT))
          end if
          ZEDET = FLOATJ(IEDET)
          IF (ZEDET.LE.0.0) ZEDET = 0.5
          IF (LFIT.EQ.1) THEN ! ----- Poisson Fitting
             CALL POIES(NIE,IE,CONPER,FPAR,FPARMIN,FPARMAX)
             IF (FPAR.LE.0.0) FPAR = 0.001
c            FPROB = POIPR(IEDET,FPAR)
c            IF (FPROB.GT.0.0) THEN
c              FPROB = ALOG(FPROB)
c            ELSE
             FPROB = ZEDET*ALOG(FPAR)-ZEDET*ALOG(ZEDET)+ ZEDET -
     +                    0.5*ALOG(2.0*PI*ZEDET)-FPAR
c            END IF
          ELSE ! ----- Gaussian Fitting
            S1 = 0.0D0
            S2 = 0.0D0
            XNIE = DFLOTJ(NIE)
            IF (XNIE.NE.0.0) THEN
              DO IIE = 1,NIE
                XE = DFLOTJ(IE(IIE))
                S1 = S1 + XE
                S2 = S2 + XE*XE
              END DO ! IIE
              S1 = S1/XNIE
              S2 = DSQRT((S2/XNIE) - S1*S1)
              IF (S2.LE.0.0) S2 = 0.5
              if (ier.eq.1) then
                XE = EDET(IDET,JEVT)
              else if (ier.eq.2) then
                XE = RDET(IDET,JEVT)
              end if
              XAV = SNGL(S1)
              XSD = SNGL(S2)
              PI = 4.0*ATAN(1.0)
              FPROB = -ALOG(XSD)-0.5*ALOG(2.0*PI)-
     +                  ((XE-XAV)**2/(2.0*(XSD**2)))
            ELSE
              FPROB = -1.0E-20
            END IF
          END IF
        ELSE
          WRITE(6,90) NIE
90        FORMAT(' ','***** NIE = ',I)
        END IF

        RETURN
        END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
        SUBROUTINE FFEED(IUNIT)
        WRITE(IUNIT,10)
10      FORMAT(1H1)
        RETURN
        END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
        SUBROUTINE GETFIL
        INCLUDE 'LH92.INC'

        FN='LH92RPT.IN'
        OPEN(UNIT=92,FILE=FN,ACCESS='SEQUENTIAL',STATUS='OLD',
     &      READONLY)
10      CONTINUE
           READ(92,20,END=99,ERR=99) S80
20         FORMAT(A80)
           WRITE(20,30) S80
30         FORMAT(1H ,A80)
```

```
      GO TO 10
99    CONTINUE
      CALL FFEED(20)
      CLOSE(UNIT=92)

      FN='LH92.FOR'
      OPEN(UNIT=92,FILE=FN,ACCESS='SEQUENTIAL',STATUS='OLD',
     &     READONLY)
      WRITE(20,100)
100   FORMAT(1H ,'<LH92.FOR> FILE ----------------------')
110   CONTINUE
         READ(92,20,END=199,ERR=199) S80
         WRITE(20,30) S80
      GO TO 110
199   CONTINUE
      CALL FFEED(20)
      CLOSE(UNIT=92)

      FN='LH92.INC'
      OPEN(UNIT=92,FILE=FN,ACCESS='SEQUENTIAL',STATUS='OLD',
     &     READONLY)
      WRITE(20,200)
200   FORMAT(1H ,'<LH92.INC> FILE ----------------------')
210   CONTINUE
         READ(92,20,END=299,ERR=299) S80
         WRITE(20,30) S80
      GO TO 210
299   CONTINUE
      CALL FFEED(20)
      CLOSE(UNIT=92)

      RETURN
      END

c-----------------------------------------------
      subroutine getdat
      include 'lh92.inc'

      ICNT = 54-MDET
      FN='USER$DISK25:[NASA_SNYDER.SUBRAMANIAN.APPL]FOR51.DAT'
      OPEN(UNIT=92,FILE=FN,ACCESS='SEQUENTIAL',STATUS='OLD',
     &     RECL=915,READONLY)
      DO I = 1,NROW
         READ(92,*) Z,Z,(EDET(J,I),J=1,MDET),(Z,J=1,ICNT)
         READ(92,*) (RDET(J,I),J=1,MDET)
      END DO
      CLOSE(UNIT=92)

      FN='USER$DISK25:[NASA_SNYDER.SUBRAMANIAN.APPL]FOR52.DAT'
      OPEN(UNIT=92,FILE=FN,ACCESS='SEQUENTIAL',STATUS='OLD',
     &     RECL=915,READONLY)
      DO I = 1,NROW
         READ(92,*) Z,Z,(EDET(J,I+NROW),J=1,MDET),(Z,J=1,ICNT)
         READ(92,*) (RDET(J,I+NROW),J=1,MDET)
      END DO
      CLOSE(UNIT=92)

      RETURN
      END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
      SUBROUTINE ILIMIT(IX,ILO,IHI)
      IF (IX.LT.ILO) THEN
         IX = ILO
      ELSE IF (IX.GT.IHI) THEN
         IX = IHI
      END IF
```

```
      RETURN
      END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
      SUBROUTINE INIT
      INCLUDE 'LH92.INC'

      T0 = CTIME()
      CALL UMACH(-2,20)
      CALL PAGE(-2,20)
      OPEN(UNIT=20,FILE='L1'//FS//'.OUT',STATUS='NEW')
      OPEN(UNIT=21,FILE='L2'//FS//'.OUT',STATUS='NEW')
      OPEN(UNIT=22,FILE='L3'//FS//'.OUT',STATUS='NEW')
      ISEED = 0
      CALL RNSET(ISEED)
      CALL GETFIL
      call getdat

      RETURN
      END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
      SUBROUTINE MVOTE(N,X,Y,I)
      REAL X(*),Y(*)

      ISUM = 0
      DO J = 1,N
        IF (X(J).GT.Y(J)) THEN
          ISUM = ISUM + 1
        ELSE
          ISUM = ISUM -1
        END IF
      END DO
      IF (ISUM.GE.1) THEN
        I = 1
      ELSE IF (ISUM.LE.-1) THEN
        I = 2
      ELSE
        I = 0
      END IF

      RETURN
      END
C---------------------------------------------------
      subroutine prcnt(s6,icnt,imax)
      character s6*6
      integer icnt,imax
      open(unit=99,status='NEW')
      x = floatj(icnt)*100.0/floatj(imax)
      write(99,10) s6,x
10    format(' LH92 Subroutine ',A6,': ',F8.2,'% Complete')
      close(unit=99)
      return
      end

C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
      SUBROUTINE PRFSTA
      INCLUDE 'LH92.INC'
      DATA LHIST/0/

      IF (LHIST.NE.0) THEN
        WRITE(20,10)
10      FORMAT(1h /
     +  1h ,'Histogram of Number of Events Used in Fits (Log scale)'/
     +  1h ,' #Evts    Tally per Detector (1 - 10)')
        DO I = 1,10
          J = 2**(I-1)
          WRITE(20,20) J,(NNIE(IDET,I),IDET=1,10)
```

```
20        FORMAT(1H ,11I7)
        END DO ! I

        WRITE(20,30)
30      FORMAT(1h /
     +  1h ,'Histogram of Number of events Used in Fits (Log scale)'/
     +  1h ,' #Evts   Tally per Detector (11 - 20)')
        DO I = 1,10
          J = 2**(I-1)
          WRITE(20,40) J,(NNIE(IDET,I),IDET=11,20)
40        FORMAT(1H ,11I7)
        END DO ! I

        WRITE(20,50)
50      FORMAT(1h /
     +  1h ,'Histogram of Number of events Used in Fits (Log scale)'/
     +  1h ,' #Evts    Tally per Detector (21-25)')
        DO I = 1,10
          J = 2**(I-1)
          WRITE(20,60) J,(NNIE(IDET,I),IDET=21,25)
60        FORMAT(1H ,11I7)
        END DO ! I
      END IF

      RETURN
      END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
      SUBROUTINE PRSIDP(ifit,iscale,i)
      INCLUDE 'LH92.INC'

      IPAGE = IPAGE + 1
      ENCODE(8,5,CNUM) IPAGE
5     FORMAT('#',I6,'/')
      CALL FFEED(20)
      WRITE(20,20) CNUM,sfit(ifit),sscal(iscale),slm(i),
     +             slm(i+MDECID)
20    FORMAT(1H ,'DATA SUMMARY PLOT: ',A8/1h ,4A12)
      DO IMSIDP = 1,MSIDP
         WRITE(20,10) SIDP(IMSIDP)
10       FORMAT(1H ,A78)
      END DO

      RETURN
      END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
      SUBROUTINE RDSIDP
      INCLUDE 'LH92.INC'

      FN='LH92IDP.IN'
      OPEN(UNIT=92,FILE=FN,ACCESS='SEQUENTIAL',STATUS='OLD',
     &     READONLY)
      DO I = 1,MSIDP
         READ(92,800) SIDP(I)
800      FORMAT(A78)
      END DO
      CLOSE(UNIT=92)

      RETURN
      END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
      SUBROUTINE WRTSTR(IUNIT,S)
      CHARACTER S*80
      WRITE(IUNIT,10) S
10    FORMAT(1H ,A80)
      RETURN
      END
```

```
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
      SUBROUTINE ZERSUM
      INCLUDE 'LH92.INC'

      do icat = 1,mcat
        do jcat = 1,mcat
          do idet5 = 1,mdet5
            do ifit = 1,mfit
              do iscale = 1, mscale
                do idecid = 1,mdecid
                  r(icat,jcat,idet5,ifit,iscale,idecid)=0.0
                end do ! idecid
              end do ! iscale
            end do ! ifit
          end do ! idet5
        end do ! jcat
      end do ! icat

      RETURN
      END
C-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
      SUBROUTINE XYSIDP(PERCNT,IPLOT,IX,IY)
      INCLUDE 'LH92.INC'

      CALL ILIMIT(IPLOT,1,10)
      CALL ILIMIT(IX,1,12)
      CALL ILIMIT(IY,1,13)
      IF ((IPLOT.GE.1).AND.(IPLOT.LE.5)) THEN
         IXOFF = (IPLOT-1)*15 + 2
         IYOFF = 18
      ELSE IF ((IPLOT.GE.6).AND.(IPLOT.LE.10)) THEN
         IXOFF = (IPLOT-6)*15 + 2
         IYOFF = 39
      ELSE
         RETURN
      END IF
      ICX = IXOFF + IX
      ICY = IYOFF - IY
      IF ((PERCNT.GE.0.0).AND.(PERCNT.LT.90.0)) THEN
         SYM = CHAR(48+JINT(PERCNT/10.0))
      ELSE IF ((PERCNT.GE.90.0).AND.(PERCNT.LT.100.0)) THEN
         SYM = CHAR(65+JINT(PERCNT-90.0))
      ELSE IF (PERCNT.EQ.100.0) THEN
         SYM = '*'
      ELSE IF (PERCNT.GT.100.0) THEN
         SYM = '+'
      ELSE IF (PERCNT.LT.0.0) THEN
         SYM = '-'
      END IF
      SIDP(ICY)(ICX:ICX) = SYM

      RETURN
      END
```

```
      PARAMETER (NEVTEN=1000,MDET=50,MDECID=4,MER=3,
     +           MAXRAN=200,NEDEP=3,NBIN=200,MBIN=1000,
     +           MFIT=2,MEN=6,MPE=2,MCAT=MEN*MPE,MSIDP=43,
     +           MSCALE=4,MDET5=MDET/5,NROW=MEN*NEVTEN,
     +           NROW2=NROW*MPE,MINDEX=7,MNPLOT=20,MIPOFF=3)
      CHARACTER FN*70,S80*80,SIDP(MSIDP)*78,FS*6,
     +          TITLE*80,xlabel*80,ylabel*80,SYM*1,CNUM*8,
     +          SCL*7,SEN(MEN)*6,SDET(MDET5)*8,SPE(MPE)*5,
     +          SFIT(MFIT)*5,SSCAL(MSCALE)*6,
     +          SLM(MDECID*MPE)*10
      INTEGER ISEED,NDET,IC(2),IE(NEVTEN),IPAGE,NNIE(MDET,10),
     +        LFIT,LSCALE,LDET,IP(MIPOFF+MINDEX,MNPLOT),IMX(MINDEX),
     +        KFIT(MFIT*MSCALE),KSCA(MFIT*MSCALE),K1OPT,K2OPT
      LOGICAL LBUG,LFAST
      REAL EDET(MDET,NROW2),RDET(MDET,NROW2),CONPER,DETNUM(MDET),
     +     FPAR,FWIND,LLHPR,LLHPO,DLLH(NEVTEN),LHV(50),
     +     PEL(MDET,MER),PPL(MDET,MER),T0,T1,
     +     XPEL(MDET),XPPL(MDET),
     +     SUM1,SUM2,STOT,HDIV(15),HFREQ(15),XP(MNPLOT),YP(MNPLOT),
     +     R(MCAT+1,MCAT,MDET5,MFIT,MSCALE,MDECID),
c            ^    ^     ^     ^      ^       ^
c            |    |     |     |      |       |
c            |    |     |     |      |       -- 1  LLh Fit uc
c            |    |     |     |      |          2  MV Fit uc
c            |    |     |     |      |          3  LLh Fit cl
c            |    |     |     |      |          4  MV Fit cl
c            |    |     |     |      -- Ind,DepNoSc,DepTrSc,DepPrSc
c            |    |     |     -- 1=Poisson, 2=Gauss
c            |    |     -- 1=5Dets, 2=10Dets,...,10=50 Dets
c            |    -- Catagory of incident particle (1-12)
c            -- Catagory for fitting function (1-12)
c
     +     SUMR(MDECID),XEDET(2),YEDET(2),DEDET(2)
      COMMON/LHCOM/ FN,S80,SIDP,
     +              TITLE,xlabel,ylabel,SYM,CNUM,
     +              SCL,SEN,SDET,SPE,FS,
     +              SFIT,SSCAL,SLM,
     +              ISEED,NDET,IC,IE,IPAGE,NNIE,
     +              LFIT,LSCALE,LDET,IP,IMX,KFIT,KSCA,
     +              LBUG,K1OPT,K2OPT,
     +              EDET,RDET,CONPER,DETNUM,
     +              FPAR,FWIND,LLHPR,LLHPO,DLLH,LHV,
     +              SUMNI,SUMCIP,SUMCIE,PEL,PPL,XPEL,XPPL,SR,T0,T1,
     +              SUM1,SUM2,STOT,HDIV,HFREQ,XP,YP,
     +              R,
     +              SUMR,XEDET,YEDET,DEDET
c       DATA IMX/MPE,MEN,MEN,MDET5,MFIT,MSCALE,MDECIS*MPE/
        DATA KFIT/1,1,1,1,2,2,2,2/
        DATA KSCA/1,2,3,4,1,2,3,4/
        DATA K1OPT,K2OPT/1,1/
      DATA FS/'POIIPN'/
c       DATA FS/'POIDPN'/
c       DATA FS/'POIDPT'/
c       DATA FS/'POIDPP'/
c       DATA FS/'GAUIPN'/
c       DATA FS/'GAUDPN'/
c       DATA FS/'GAUDPT'/
c       DATA FS/'GAUDPP'/
      DATA LFAST/.TRUE./
      DATA IMX/2,6,6,5,2,4,8/
      DATA FRAC,PMIN/0.2,-10.0/
      DATA SFIT /'Pois/','Gaus/'/
c     Fitting used to compute probabilities for likelihood
c        LFIT = 1   Poisson fitting
c               2   Gaussian fitting
      DATA SSCAL/'IndPr/','DPNoS/','DPTrS/','DPPrS/'/
```

```
c     Scaling used to adjust raw data values used in fitting
c        LSCALE = 1    Independent probabilities
c                 2    Dep. Prob., no adjustment of raw data
c                 3    Dep. Prob., translational adjustment
c                 4    Dep. Prob., proportional adjustmant
      DATA IP/
     +         4, 3, 2, 1, 1, 1, 1, 1, 1, 1,
     +         4, 3, 2, 1, 1, 1, 1, 1, 2, 1,
     +         4, 3, 2, 1, 1, 1, 1, 1, 3, 2,
     +         4, 3, 2, 1, 1, 1, 1, 1, 4, 2,
     +         4, 3, 2, 1, 1, 1, 1, 1, 1, 3,
     +         4, 3, 2, 1, 1, 1, 1, 1, 2, 3,
     +         4, 3, 2, 1, 2, 1, 1, 1, 3, 4,
     +         4, 3, 2, 1, 2, 1, 1, 1, 4, 4,
     +         4, 3, 2, 1, 2, 1, 1, 1, 1, 5,
     +         4, 3, 2, 1, 2, 1, 1, 1, 2, 5,
     +         4, 3, 2, 1, 2, 1, 1, 1, 3, 6,
     +         4, 3, 2, 1, 2, 1, 1, 1, 4, 6,
     +         4, 3, 2, 1, 3, 1, 1, 1, 1, 7,
     +         4, 3, 2, 1, 3, 1, 1, 1, 2, 7,
     +         4, 3, 2, 1, 3, 1, 1, 1, 3, 8,
     +         4, 3, 2, 1, 3, 1, 1, 1, 4, 8,
     +         4, 3, 2, 1, 3, 1, 1, 1, 1, 1,
     +         4, 3, 2, 1, 3, 1, 1, 1, 2, 1,
     +         4, 3, 2, 1, 4, 1, 1, 1, 3, 2,
     +         4, 3, 2, 1, 4, 1, 1, 1, 4, 2
c              ^  ^  ^  ^  ^  ^  ^  ^  ^  ^
c              |  |  |  |  |  |  |  |  |  |
c              |  |  |  |  |  |  |  |  |  --- MDECID,MPE 1-4 Pro, 5-8 Pos
c              |  |  |  |  |  |  |  |  ------ Ind, DNoSca, DTrSca, DPrSca
c              |  |  |  |  |  |  |  --------- Poisson, Gauss
c              |  |  |  |  |  |  ------------ 5dets, 10dets, 15dets,...
c              |  |  |  |  |  ---------------- Incident energy (1-6)
c              |  |  |  |  ------------------- Fitting energy
c              |  |  |  ---------------------- Proton, positron
c              |  |  ------------------------ axes options
c              |  --------------------------- Curve variable (1-7)
c              ------------------------------ X-axes variable (1-7)
c
     +       /
      DATA CONPER/0.90/
      DATA ISEED,LBUG/87448387,.TRUE./
      DATA FWIND/2.0/
      DATA DETNUM /
     +     1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0,
     +     9.0,10.0,11.0,12.0,13.0,14.0,15.0,16.0,17.0,
     +    18.0,19.0,20.0,21.0,22.0,23.0,24.0,25.0,
     +    26.0,27.0,28.0,29.0,30.0,31.0,32.0,33.0,
     +    34.0,35.0,36.0,37.0,38.0,39.0,40.0,41.0,
     +    42.0,43.0,44.0,45.0,46.0,47.0,48.0,49.0,50.0
     +    /
      DATA SCL/'CL=0.9/'/
      DATA SEN/'0.1Gv/','0.5Gv/','2.1Gv/','10.Gv/',
     +         '44.Gv/','200Gv/'/
      DATA SDET/'Det=05/','Det=10/','Det=15/',
     +          'Det=20/','Det=25/','Det=30/',
     +          'Det=35/','Det=40/','Det=45/',
     +          'Det=50/'
     +         /
      DATA SPE/'Prot/','Posi/'/
      DATA SLM/
     +         'LL Pro UC/','MV Pro UC/','LL Pro C1/','MV Pro C1/',
     +         'LL Pos UC/','MV Pos UC/','LL Pos C1/','MV Pos C1/'
     +        /
```

Example Cluster Program Output

The following listing presents some representative output from the cluster analysis program. At present, the particle identification strategy is being adjusted to better utilize both the energy deposit and radial spread information to make a final determination of particle identity and energy. These results are being listed here to stimulate further discussion and productive criticism for improving the final report of this project. The results shown are for a limited range of run options and should not be used to draw final conclusions.

The attached output is presented in the form of text character contour maps of identification percentages. The characters in the square contours have the following significance: "0" = 0-9%, "1" = 10-19%, ... , "8" = 80-89%, "J" = 90-91%, "I" = 91-92%, ... , "A" = 99-100%. The horizontal axis represents the incident particle and its energy: the leftmost group of 6 are incident protons, the rightmost group of 6 are incident positrons. "1" means lowest energy (0.1 GeV) and "6" means highest (200 GeV)). The vertical axis represents the fitting catagory (particle and energy): the lower group of 6 are fits to protons, the upper group of 6 are fits to positrons. "1" means lowest energy (0.1 GeV) and "6" means highest (200 GeV)). Note that each plot has an additional top row of characters (showing 13 instead of 12 rows). The character symbol in this row gives the total percentage of correct particle type identifications for each catagory of incident particle.

Ideally, these contours should show all "A"s on a 45 degree diagonal line (meaning that 100% of the "unknown" particles were placed in the correct particle and energy catagory), and all "A"s in the top (13th) row to confirm correct particle type identification at all incident energies.

```
     +          0,0,0,0, 0,0,0,0, 0,0,0,0,
     +          1,1,1,1, 1,1,1,1, 1,1,1,1,
     +          2,2,2,2, 2,2,2,2, 2,2,2,2,
     +          0,1,2,3, 0,1,2,3, 0,1,2,3,
     +          0,1,2,3, 0,1,2,3, 0,1,2,3
     +         /
      data slog /
     +           'NoL/','L02/','L10/','L50/'
     +         /
c    jlog options
c      0 - Use raw data
c      1 - Use LOG2 of raw data
c      2 - Use LOG10 of raw data
c      3 - Use LOG50 of raw data
      data scat /
     +           'Cat01/','Cat02/','Cat03/',
     +           'Cat04/','Cat05/','Cat06/',
     +           'Cat07/','Cat08/','Cat09/',
     +           'Cat10/','Cat11/','Cat12/'
     +          /
      data sdet /
     +           '05 Dets/','10 Dets/','15 Dets/','20 Dets/',
     +           '25 Dets/','30 Dets/','35 Dets/','40 Dets/',
     +           '45 Dets/','50 Dets/'
     +           /
      data inv/3,5,10,15,20/
      data ssam /
     +           '003 Vote/','005 Vote/','010 Vote/',
     +           '015 Vote/','020 Vote/'
     +          /
      data sid /
     +           'ProVo/', 'PosVo/','CPEVo/'
     +         /
```

DATA SUMMARY PLOT: #

Eucl/ NoSca/ NoL/ 003 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
K8788B84778C	J88C8887788A	I8788FA78HJH	EC8888888JJK	G88AD877HKGI
6000000000000	6000000000001	6000000000002	6000000000004	600000000001
V5000000000022	5000000000113	5000000000034	5000000000144	500000000025
O4000000001113	4000000001222	4000000001241	4000000000631	400000000152
T3000000103211	3000000113221	3001000012310	3000000014110	300000001511(
E2001000331110	2000000232210	2000000233100	2000000243000	201000014200(
1000000300010	1000000410000	1000000610000	1000000510000	100100061000(
I6000000000000	6000001000000	6000011000000	6000011000000	600001100000(
D5000002000000	5001011000000	5000101000000	5000012000000	500011300000(
4000111000000	4001233000000	4003123000000	4002232000000	400133100000(
3003333021100	3004521000000	3003432010000	3004422000000	300432200000(
2072221110000	2081101110000	2071000010000	2181000010000	206100011000(
1G00000000000	1D00000000000	1800000000000	1800000000000	1A0000000000(
123456123456	123456123456	123456123456	123456123456	12345612345(
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
F8FB8A77BHKK	G8D888678HJK	K788CD66EIKK	I8ABFA66GKKK	I8BEFG668JI
6000000000005	6000000000007	6000000000007	6000000000007	600000000000(
V5000000000144	5000000000162	5000000000172	50000000002A2	50000000001G(
O4000000000540	4000000001620	4000000001710	4000000002700	400000000080(
T3000000006200	3000000015200	3000000017100	3000000007000	300000000700(
E2000000141000	2000000241000	2010000340000	2000000350000	200000025000(
1000000510000	1000000410000	1000000310000	1000000300000	100000030000(
I6000012000000	6000001000000	6000001000000	6000003000000	600000300000(
D5000012000000	5000022000000	5000132000000	5001121000000	500013200000(
4002342000000	4002333000000	4001333000000	4002442000000	400353200000(
3005411000000	3014211000000	3014301100000	3003211100000	300411010000(
2171000220000	2062100221000	2062000220000	2171000220000	217101022100(
1800000000000	1A00000000000	1C00000000000	1800000000000	181000000000(
123456123456	123456123456	123456123456	123456123456	12345612345(
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

Eucl/ NoSca/ NoL/ 005 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
K8788E84768D	I88A7887788B	I87888B78HJI	EC878888AIKK	G77AE887FKIK
6000000000011	6000000000012	6000000000013	6000000000015	6000000000016
V5000000000122	5000000000223	5000000000133	5000000000153	5000000000253
O4000000012112	4000000002222	4000000001331	4000000001521	4000000001530
T3000000012211	3000000023120	3000000024310	3000000025210	3000000015100
E2000000311011	2000000232200	2000000222100	2000000142000	2010000142000
1000000300000	1000000500000	1000000510000	1000000710000	1001000610000
I6000001000000	6000022000000	6000013000000	6000023000000	6000021000000
D5001133000000	5001224000000	5001243000000	5001233000000	5000234000000
4001321010000	4002411000000	4002312000000	4003321000000	4002421000000
3003111020100	3002100000000	3002100000000	3002100000000	3003100100000
2070101010000	2081000010000	2070000010000	2071000000000	2061000010000
1E00000000000	1C00000000000	1800000000000	1800000000000	1A00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
E8DA8867DJKK	H8A88867CHJK	K8888B77FJKK	J888FA66HKKK	I88EBF568JKK
6000000000016	6000000000007	6000000000008	6000000000008	600000000000I
V5000000000143	5000000000182	5000000000181	50000000001A1	50000000001G0
O4000000001630	4000000002610	4000000001710	4000000002700	4000000000800
T3000000007100	3000000015100	3000000017100	3000000016000	3001000007000
E2010000251000	2010000250000	2010000450000	2010000340000	2000000460000
1000000410000	1000000210000	1000000200000	1000000200000	1000000100000
I6000012000000	6000002000000	6000013000000	6000014000000	6000004000000
D5001254000000	5000244000000	5000254000000	5001242000000	5000254000000
4004510000000	4003511000000	4003411000000	4003521000000	4004501000000
3003100100000	3004100200000	3012000100000	3012100100000	3012100100000
2170000120000	2060000120000	2061000120000	2051000130000	2050000221000
1700000000000	1800000000000	1800000000000	1800000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

Eucl/ NoSca/ NoL/ 010 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
K8878873668A	K8787887788C	I87888A78GKI	C87788878IKK	G778D877FKK
6000100000012	6000000000112	6000000000014	6000000000014	600000000001
V5000000002123	5000000000214	5000000000132	5000000000244	500000000015
O4000000002022	4000000011131	4000000000332	4000000000421	400000000163
T3000000101110	3000000123210	3000000013310	3000000014210	300000001510
E2000000200000	2000000212100	2000000132100	2000000143000	201000014200
1000000300000	1000000410000	1000000710000	1000010710000	100100061000
I6000001000000	6000022000000	6000024000000	6000023000000	600002200000
D5002354000110	5002333000000	5002153000000	5001232000000	500034400000
4002211011100	4002311000000	4003401000000	4002310000000	400432000000
3003211120000	3002210001000	3002100000000	3003100000000	300210010000
2070000010000	2070000000000	2060000010000	2160000010000	206000002000
1E00000000000	1E00000000010	1800000000000	1700000000000	1A0000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
E7C88856AGKK	I78878578GKK	K77888678KKK	H788B856GJKK	I78F8A468J
6000000000007	6000000000007	6000000000008	6000000000007	600000000000
V5000000000152	5000000000182	5000000000071	50000000001A2	50000000001E
O4000000000530	4000000002710	4000000001720	4000000001710	400000000180
T3000000007200	3000000006100	3001000016100	3000000007000	300000000700
E2010000150000	2010000250000	2010000460000	2000000450000	201000035000
1000000300000	1000000200000	1000000100000	1000000100000	100000000000
I6000013000000	6000013000000	6000015000000	6000015000000	600001500000
D5000143000000	5000233000000	5000361000000	5000342000000	500025300000
4004510000000	4003410000000	4004400000000	4004421000000	400450000000
3003100200000	3014100200000	3002000200000	3012000200000	301210020000
2160000220000	2050000221000	2050000121000	2060000120000	205100023100
1710000000000	1810000000000	1800000000000	1800000000000	181000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

Eucl/ NoSca/ NoL/ 015 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
K8778873768H	K8887887788A	I77888868GKJ	C87777878IKK	G778A777DKKK
6000100000012	6000000000113	6000000000023	6000001000015	6000001000015
V5001000001033	5000000000022	5000000000133	5000000000243	5000000000154
O4000000012012	4000000011212	4000000001321	4000000000421	4000000001630
T3000000001120	3000000023110	3000000013310	3000000015200	3000000016200
E2000000310100	2000000222100	2000000133100	2000000142000	2010000141000
1000000200000	1000000510000	1001000700000	1001000610000	1011000510000
I6000000000000	6000123000000	6000124000000	6000023000000	6000022000000
D5001255000100	5002223000000	5001242000000	5001332000000	5000243000000
4002321010000	4002411000000	4003210000000	4003211000000	4003410000000
3003100120000	3001110001000	3001100000000	3002000100000	3003100100000
2070000010000	2071000001100	2060000020000	2160000021000	2060000110000
1C00000000000	1C00000000010	1800000000000	1700000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
G7A88856CGKK	J78878578FKK	K77888678IKK	H788A866FKKK	H78E88458JKK
6000000000007	6000000000008	6000000000008	6000000000007	600000000000G
V5000000000162	5000000000182	5000000000081	5000000000182	50000000001E0
O4000000001520	4000000001610	4000000001710	4000000001710	4000000000800
T3000000007200	3000000016100	3001000017200	3000000017100	3000000007000
E2010000140000	2010000250000	2010000460000	2010100450000	2020000350000
1000000300000	1000000200000	1000000100000	1000000100000	1000000000000
I6000023000000	6000024000000	6000014000000	6000025000000	6000015000000
D5001233000000	5000333000000	5000262000000	5000342000000	5000342000000
4003411000000	4003310000000	4003401000000	4003421000000	4004410000000
3003000200000	3013100200000	3002000200000	3013000200000	3012000200000
2160000230000	2050000121000	2050000121000	2051000130000	2040000231000
1710000000000	1810000000000	1800000000000	1800000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

Eucl/ NoSca/ NoL/ 020 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
K8778873658E	K88878866788	K87888857GKK	C87777768IKK	G7688777CKKK
6001100000012	6000010000103	6000000000013	6000001000004	6000001000015
V5000000001023	5000000000022	5000000000133	5000000000254	5000000000163
O4000000001112	4000000000122	4000000000331	4000000000421	4000000001620
T3000000001110	3000000023210	3000000024310	3000000014210	3000000015200
E2000000311000	2000000112000	2000000122100	2000000142000	2011000141000
1000000300000	1000000520000	1000000710000	1001000610000	1011000510000
I6000001000000	6000123000000	6000024000000	6000023000000	6000022000000
D5002245001100	5002223000000	5002252000000	5001232000000	5000243000000
4002321011100	4003321010000	4001301000000	4003311000000	4002410000000
3002100120000	3000001000000	3002100010000	3002000100000	3003000100000
2080000011000	2071000111100	2070000021000	2160000021000	2160000110000
1C00000000000	1C00000000010	1800000000000	1700000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
H7A87845AGKK	J78878478EKK	K77888578GKK	H7888856FKKK	H78D88368KK
6000000000008	6000000000008	6000000000008	6000000000007	600000000000E
V5000000000161	5000000000172	5000000000182	5000000000182	50000000001E0
O4000000001530	4000000001620	4000000001610	4000000002710	4000000000800
T3000000007300	3000000016100	3000000006100	3010000017000	3000000007000
E2010000140000	2011000250000	2010000460000	2011100450000	2020000350000
1000000300000	1000000100000	1000000100000	1000000000000	1000000000000
I6000023000000	6000023000000	6000014000000	6000025000000	6000024000000
D5000233000000	5000224000000	5001352000000	5000242000000	5000342000000
4004411000000	4004420000000	4003411000000	4004520000000	4003410000000
3003000200000	3003100300000	3012000200000	3013000300000	3013000400000
2160000231000	2050000221000	2140000121000	2050000120000	2040000131000
1710000000000	1810000000000	1800000000000	1800000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

SumD/ NoSca/ NoL/ 003 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
KC7888856668	H888DH8768DB	J7DCFEE78GHK	G88EEH878GIK	J8EB8A77IHKK
6000000000000	6000000000001	6000000000001	6000000000003	6000000000014
V5000000000101	5000000000011	5000000000025	5000000000024	5000000000143
O40000000001112	4000000001233	4000000000441	4000000000352	4000000001432
T3000000021221	3000000022331	3010000015310	3000000015410	3000000005300
E2000000222100	2000000231100	2000000141100	2000000041100	2000000152000
1000000410000	1000000510000	1000000710000	1010000710000	1000000600000
I6000001000000	6000011000000	6000000000000	6000013000000	6000012000000
D5000011000000	5000021000000	5000012000000	5000121000000	5000011000000
4000111000000	4001113000000	4002233000000	4002423000000	4003333000000
3004343011110	3005532000000	3005433001000	3005311010000	3004311110000
2072212021101	2070111012100	2070100010000	2070000110000	2080000010000
1K00000000000	1800000000000	1B00000000000	1E00000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
H8CECE768JKK	IFDGFC75BKKK	K8CF8F64EKKK	IACJID648KKK	I8DIDE54FKKK
6000000000016	6000000000007	600000000000C	600000000000A	600000000000E
V5000000000153	5000000000162	50000000001A0	5000000000080	50000000000C0
O4000000000520	4000000000630	4000000000700	4000000000800	40000000000A00
T3000000006200	3000000007100	3000000008100	3000000007100	3000000008000
E2000000051000	2000000041000	2000000030000	2000000030000	2010000030000
1000000700000	1000000600000	1000000500000	1000000500000	1000000400000
I6000013000000	6000004000000	6000004000000	6000002000000	6000004000000
D5000132000000	5000031000000	5000132000000	5000043000000	5000043000000
4003432000000	4002422000000	4002422000000	4003532000000	4002431000000
3004310000000	3004310000000	3004210000000	3014200000000	3004211000000
2071000020000	2081000120000	2072100040000	2071100141000	2071100040000
1800000000000	1E00000010000	1I00000200000	1A00000110000	1G00000300000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

SumD/ NoSca/ NoL/ 005 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
KB7888856778	F888CI8778E8	I7B8EFE78JJK	I88BCJ87AGIK	K8D88A77GGKK
6000000000001	6000000000001	6000000000002	6000000000004	6000000000014
V5000000000212	5000000000022	5000000000124	5000000000033	5000000000154
O4000000002112	4000000012243	4000000001331	4000000001451	4000000001521
T3000000121131	3000000012320	3010000015321	3000000014410	300000001620C
E2000000211010	2000000230100	2000000132100	2000000042000	200000015200C
1000000300000	1000000400000	1000000710000	1000000710000	100000060000C
I6000001000000	6000012000000	6000013000000	6000124000000	600001400000C
D5000133000000	5002135000000	5001244000000	5000243000000	500015300000C
4002321010000	4003431000000	4004321000000	4004411000000	400451100000C
3004212011100	3003200011000	3002210000000	3003000010000	300400011000C
2071110101000	2070000000000	2060000000000	2070000010000	207000001000C
1I00000000000	1800000000000	1800000000000	1E00000000000	1A0000000000C
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
I88CB8768HKK	KDCGEC75BJKK	K8BE8D54DKKK	H88IHB548KKK	I8DHCD34BKK
6000000000007	6000000000007	600000000000E	60000000000008	600000000000C
V5000000000161	5000000000172	5000000000180	50000000000C1	50000000000CC
O4000000001520	4000000001620	4000000000710	4000000000800	400000000080C
T3000000016200	3000000006100	3000010008100	3000000007100	300000001810C
E2000000140000	2000000150000	2000000040000	20100000300000	201000003000C
1000000600000	1000000500000	1000000400000	1000000400000	100000030000C
I6000025000000	6000016000000	6000015000000	6000015000000	600001500000C
D5000252000000	5000051000000	5000253000000	5000273000000	500026200000C
4003500000000	4004610000000	4003410000000	4005500000000	400351000000C
3004100100000	3004210100000	3003200100000	3012100000000	300320000000C
2070000030000	2070000030000	2061000140000	2060000141000	206100015000C
1800000000000	1G00000000000	1G00000100000	1A00000100000	1G0000040000C
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

SumD/ NoSca/ NoL/ 010 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
KG8888845678	I8888H7658C8	J788ACA67GKK	I78ABG76AGIK	K8888877GFKK
6000000000002	6000000000012	6000000000003	6000000000004	6000000000004
V5000000000122	5000000000012	5000000000024	5000000000024	5000000000153
O4000000002322	4000000001232	4000000001441	4000000001451	4000000001431
T3000000111110	3000000023431	3000000014310	3000000015310	3000000006300
E2000000321000	2000000230000	2000000151010	2010000042000	2000000061000
1000000300000	1000000500000	1000000700000	1000000600000	1000000600000
I6000000000000	6000024000000	6000024000000	6000135000000	6000025000000
D5000134011100	5001144000100	5001264000000	5001344000000	5000052000000
4004432021000	4004410001000	4005500010000	4005410000000	4003600100000
3002210011000	3003100011000	3002000011000	3002000210000	3004000110000
2070000000000	2070000000000	2060000010000	2060000010000	2060000010000
1G00000000000	1800000000001	1A10000000000	1C00000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
I88CA8658GKK	K8DGAA66AIKK	K88B8D45CKKK	G88FF8458IKK	J7AGCB258JKK
6000000000007	6000000000007	6000000000008	6000000000008	600000000000E
V5000000000161	5000000000172	5000000000181	5000000000081	500000000000C0
O4000000001520	4000000001620	4000000001710	4000000001810	400000000000800
T3000000006200	3000000007100	3000000008100	3000000007100	3000000018100
E2000000140000	2010000151000	2011000150000	2010000150000	2011000040000
1000000500000	1000000400000	1000000200000	1000000300000	1000000200000
I6000025000000	6000016000000	6000027000000	6000026000000	6000016000000
D5000152000000	5000151000000	5000251000000	5000261000000	5000262000000
4003600100000	4003600000000	4003510100000	4003500100000	4004510100000
3003000100000	3004210100000	3003100200000	3013000100000	3013200100000
2170000031000	2070000021000	2060000040000	2050000031000	2050000041000
1800000000000	1G00000000000	1E00000100000	1800000100000	1B00000300000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

SumD/ NoSca/ NoL/ 015 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
JF7888845678	I8888K766788	K788AC867EJK	I788BF768GIK	K8888867FFKI
6000000000003	6000000000001	6000000000002	6000000000003	600000000001
V5001000000122	5000000000012	5000000000034	5000000000044	500000000015
O4000000002222	4000000011222	4000000000331	4000000000541	400000000143
T3000000011110	3000000022221	3010000004410	3000000015310	300000000630
E2000000221000	2000000321000	2000000142010	2000000042000	201000006100
1000000400000	1000000400000	1000000710000	1000000610000	100000050000
I6000000000000	6000025000000	6000034000000	6000136000000	600002500000
D5001134011100	5002244000000	5001143000000	5001242000000	500014200000
4003322021100	4003411110000	4004511000000	4004410100000	400450010000
3002311001000	3002000111000	3002000011000	3002000110000	300300011000
2070000000000	2070000000000	2060000010000	2060000010000	206000001000
1E00000000000	1800000000011	1810000000000	1C00000000000	181000000000
123456123456	123456123456	123456123456	123456123456	12345612345
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
I88C88658GKK	K8BE88568IKK	K88A8B358KKK	G88DD8358IKK	K78GC8158H
6000000000007	6000000000006	6000000000008	6000000000008	600000000001
V5000000000162	5000000000172	5000000000081	5000000000081	50000000000A
O4000000000530	4000000000720	4000000000700	4000000001810	400000000081
T3000000006200	3000000017100	3000000008100	3000000016100	300000001810
E2000000141000	2000000150000	2011000050000	2011000040000	201100004000
1000000500000	1000000300000	1000000200000	1000000200000	100000010000
I6000035000000	6000015000000	6000027000000	6000036000000	600001600000
D5000241000000	5000151000000	5000251000000	5001251000000	500016100000
4003600000000	4004511100000	4003510200000	4003500100000	400450020000
3003000100000	3004210200000	3004100200000	3013000200000	301210010000
2170000031000	2070000031000	2050000031000	2050000131000	215100004100
1800000000000	1G00000000000	1E10000100000	1800000100000	180000030000
123456123456	123456123456	123456123456	123456123456	12345612345
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

SumD/ NoSca/ NoL/ 020 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
JD7888844678	I8888J765788	K7888B857EJK	I8888E768GIK	K8888866EFKK
6000000000013	6000000000002	6000000000003	6000000000003	6000000000013
V5001000000122	5000000000012	5000000000034	5000000000034	5000000000154
O4000000001211	4000000001232	4000000001331	4000000000441	4000000001432
T3000000010110	3000000022321	3010000003420	3000000015410	3000000006300
E2000000211000	2000000221000	2000000131000	2000000042000	2010000061000
1000000400000	1000000500000	1000000710000	1000000600000	1000000500000
I6000011000000	6000034000000	6000125000000	6000125000000	6000025000000
D5000134001200	5002224001100	5001152000000	5000253000000	5001252000000
4004331020000	4003410110000	4005300000000	4005400100000	4003500100000
3002210012000	3002100111000	3001100011000	3002000120000	3003000210000
2070000000000	2070000000000	2060000010000	2060000011000	2160000010000
1E00000000000	1800000000011	1810000000000	1C00000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
I88A88668GKK	K8AC88468IKK	K88888258KKK	G88BB8268IKK	K78EB8158GKK
6000000000007	6000000000007	6000000000007	6000000000008	600000000000C
V5000000000162	5000000000162	5000000000082	50000000000A1	5000000000080
O4000000000520	4000000000720	4000000000710	4000000000710	4000000001810
T3000000016200	3000000007100	3000000008100	3000000017100	3000000017100
E2000000141000	2000000050000	2011000050000	2011000040000	2011000040000
1000000500000	1000000300000	1000000200000	1000000100000	1000000000000
I6000026000000	6000015000000	6000016000000	6000016000000	6000025000000
D5000151000000	5000241000000	5000251000000	5001371000000	5000261000000
4004600100000	4004511100000	4003410200000	4003400100000	4003500200000
3003000100000	3004100200000	3003100300000	3013000200000	3013100100000
2170000031000	2070000131000	2050000031000	2050000031000	2051000041000
1800000000000	1E00000000000	1E10000000000	1800000100000	1800000200000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

MaxD/ NoSca/ NoL/ 003 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
IDAE8A756677	K888AE76678A	F8A8BC777GG8	K8888I77ABIJ	J88E8877CGGI
6000000000001	6000000000001	6000000000012	6000000000012	600000000002
V5000000000010	5000000000002	5000000000023	5000000000044	500000000003
O4000000001111	4000000000232	4000000000222	4000000000332	400000000143
T3000010122222	3000000012231	3000000013420	3000000014310	300000001630
E2000000111111	2000000132110	2000000233110	2000000133100	200000013100
1000000410000	1000000410000	1000000410000	1000000530000	100000051000
I6000000000000	6000000000000	6000002000000	6000001000000	600000200000
D5000010000000	5000002000000	5000001000000	5000011000000	500001100000
4001303000100	4001112000000	4001212000000	4002232000000	400222200000
3003432011100	3004442000000	3005443000000	3004332000000	300342110000
2083121122101	2072111121000	2162110111000	2171201111000	207211110000
1I00000000000	1E00000001000	1800000000000	1800000010000	180000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
E8E88D7HECFJ	K8HCC8688HHK	KA8C8A88IHKK	K8ACED77DKJF	I88HD858FG
6000000000004	6000000000005	6000000000007	6000000000007	600000000000
V5000000000154	5000000000063	5000000000072	5000000000181	500000000028
O4000000001420	4000000001520	4000000001620	4000000001710	400000000260
T3000000025100	3000000026300	3000000015100	3000000015100	300000001500
E2000000352000	2000000351000	2000000352000	2000000241000	200000035100
1000000420000	1000000300000	1000000410000	1000000410000	100000011000
I6000000000000	6000001000000	6000000000000	6000001000000	600000100000
D5000012000000	5000012000000	5000011000000	5000011000000	500001100000
4001212000000	4000331000000	4001313000000	4001233000000	400032200000
3014333000000	3005331000000	3004432000000	3013323000000	300434100000
2063211100000	2073001110000	2172101110000	2073120110000	207410131000
1800000000000	1C00000000000	1800000000000	1C00000000000	1C00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

MaxD/ NoSca/ NoL/ 005 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
I8BH8C766588	I888DB76688D	E78888778GG8	J8888G878GIK	J87D8878DHIJ
6000000000001	6000000000001	6000000000013	6000000000013	6000000000015
V5000000001022	5000000000122	5000000000133	5000000000144	5000000000153
O4000000011111	4000000000223	4000000001221	4000000000311	4000000002521
T3000000111121	3000000112220	3000000133310	3000000004310	3000000015200
E2000000212100	2000000222110	2000000122110	2000000143100	2000000251000
1000000310000	1000000410100	1000000510000	1000000620000	1000000410000
I6000000000000	6000011000000	6000002000000	6000011000000	6000011000000
D5001213000100	5001033000000	5001123000000	5002134000000	5001133000000
4002322000100	4001323000000	4003431000000	4002332000000	4001321000000
3003311001000	3003311000000	3003221000000	3002210000000	3003300000000
2071011111000	2071000121000	2161010110000	2171100111000	2061000110000
1G00000000000	1800000000000	1800000000000	1700000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
D8G8888FFCGJ	J8GAA778AIIK	K88B888AJHKJ	KB8AFC88AKKG	I88GA768DJKK
6000000000006	6000000000006	6000000000018	6000000000007	6000000000007
V5000000000253	5000000000163	5000000000071	5000000000181	50000000001A1
O4000000001430	4000000000520	4000000001710	4000000001710	4000000002700
T3000000025100	3000000026200	3000000015100	3000000016000	3000000015000
E2000000341000	2000000451000	2010000462000	2000000461000	2000000241000
1000000420000	1000000210000	1000000310000	1000000310000	1000000220000
I6000001000000	6000011000000	6000002000000	6000001000000	6000002000000
D5001123000000	5000134000000	5000123000000	5000234000000	5000243000000
4003332000000	4002431000000	4002432000000	4001342000000	4001531000000
3003210000000	3015210000000	3013210000000	3025200000000	3013100000000
2062100100000	2061000101000	2161000000000	2061000100000	2062000210000
1800000000000	1B00000000000	1800000000000	1A00000000000	1A00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

MaxD/ NoSca/ NoL/ 010 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
IDDG8E646588	H8888A666888	G78888778IHC	H8878C878JIK	I88B8878EIHJ
6000000000012	6000000000012	6000000000024	6000000000024	6000000000014
V5000000000132	5000000000123	5000000000123	5000000000133	5000000000153
O4000000002010	4000000000221	4000000001321	4000000000321	4000000001421
T3000000111111	3000000102220	3000000022310	3000000014210	3000000026200
E2000000111110	2000000232100	2000000123100	2000000132200	2000010241000
1000000310000	1000000310000	1000000510000	1000000620000	1000000420000
I6000000000000	6000012000000	6000011000000	6000111000000	6000012000000
D5002333000000	5001123000000	5001123000000	5002034000000	5001133000000
4002323010100	4002322000000	4003411000000	4002421000000	4002431000000
3002111111100	3002221000000	3002120000000	3001110000000	3004100000000
2071000010000	2160000121000	2161000120000	2071000021000	2060000110000
1G00000000000	1800000001111	1800000000000	1700000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
E8G8878DHCGJ	I8GB87788JIK	K88B7888IIKJ	J8AC887BFKJJ	I88C876CEIK
6000001000016	6000000000016	6000000000008	600000000000A	6000001000007
V5000000000253	5000000000163	5000000000181	5000000000180	5000001000182
O4000000001520	4000000001620	4000000002610	4000000001700	4000010002710
T3000000015100	3000000026100	3000000115100	3000000016000	3001000016000
E2010000251000	2010000351000	2000000351000	2000000361000	2000000451000
1000000510000	1000000310000	1000000410000	1000000300000	1000000220000
I6000001000000	6000013000000	6000001000000	6000002000000	6000002000000
D5000243000000	5000243000000	5001135000000	5001244000000	5000153000000
4003321000000	4003520000000	4012530000000	4002430000000	4001521000000
3013100000000	3004000000000	3013100000000	3014100000000	3013100000000
2052000100000	2061000111000	2151000010000	2061000100000	2162000200000
1800000000000	1800000000000	1800000000000	1A00000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

MaxD/ NoSca/ NoL/ 015 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
IEBG8D746588	H87788666888	E78888778CHE	H8778A888IIK	I88B8778BIJI
6000000000012	6000010000002	6000010000025	6000001000024	6000000000025
V5000000001132	5000000000122	5000000001122	5000000000133	5000000000253
O4000000002010	4000000001221	4000000001221	4000000000331	4000000001420
T3000000111011	3000000012210	3000000022310	3000000015310	3000000025300
E2000000210101	2000000221101	2000000122100	2000000132100	2000000231000
1000000310100	1000000311000	1000000410000	1000000620000	1000000510000
I6000000000000	6000011000000	6000012000000	6000122000000	6000012000000
D5001233001100	5001133000000	5001123000000	5002124000000	5001244000000
4003433010100	4002312000000	4003311000000	4001321000000	4002420000000
3002101010000	3002211010000	3001121000000	3001100000000	3004100000000
2071001111100	2161100231000	2161100211000	2071000111000	2060000110000
1G00000000000	1810000000111	1700000000000	1700000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
E8E7877EGCHI	I8FB87788JIK	K88B788BIHKK	I888887CHKJK	J88C876CHJKK
6000001000016	6000000000015	6000000000008	600000000000C	6000000000006
V5000000000263	5000000000173	5000000000281	5000000000280	50000010001E3
O4000000002510	4000000002510	4000000002510	4000000002700	4000000002700
T3000000015100	3000000025200	3000000025100	3000000116000	3001000016000
E2010000251000	2010000441000	2000000451000	2000000361000	2010000450000
1000000520000	1000000310000	1000000310000	1000000210000	1000000210000
I6000001000000	6000012000000	6000002000000	6000012000000	6000002000000
D5000143000000	5000233000000	5001234000000	5001234000000	5000154000000
4003431000000	4003530000000	4013420000000	4001430000000	4002520000000
3003100000000	3004000000000	3012100000000	3014000000000	3013100000000
2062000100000	2161000111000	2150100000000	2061000100000	2161000200000
1800000000000	1800000000000	1800000000000	1A00000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

MaxD/ NoSca/ NoL/ 020 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
IEAE8B64658B	H87778656788	D78888678AHI	H87778878IIK	I8888778BHJJ
6000000000023	6000010000002	6000000000025	6000001000024	6000000000025
V5000000001111	5000000000122	5000000001122	5000000000133	5000000000253
O4000000001011	4000000001221	4000000001220	4000000000321	4000000001321
T3000000011011	3000000011210	3000000021320	3000000004210	300000002530C
E2000000100100	2000000121110	2000000121100	2000000142100	200000033100C
1000000411100	1000000310000	1000000411000	1000000620000	100000041000C
I6000000000000	6000012000000	6000012000000	6000011000000	600001100000C
D5001243001100	5001122000000	5001133000000	5002134000000	500024400000C
4003322010000	4001213000000	4002321000000	4002321000000	400152000000C
3002210101000	3002220010000	3002110000000	3001000000000	301410000000C
2071001221100	2162100221000	2161000221000	2071000121000	216000011000C
1G00000000000	1810000001111	1700000000000	1700000000000	180000000000C
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
E7B7867EBCII	I7DB87788KIK	K8887888IIKK	I888887DGJIJ	K8788768CIK
6000001000016	6000000000016	6000001000008	600000000000D	6000000000006
V5000000000163	5000010000163	5000000000281	5000000000280	50000010001G3
O4000000001410	4000000002520	4000000002510	4000000002700	400000000370C
T3000000025200	3000000025200	3001000015100	3001000026000	300100001500C
E2010000251000	2010000450000	2010000462000	2000000461000	201000045100C
1000000410000	1000000210000	1000000210000	1000000210000	100000011000C
I6000001000000	6000013000000	6000001000000	6000013000000	600000200000C
D5000144000000	5000133000000	5001145000000	5000234000000	500015400000C
4003420000000	4002630000000	4003520000000	4002430000000	400152000000C
3013100000000	3004000000000	3013100000000	3014000000000	300310000000C
2061000100000	2161000111000	2150000010000	2061000100000	216100021000C
1800000000000	1700000000000	1800000000000	1A00000000000	180000000000C
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

ShaC/ NoSca/ NoL/ 003 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
D87766636778	J7878766787A	D88868768GJK	J87886768JKK	K8887756CEKG
6000000000000	6000000000001	6000000000001	6000000000002	6000000000015
V5000011000111	5000000000013	5000000000024	5000000000046	5000001000134
O4001100000222	4000000000122	4000000001332	4000000000451	4000000001440
T3000000012211	3000000113320	3000000014311	3000000003300	3000000005300
E2000001111011	2010000141110	2010000133110	2001000133100	2000000132000
1000000301000	1000000400000	1000000510000	1000000510000	1000000420000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000010000000	5000000000000	5000011000000	5000011000000	5000100000000
4000001000000	4010111000000	4001112000000	4001221000000	4001132000000
3022332100100	3013333110000	3033422000000	3033431000000	3034332000000
2153222132011	2043121111000	2132111210000	2032101120000	2041111320000
1700000010000	1E00000000010	1700000000000	1800000000000	1A00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
F76876558JIK	J87677558KJK	F88867647HKK	G88G78647EHK	H86886644GKK
6000000000004	6000000000006	6000000000008	6000000000008	600000000000C
V5000001000164	5000011000153	5000011000181	5000001000181	50000020001E0
O4000000001521	4000000001630	4000000000710	4000010001610	4000001000700
T3000000014200	3000100004100	3000100014000	3000000014100	3000000003000
E2010000232000	2000000131000	2000000320000	2000000320000	2001000341000
1011000310000	1011000300000	1000000210000	1001000200000	1001000200000
I6000000000000	6000000000000	6000000000000	6000010000000	6000001000000
D5000001000000	5000001000000	5000011000000	5000011000000	5000021000000
4001212000000	4001222000000	4002222000000	4001312000000	4000321000000
3024231100000	3033321100000	3033311110000	3034511010000	3043220110000
2031210231000	2041011331000	2042111242000	2032001242000	2041100133000
1810000000000	1800000000000	1D00000000000	1A00000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

ShaC/ NoSca/ NoL/ 005 Vote/

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5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
D87775745778	H7877766777B	A78767778FKK	I87886768IKK	I8777765AFKI
6000000000001	6000000000002	6000000000012	6000011000004	6000001000025
V5001001000112	5000000000013	5000000000134	5000000000154	5000001000243
O4000010000322	4000000001222	4000000000432	4000000000341	400000000133C
T3000000112022	3000000013320	3000010014211	3000000014300	300010001530C
E2000000111010	2000000222100	2010000132100	2001000123100	200001023200C
1000000300000	1010000300000	1000100510000	1000000410000	100000031000C
I6000000000000	6000101000000	6000001000000	6000001000000	600010100000C
D5001111000000	5001111000000	5001121000000	5001132000000	500023200000C
4011111000000	4011231000000	4003313000000	4001431000000	400233210000C
3022120111000	3032101110000	3032110010000	3032100000000	304310000000C
2042112021100	2022011111000	2020000110000	2021000121000	202000012000C
1700000010000	1D00000000110	1800000000000	1810000000000	180000000000C
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

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30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
H76775458HKK	I86676448KJK	E88856536IKK	F78D67536DIK	H85876544GK
6000001000005	6000000000007	6000000000008	600000000000C	600000000000E
V5000001000073	5000011000152	5000011000181	5000002000180	50000020000CC
O4000000001621	4000000002630	4000010001710	4000010001610	400000100080C
T3000100005200	3000100015200	3000000004100	3000000003100	300010000300C
E2011000131000	2000000131000	2000000220000	2000000320000	200100034000C
1011000200000	1011000200000	1000000210000	1010000200000	100100010000C
I6000001000000	6000001000000	6000000000000	6000011000000	600001300000C
D5000022000000	5000122000000	5000123000000	5000134000000	500023200000C
4002421000000	4003321000000	4003411000000	4002510000000	400231000000C
3034010110000	3032011100000	3053100110000	3042100120000	305210021000C
2020110330000	2030000241000	2021000243000	2011000243000	202000014500C
1810000000000	1810000000000	1800000000000	1800000000000	180000000000C
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

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DATA SUMMARY PLOT: #

ShaC/ NoSca/ NoL/ 010 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
F87766635778	I78777657768	B78767767FKK	J86885658IKK	K87777458EKI
6000001000001	6000000000002	6000000000012	6000000000013	6000001000025
V5001000000223	5000000000013	5000010000144	5000001000145	5000000000133
O4000010010222	4000001001111	4000000001321	4000000001330	4001000001330
T3000000101111	3000000012320	3000000023210	3001000013300	3000000005300
E2000000111000	2000000222100	2000000122000	2001000033100	2000000131000
1000000300000	1000000310000	1000000510000	1011000510000	1000000210000
I6000000000000	6000011000000	6000011000000	6000010000000	6000111000000
D5002122000000	5001221000000	5001323000000	5002143000000	5000233000000
4012222011000	4012222000000	4013311000000	4001421000000	4003321000000
3041111121000	3033011110000	3042000010000	3041100100000	3043000200000
2021100110000	2020100111000	2010000111000	2010000231000	2020000231000
1800000010000	1C00000000121	1800000000000	1810000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
H76675348HKK	I86666247IKK	E87866435HKK	F77866325DIK	J86866332FKK
6000001000006	6000000000008	6000000000008	600000000000E	600000000000E
V5000001000073	5000011000161	5000012000181	5000002000180	50000020001C0
O4000100001620	4000000001520	4000000001710	4000010001610	4000010000700
T3000000004200	3000210015100	3000010003100	3000000003100	3000100002000
E2011000122000	2011000120000	2001000120000	2011000210000	2002000230000
1001000210000	1001000100000	1000000200000	1000000100000	1001000100000
I6000001000000	6000001000000	6000001000000	6000012000000	6000013000000
D5000143000000	5000223000000	5000233000000	5001133000000	5000242000000
4001320100000	4003310100000	4003310100000	4002610100000	4012310000000
3034000210000	3041000210000	3053100210000	3063000210000	3052000110000
2010000331000	2020000242000	2020000144000	2000000264000	2010000346000
1810000000000	1810000000000	1800000000000	1800000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

ShaC/ NoSca/ NoL/ 015 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
E8776563578B	B7776664776B	A78767766DJK	I86785548GKK	K87777347BKI
6000012000102	6000000000012	6000001000012	6000000000014	6000001000025
V5001100000123	5000000000013	5000010000144	5000000000144	5000011000143
O4000010001122	4000001000211	4000000001422	4000000000231	4000000001320
T3000000011110	3000000003321	3000000023210	3000000014300	3000000015300
E2000000101000	2010000131110	2000000121100	2011000022100	2000010021000
1000000200000	1000000400000	1000000510000	1001001510000	1000000210000
I6000000000000	6000011000000	6000022000000	6000011000000	6000110000000
D5013122000100	5001222000000	5002223000000	5001143000000	5000235000000
4001322101000	4022311000000	4003300000000	4012510000000	4003321100000
3041111121000	3032000110000	3042000111000	3041100010000	3042000100000
2021100110000	2010000120000	2010000111000	2010000231000	2010000341000
1800000010000	1800000000120	1800000000000	1810000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
I77665347FKK	I86656136HKK	F88766324HKK	E77866225AIK	K86766133DK
6000001000006	6000000000008	6000000000008	600000000000E	600000000000C
V5000001000072	5000011000261	5000012000181	5000002000180	500000200000C
O4000100002610	4000110001520	4000000000710	4000010001610	400001100070C
T3000010003200	3000100014200	3000010003100	3000000003100	300000000200C
E2011000131000	2000000020000	2001100220000	2010000120000	201200013000C
1001100100000	1001000100000	1000000100000	1000000000000	100000000000C
I6000012000000	6000002000000	6000002000000	6000012000000	600001300000C
D5000233000000	5000222000000	5001232100000	5000143000000	500024200000C
4002310000000	4002420100000	4003410100000	4002610000000	401231010000C
3043000210000	3052000200000	3053000210000	3053000200000	304200031000C
2010000342000	2010000352000	2010000254000	2010000264000	202100025600C
1810000000000	1800000000000	1800000000000	1800000000000	180000000000C
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

ShaC/ NoSca/ NoL/ 020 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
G87655534788	A7777654676B	A78766666BIK	I86785447GKK	K877773378KI
6001012000112	6000000000003	6000001000003	6000001000014	6000001000016
V5000110000223	5000000000022	5000010000143	5000000000155	5000010000153
O4000001000112	4000001000102	4000000000322	4000000000330	4000000001320
T3000000111110	3000000013311	3000000013310	3000000013300	3000000005300
E2000000101000	2010000122010	2010000121000	2011001113100	2010000120000
1000000201000	1000000310100	1000000510000	1001000310000	1000000210000
I6000000000000	6000101000000	6000021000000	6000011000000	6000111000000
D5012111000100	5011133000000	5001223000000	5001142000000	5000234000000
4012212001000	4012311000000	4014410000000	4012411000000	4013311100000
3030110131000	3042001110000	3041000110000	3041000210000	3042000100000
2021100110000	2000000121000	2010000112000	2111000251000	2110000352000
1800000011000	1800000000120	1810000000000	1710000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
J76675236EKK	I86665126GJK	G87766323GKK	E778661248IK	K86776132BKK
6000001000006	6000000000008	6000000000008	600000000000E	600000000000C
V5000001000072	5000011000161	5000022000181	5000002000180	50000020001C0
O4000000002520	4000110001520	4000000000710	4000010000610	4000011000700
T3000000003200	3000100003200	3000010002100	3000000003100	3001100002000
E2011000121000	2001000010000	2011100220000	2011000120000	2011000130000
1001000000000	1001000000000	1000000000000	1000000000000	1000000000000
I6000012000000	6000001000000	6000003000000	6000011000000	6000002000000
D5000233000000	5000133000000	5000232000000	5000234000000	5000242000000
4003310000000	4003310100000	4003410100000	4003510100000	4011410100000
3042000210000	3062000210000	3053000110000	3052000210000	3043000310000
2110000343000	2010000353000	2020000265000	2010000364100	2020000256000
1810000000000	1800000000000	1800000000000	1800000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

Cosi/ NoSca/ NoL/ 003 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
I66675665788	E8777735778A	KA888846D8IF	I888AB468BCD	E8887F3578EE
6000000000000	6000000000000	6000000000011	6000000000002	6000000000112
V5000000000011	5000000000112	5000000000123	5000000000233	5000000001234
O4000000011222	4000000011123	4000000012242	4000000012332	4000000011231
T3011001012321	3001000013232	3000000014311	3000000012210	3000000022200
E2000101221111	2000110011100	2000000131100	2000000133000	2000000112000
1010011210000	1000000110000	1000000200000	1000000100000	1000000000000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000001000000	5000000000000	5000001000000	5000001000000
4000000000000	4000200000000	4000111000000	4000111000000	4000122000000
3012131012000	3012222010000	3033122100000	3024421110000	3023313210000
2033322111001	2064234431000	2053433310000	2063133320000	2054412221000
1A10101100000	1800000100000	1E00000000000	1C00000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
I88888558III	E8D888447CHF	JDC88G447CIF	J888C8426CGI	HG8888536EI
6000000000015	6000000000024	6000000000023	6000000000113	6000000000024
V5000000000143	5000000001343	5000000000255	5000000000255	5000000000355
O4000000011420	4000000012421	4000000003510	4000000003521	4000000003510
T3000000015210	3000000013100	3000000012000	3000000012000	3000000012000
E2000000110000	2000000110000	2000000110000	2000000000000	2000000210000
1000000300000	1000000200000	1000000200000	1000000300000	1000000200000
I6000000000000	6000000000000	6000000000000	6000000000000	6000001000000
D5000010000000	5000001000000	5000001000000	5000000000000	5000000000000
4000011000000	4000022000000	4000111000000	4000121000000	4001121000000
3023333110000	3023331210000	3023331120000	3003233120000	3003131111000
2044423320000	2055422221000	2054334221000	2074423242000	2074522241000
1C00000000000	1A00000000000	1F00000000000	1H00000000000	1E00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

Cosi/ NoSca/ NoL/ 005 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
I666766558A8	I8777845778C	K8787846HAKI	I8878B368EDI	C8887C357DHG
6000000000011	6000000000001	6000000000013	6000000000123	6000000000114
V5000000000022	5000000000224	5000000001143	5000000001234	5000000001244
O4000000011222	4000000001222	4000100003231	4000000011321	4000010011331
T3011100111312	3000000112221	3000000022310	3000100023210	3000000022100
E2010000211011	2000000112000	2000010121100	2000000112000	2000000201000
1000010110000	1000000100000	1000000100000	1000000100000	1000000000000
I6000000000000	6000000000000	6000001000000	6000001000000	6000010000000
D5000000000000	5000011000000	5000010000000	5000011000000	5000012000000
4000111000000	4000311000000	4000211000000	4000112000000	4000111100000
3014121002000	3023011120000	3044312110000	3045421200000	3043321110000
2031212120000	2152213311000	2032212310000	2032032220000	2033202221000
1A10111110000	1810000000000	1C00000000000	1E00000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
G8888845BIII	F8A888347DJG	JDC88C436EKH	JB88B8426GJJ	EE8888426HKK
6000000000116	6000000000125	6000000000034	6000000000124	6000000000035
V5000000001253	5000000001442	5000000001454	5000000001355	5000001001454
O4000000012420	4000000012311	4000000002410	4000000003420	4000000004310
T3000000014100	3000000013000	3000000012000	3000000001000	3000000011000
E2000000110000	2000000010000	2000000200000	2000000000000	2000000200000
1000000100000	1000000200000	1000000100000	1000000200000	1000000200000
I6000001000000	6000001000000	6000001000000	6000000000000	6000002000000
D5000011000000	5000001000000	5000001000000	5000001000000	5000011000000
4000121000000	4001021110000	4000001000000	4000131100000	4002010100000
3034421220000	3023322231000	3014441231000	3013331121000	3002231121000
2042312200000	2053312111000	2064222112000	2074313131000	2073422241000
1C00000000000	1800000000000	1F00000000000	1F00000000000	1C00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

Cosi/ NoSca/ NoL/ 010 Vote/

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5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
I66686656888	IB7888337788	K8887836E8KG	I88788358HFJ	88886C247FGK
6000000000011	6000000000012	6000000000023	6000000000134	6000000000125
V5000100000122	5000000000113	5000000001133	5000000001344	5000110001243
O4000000012232	4000000002232	4000100011221	4000000002210	4000010022321
T3012101111211	3000000012211	3000000023200	3000000012200	3000000011100
E2011000111100	2000000211000	2000010111000	2000000111000	2000000100000
1000000100000	1000000000000	1000000000000	1000000000000	1000000100000
I6000000000000	6000000000000	6000000000000	6000001000000	6000011000000
D5000000000000	5000111000000	5000011000000	5000012000000	5000012000000
4001111001000	4001221000000	4000111000000	4000101000000	4000010100000
3013132001000	3122212110000	3054322210000	3045422210000	3034212210000
2030221120000	2052212331000	2032222210000	2032122321000	2043402231000
1C10000110000	1800000000000	1C00000000000	1C00000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

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30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
J88888248EJH	H8A887236FIK	KCC888235HKJ	I87888315IJK	GD7887316IK
6000000000126	6000000000126	6000000000035	6000000000126	6000000000136
V5000000001352	5000000002453	5000010001453	5000001001354	5000001001453
O4000000023210	4000000012310	4000000012400	4000000003410	4000000003410
T3000000013100	3000000011000	3000000001000	3001000000000	3000000000000
E2000000000000	2000000000000	2000000100000	2000000000000	2000000100000
1000000100000	1000000100000	1000000000000	1000000200000	1000000200000
I6000001000000	6000001000000	6000001000000	6000000000000	6000011000000
D5000011000000	5000110000000	5000001000000	5000000000000	5000000000000
4000020110000	4000010200000	4000010200000	4000110100000	4000000100000
3033321220000	3023131320000	3012211231000	3012241230000	3012230220000
2044413210000	2055423122000	2066543122000	2064424143000	2064534162000
1C00000000000	1A00000000000	1E10000000000	1G00000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

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DATA SUMMARY PLOT: #

Cosi/ NoSca/ NoL/ 015 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
J66476656888	GC887833878A	K8887835DAKG	I88888258FJK	88886A147GIK
6000000000011	6000000000012	6000000000134	6000000000235	6000000001225
V5000000101222	5000000000232	5000000002233	5000000001243	5000010001353
O4010201112222	4000000002231	4000100001120	4001000001311	4000010012210
T3001100111221	3000000012111	3000000033200	3000000123100	3000000012100
E2010000110000	2000000111100	2000000111100	2000000111000	2000000000000
1000010100000	1000000000000	1000000000000	1000000000000	1000000000000
I6000000000000	6000000000000	6000001000000	6000001000000	6000001000000
D5000000000000	5000011000000	5000111000000	5000011000000	5000012000000
4001011000000	4000221000000	4000111000000	4000010000000	4000001100000
3013112001000	3022211120000	3054313310000	3044331210000	3033221220000
2031121010000	2043212320100	2022221320000	2034323320000	2043413331000
1D10000120000	1800000010010	1C00000000000	1C00000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
K88887148BJH	I88887236GKK	KCC878235IKK	K877B8305HKK	DB7887215IKK
6000000000146	6000000000236	6000000000146	6000000000136	6000011000046
V5000000001442	5000001001443	5000001002353	5000001001353	5000101001553
O4000000013200	4000000013320	4000000001500	4000000003310	4000000003400
T3000000012100	3000000011000	3000000011000	3001000000000	3000000000000
E2000000000000	2000000000000	2000000100000	2000000000000	2000000100000
1000000000000	1000000100000	1000000000000	1000000100000	1000000100000
I6000000000000	6000001000000	6000002000000	6000011000000	6000001000000
D5000011000000	5000010000000	5000000000000	5000000000000	5000000000000
4000120100000	4000000200000	4000010100000	4000000100000	4000000100000
3033221321000	3012110221000	3000201420000	3011230330000	3011110320000
2044424320000	2065533232000	2078543133000	2065445154000	2075544163000
1E00000000000	1B00000000000	1E10000000000	1G00000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

Cosi/ NoSca/ NoL/ 020 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
J665865568A8	FC7A8833778A	JB88782588KF	I88888258EJK	B88878136EIK
6000000000002	6000000001113	6000000000134	6000000000245	6000000001345
V5000101001233	5000000000233	5000000002234	5000000001223	5000000001233
O4010100112321	4000000002111	4000000011110	4000000001220	4000000011321
T3001100111121	3000000012110	3000000023210	3000000023100	3000000012000
E2010000110100	2000000100000	2000000111000	2000000110000	2000000000000
1000000000000	1000000000000	1000000000000	1000000000000	1000000000000
I6000000000000	6000000000000	6000000000000	6000001000000	6000001000000
D5000101000000	5000011000000	5000011000000	5000011000000	5000001000000
4001011001000	4000112000000	4000111000000	4000010000000	4000010100000
3003121101000	3022311110000	3054323220000	3033331210000	3022222310000
2031121120000	2053222430100	2022222410000	2044323421000	2054413342000
1820001110000	1800000001000	1B00000000000	1C00000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
K888881378JI	J8B887136EKK	KCA878225EII	K87787205HKK	BA7877215IK
6000000000247	6000001000235	6000000000146	6000000000136	6000001000136
V5000000001342	5000000001454	5000010011343	5000001002353	5001011001453
O4000000014200	4000000003210	4000000002500	4000100002410	4000000003400
T3000000011000	3000000010000	3000000011000	3001000000000	3000000000000
E2000000000000	2000000000000	2000000000000	2000000000000	2000000100000
1000000000000	1000000000000	1000000000000	1000000100000	1000000000000
I6000000000000	6000001000000	6000001000000	6000001000000	6000001000000
D5000001000000	5000010000000	5000000000000	5000000000000	5000000000000
4000010110000	4000100100000	4000000200000	4000000100000	4000000000000
3032320420000	3012110421000	3000110220000	3001220230000	3011020321000
2055434321000	2066544242000	2078644344000	2065545254000	2075644253000
1E00000000000	1B00000000000	1E10000000000	1G00000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

BCCo/ NoSca/ NoL/ 003 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
335646777676	346767866586	468777867787	768776767776	667788678788
6000000000000	6000000000000	6000000000001	6000000000001	6000000000001
V5000000000011	5000000000001	5000000000020	5000000100101	5000000000011
O4210000110122	4100100110121	4000000110011	4000000101121	4001000011212
T3221010111121	3301000111131	3200000111222	3100000022221	3000000123322
E2112101233110	2131010322110	2220000223211	2010000131120	2210000212220
1000121111200	1000011211110	1000010311000	1000111200000	1010100210000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000000000000	5000000000000	5000000000000	5000000000000
4001001000000	4000001000000	4000010000000	4001010000000	4000110000000
3001111000000	3001221000001	3002233000000	3001232000001	3001212000000
2021212101101	2023333011201	2124322101000	2313321101111	2424234111100
1210100000000	1100000000100	1231000011000	1331000011000	1121111010000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
868877668787	B77777778888	D7777766788D	G867865778C8	F888887778DF
6000000000000	6000000000000	6000000000001	6000000000000	6000000000001
V5000000000022	5000000000012	5000000000023	5000000000122	5000000000132
O4000000011212	4000000002232	4000000011322	4000000000221	4000000000333
T3000000012221	3000000113211	3000000012212	3000000012212	3000000023211
E2110000232111	2010000132211	2000000132110	2000000142111	2000000222100
1020101200000	1001111310000	1001101410000	1001101311000	1000000410000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000000000000	5000000000000	5000000000000	5000000000000
4000010000000	4000010000001	4000001000000	4100010000000	4200110000000
3001113100000	3211222100000	3310110100000	3211111100000	3212212001000
2444423111200	2443222011000	2343233121000	2532332222000	2444233110000
1211210000000	1121111010000	1113212000000	1031211000000	1011221000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

BCCo/ NoSca/ NoL/ 005 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
334545767786	446667877586	368777777887	768887778787	76768867CAB8
6000000000011	6000000000001	6000000000011	6000000100002	6000000000001
V5110000010121	5100000000011	5000000100011	5000000000111	5000000000023
O4110000110121	4100100111221	4100000110121	4000000102111	4000000012222
T3111000112010	3111000222011	3300000122311	3100000133211	3000000113221
E2111101211110	2120000312110	2110010232100	2010000121210	2220000121310
1001121112100	1000111111000	1010010111000	1011000110000	1000100111000
I6000000000000	6000001000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000001000000	5000000000000	5000010000000	5000000000000
4000000000000	4000010000000	4001001000000	4000011000001	4000011100000
3001112000000	3002222000000	3013252000000	3002243000000	3101112000000
2020211010101	2031211011201	2112302111000	2314301000110	2423222100000
1200000000000	1200000000000	1131000000000	1330000011000	1131010000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
85888767A8F8	D67877788EBD	B778776788EG	G777875778FF	F888888778C
6000000000002	6000000000001	6000000000002	6000000000001	6000000000002
V5000000101031	5000000000133	5000000000033	5000000000123	5000000000152
O4000000001121	4000000012322	4000000011422	4000000001331	4000000001322
T3000000023301	3000000022321	3000000013210	3000000022111	3000000022201
E2010000221111	2010000222101	2000000132100	2010000141010	2000000242001
1020000210000	1001011320000	1011001410000	1001101200001	1000000400000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000010000000	5000000000000	5000000000000	5000010000000	5000100000000
4000111100000	4000000000000	4100110100000	4201011000000	4311111000000
3102113100000	3202213000000	3311111000000	3411111100000	3302212000000
2534321100000	2432231000000	2332221111000	2322332111000	2264122010000
1110000000000	1120210010000	1023211000000	1021111000000	1001221000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

BCCo/ NoSca/ NoL/ 010 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
334544768787	3466678777C6	3687877878A7	66887777888B	65667778CEGA
6000000000012	6000000000002	6000000000012	6000000100013	6000000100012
V5110000001122	5100000000131	5000000000132	5000000000133	5000000000014
O4120000301221	4200000112211	4100000111211	4000000112321	4000000012340
T3112000112010	3111100221120	3310000222211	3210000133200	3010100113311
E2111011122100	2120000322200	2100000121110	2010000221010	2320000131110
1000222101000	1000011100100	1010001111000	1010011110000	1010100210000
I6000000000000	6001001000000	6000000000000	6000000000000	6000000000000
D5000001000000	5000000000000	5000000000000	5000100000000	5000000000000
4000000000000	4001101000000	4001011000000	4001011000000	4000011100000
3001111110100	3002242000000	3002243000000	3011244000000	3200124000000
2010111010000	2021100000100	2112300001000	2305300000000	2323211000000
1300000000000	1200000000000	1141000000000	1240100011000	1020010000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
84877768F8HE	F7776578CJGJ	A76776788EHH	G77876588FII	D78788888GGK
6000000000011	6000000000002	6000000000002	6000000000012	6000000000012
V5000000001033	5000000000134	5000000000125	5000000001234	5000000000255
O4000000011422	4000000012531	4000100021441	4000000002331	4000000001320
T3000000124211	3000000024220	3001000004200	3000000022210	3000000024200
E2020000121100	2000000021001	2010000141010	2000000241000	2000000251101
1020001210000	1001112410000	1011002400000	1011001210000	1000000400000
I6000010000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000101000000	5000010100000	5000110000000	5000100000000
4000111100000	4000001100000	4100101000000	4201010100000	4301101000000
3202113000000	3302111000000	3420011000000	3510111101000	3402011000000
2434321000000	2443220000000	2322321000000	2222221000000	2152123000000
1001000010000	1010210000000	1022121000000	1022111000000	1001221000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

BCCo/ NoSca/ NoL/ 015 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
31344487A787	2356668887G6	258787788887	65A887788F88	64778878EHEH
6000000000011	6000000000022	6000000000113	6000001100012	6000000100002
V5111000001123	5100000001122	5000000100131	5000000100243	5000000001034
O4130000212121	4210000121131	4200000112211	4000000112321	4000000012432
T3211000113010	3131000222110	3310000232210	3210000033200	3010000144410
E2111110131100	2111010321100	2100000122000	2110000221000	2210000111000
1000222211000	1000101000000	1010001000000	1000000110000	1020000200000
I6001000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5001001000001	5000001000001	5000100000000	5000001000000
4000001000000	4002101000001	4000021000000	4001121100000	4000111000000
3000100110000	3001232000000	3002233000000	3001234000000	3101124000000
2000110000100	2020010000100	2113310001000	2315200000000	2414321000000
1300000000000	1200000000000	1141000000100	1230000011000	1020010000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
85877758GGIJ	E788757AAIJK	C7787768CGIG	F678775D8GKK	C78788888IK
6000010000012	6000000000012	6000000000012	6000000000002	6000000000013
V5000000001033	5000000000234	5000010000245	5000000001144	5000000001254
O4000000012431	4000000013541	4000000012531	4000000002430	4000000001320
T3000000133300	3000000034201	3000000015110	3000000022211	3000000013200
E2010000121000	2000000121001	2010000141000	2010000241000	2000000252100
1010001110000	1001012400000	1010001300000	1021000210000	1000100400000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000010000000	5001101000000	5001000100000	5001000000000	5000110000000
4000011100000	4000001100000	4101100100000	4101111100000	4302001000000
3302114100000	3301212000000	3421013000000	3501112101000	3412011000000
2334320000000	2442320000000	2322321000000	2222220000000	2152132000000
1110010010000	1011110000000	1011211000000	1011121000000	1001212000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

BCCo/ NoSca/ NoL/ 020 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
323433878786	235566888716	26878778A8A7	66A877777HB8	74768878IIGG
6000000000122	6000000000022	6000000000023	6000001100113	6000000100011
V5110000011123	5000000111132	5000100200222	5000000100252	5000000002234
O4111000202110	4301000112111	4300000102221	4000000012211	4000000013431
T3111000122100	3120000222110	3310000132210	3310000023200	3010100043211
E2112121121100	2121000221210	2000000232110	2010000231000	2210000121000
1000222110000	1000111010000	1010001000000	1000000100000	1010000200000
I6001000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000001	5001001000001	5000001000000	5001100000000	5000000000000
4000001000001	4001001100000	4000010000000	4000121100000	4000021100000
3000100000000	3001232000000	3002243000000	3001134000000	3202124000000
2000111000100	2020110000100	2123311000000	2305300000000	2314321000000
1300000000000	1200000000000	1031000000100	1230000011000	1120010010000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
85877758KHIJ	87686568FJKK	C6687668CKIF	E577765EDKKK	B6867888EIKK
6000011000012	6000000000001	6000000000012	6000000000002	6000000000012
V5000000001144	5000000000245	5000010000246	5000000001154	5000000000255
O4000000012521	4000000012531	4000000013430	4000010002731	4000000002420
T3000000024300	3000001034200	3001000025200	3000000023110	3000100024200
E2010000221000	2100000131001	2010000141000	2010000241000	2000000251100
1020001200000	1011012310000	1011001300000	1021000310000	1011000400000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000100000000	5000001000000	5000000000000	5000000000000	5000110000000
4000011200000	4000000100000	4001111100000	4101101000000	4201000000000
3201114000000	3201112100000	3411002000000	3401111100000	3403102000000
2434320100000	2431320000000	2332220000000	2322221000000	2142222000000
1111010010000	1021110000000	1012211000000	1011121000000	1000122000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

Corr/ NoSca/ NoL/ 003 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
866656755787	D7775545888E	F787754688IH	J77776468GGK	I88876378HII
6000000000001	6000000000000	6000000000001	6000000000001	6000000000012
V5000000000011	5000000000023	5000001000123	5000001001134	5000000001143
O4000001000131	4000000002422	4000000002232	4000000012322	4000000003432
T3001000011221	3000000013111	3000011013331	3000000023211	300000003331C
E2011100312211	2011011122210	2010000121100	2000101111110	201000011100C
1010010210000	1010010210000	1000100110000	1000000200000	100000021000C
I6000000000000	6000000000000	6000000000000	6000000000000	600000000000C
D5000000000000	5000000000000	5000000000000	5000000000000	500000000000C
4000000000000	4000000000000	4000000000000	4000100000000	400101010000C
3011212000000	3012122000000	3023321000000	3024512210000	302343101000C
2023322122111	2033421231010	2043232310000	2043042211000	205431220000C
1721011001000	1811101110000	1A00001000000	1C00000000000	180000010000C
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
K8887746AKGK	GB8B7755CEKK	J88887548EHK	K88887458EIG	F8A877568C[illegible]
6000000000024	6000000000014	6000000000014	6000000000113	600000000012[illegible]
V5000000000233	5000000001234	5000000000354	5000001000254	5000010001254
O4000000013531	4000000002441	4000000004420	4000010003511	400001000342C
T3000000023000	3000010013200	3001000022000	3000000014000	300000002200C
E2000000121000	2000000221000	2000000010000	2000000130000	200000013000C
1000000300000	1000000200000	1000000400000	1000000300000	100000040000C
I6000000000000	6000000000000	6000000000000	6000000000000	600000000000C
D5000000000000	5000000000000	5000001000000	5000000000000	500000000000C
4011110000000	4010211000000	4001010000000	4000111000000	400111100000C
3032422210000	3022233110000	3023231220000	3023342120000	302423211000C
2033213220000	2044411120000	2043412221000	2053212210000	205241222100C
1I00000000000	1E00000100000	1E00000000000	1C00000000000	1A00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

Corr/ NoSca/ NoL/ 005 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
A46655666787	E7775645888G	G78776468DIK	K77776568IJK	F88766478IIJ
6000000000000	6000000000011	6000000000012	6000000000012	6000000000024
V5000000000122	5000000000113	5000001000134	5000001001244	5000010001143
O4000000011122	4000000013333	4000000003342	4000000012311	4000000013521
T3011010012211	3000010021121	3000010022210	3000000024210	3000000022200
E2011000211110	2011011212100	2010000121000	2001100110000	2000010121000
1010010111000	1000000100000	1000000000000	1000000200000	1000000200000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000000000000	5000010000000	5000000000000	5000000000000
4000000000000	4000001000000	4011100100000	4011211100000	4001220200000
3012211100000	3033321110000	3034323110000	3032431110000	3034422110000
2021212121101	2022312210000	2032121110000	2022022110000	2032102100000
1811101001000	1810010010000	1D00000000000	1C00000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
K8886656EJJK	H88A6755EHKK	J88887558IIK	G8888755DIJJ	E8C86766CEKK
6000000000125	6000000000024	6000000000116	6000000000124	6000000000127
V5000000001243	5000000001344	5000000001463	5000000001354	5000020003362
O4000101013521	4000000003421	4000000014320	4000000005421	4000010002410
T3000000023000	3000010014100	3000000022000	3000000012000	3000000023000
E2000000220000	2000000120000	2000000000000	2000000120000	2000000220000
1000000200000	1000000300000	1000000400000	1000000300000	1000000300000
I6000000000000	6000000000000	6000001000000	6000000000000	6000000000000
D5000000000000	5000001000000	5000001000000	5000100000000	5000001000000
4012120000000	4021221010000	4012131010000	4011222000000	4013111100000
3023412210000	3023324110000	3034332110000	3033223110000	3023322110000
2032121110000	2032200110000	2011212110000	2032211110000	2031211010000
1G00000000000	1F00000000000	1E00000000000	1A00000000000	1A00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

Corr/ NoSca/ NoL/ 010 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
F45555666787	88776635878G	H78666368DIK	J7777657FEJK	H7876648BKKK
6000000000000	6000000000011	6000000000012	6000000000114	6000000000135
V5000010000122	5000000000124	5000001000235	5000001002233	5000010001242
O4001111011121	4000000023322	4000000012241	4000000012232	4000000022421
T3000000111111	3000010011110	3000100123200	3000001013210	3000001022100
E2021110211000	2001000111000	2000000011000	2001000110000	2000000110000
1010001110100	1000001000000	1000000000000	1000000100000	1000000200000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000010000000	5000010000000	5000000000000	5000000000000	5000000000000
4000100000000	4000210000000	4012110000000	4011211000000	4001121000000
3012221111100	3033312210100	3034232311000	3032331110000	3043322200000
2011001110000	2032111210000	2011110110000	2022111110000	2012111100000
1810000000000	1710000010000	1B00000000000	1C00001000000	1810001000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
I8886657EKKK	F7786655FHKK	J78776568KJK	C8887756IIKK	E8885666DIK
6000001000236	6000001000136	6000000000137	6000000000135	6000000000136
V5000000001332	5000021002343	5000001001543	5000000001254	5000021001463
O4000101014320	4000000002320	4000000024320	4000000005510	4000000004300
T3000000023000	3000000024100	3000000012000	3000000013000	3000000022000
E2000000220000	2010000110000	2000000010000	2000000120000	2000000120000
1000000200000	1000000300000	1000000400000	1000000300000	1000000400000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000010000000	5000000000000	5000000000000	5000000000000	5000000000000
4002211100000	4012221110000	4011121110000	4021211110000	4012111110000
3042423100000	3033323110000	3034241110000	3033233220000	3033312110000
2022010110000	2011210110000	2022201000000	2022211100000	2031210000000
1G00000000000	1F00000000000	1E00000000000	1800000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

Corr/ NoSca/ NoL/ 015 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
E335457777A8	8787553488DI	H77655368GIK	K7677547GFIK	E7776638GKKK
6000001000101	6000000000012	6000001000123	6000001010223	6000000001135
V5000010011333	5000000010235	5000001000234	5000000001234	5000011002343
O4001101011021	4000000012221	4000000012221	4000000012231	4000000023411
T3011020111111	3000011013110	3000100113200	3010000023200	3000001023100
E2031100311001	2000000101100	2000000121000	2001010111000	2010000120000
1011100121000	1000001000000	1000100000000	1000000100000	1000000100000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000010000000	5000010000000	5000011000000	5000000000000	5000000000000
4000000000000	4000200000000	4000100000000	4011110100000	4001111100000
3010211000000	3023312220000	3044323201000	3022422210000	3044431210000
2001110110000	2032111110000	2011111210000	2021111110000	2021211100000
1810001001000	1710000010000	1B00000000000	1C00011000000	1810001000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
I7786647EKKK	G7786656EJKK	I7877546BKKK	C7877655IIKK	F8884656EKKK
6000001000337	6000001000146	6000001000137	6000001000136	6000011000147
V5000000012232	5000011002232	5000000001452	5000000001343	5000021001452
O4000101014420	4000000003420	4000000025310	4010001015410	4000010005300
T3000000032000	3000010023100	3000000022000	3000000023000	3000000021000
E2001000110000	2010000120000	2000000000000	2000000110000	2000000120000
1000000200000	1000000300000	1000000400000	1000000300000	1000000400000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000001000000	5000000000000	5000000100000	5000000000000	5000001000000
4011110100000	4011111000000	4012111000000	4011210110000	4011111000000
3033423100000	3034323110000	3034341110000	3033233120000	3034311120000
2022120110000	2021320100000	2021111010000	2022211100000	2022211100000
1G00000100000	1G00000000000	1E00000000000	1A00000000000	1B00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

Corr/ NoSca/ NoL/ 020 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
F43555777788	8887563478BG	I77665368GIK	J7676547GFIK	G7776538DKKK
6000000000110	6000000000012	6000001000134	6000000000235	6000001001146
V5000011011124	5000001011224	5000001000333	5000001002134	5000010011442
O4001100011131	4000010012221	4000000002121	4000000002310	4000000023311
T3012010010110	3000010001110	3000000133200	3010000033200	3010001032100
E2020000312000	2000100001000	2010100121100	2001100110000	2000000110000
1011101110100	1000000100000	1000000000000	1000000100000	1000000200000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000001000000	5000011000000	5000000000000	5000000000000
4001010000000	4000210000000	4001100000000	4001110000000	4001110000000
3001221100000	3024222221000	3044223200000	3032332300000	3033332210000
2010100000100	2032111110000	2012110210000	2022201110000	2012310200000
1B10000001000	1710000120000	1800000000000	1C00011000000	1810001000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
I7776648EKKK	G6785557GIKK	I6777467BKKK	A7777665JIKK	D8884566GKK
6000001000347	6000012000147	6000002000237	6000001000246	6000010000147
V5000000002222	5000000002342	5000100001452	5000010001353	5000022002452
O4000100013320	4010110013410	4000010023310	4000000015410	4010010004300
T3001000032000	3000000023000	3010000022000	3011000023000	3000000022000
E2001000110000	2010001120000	2000000100000	2000000110000	2000000120000
1000000200000	1000000300000	1000000400000	1000000300000	1000000400000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000000000000	5000000000000	5000000000000	5000000000000
4011100100000	4011110000000	4001010000000	4011111110000	4001111000000
3023433100000	3033212210000	3034431110000	3023323110000	3035312110000
2021220100000	2012322010000	2021211010000	2022220110000	2022211110000
1G00000100000	1G00000000000	1C00000000000	1A00000000000	1B00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

ACor/ NoSca/ NoL/ 003 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
756877565567	865767467788	C877884788HG	888766468EGI	C877775588GH
6000000000000	6000000000000	6000000000012	6000000000003	6000000000111
V5000000000011	5000000000011	5000000001113	5000000000232	5000000000235
O4000010000221	4000000011333	4000000011342	4000010012333	4000000001232
T3000001212122	3000011012123	3000000121211	3000000013210	3000110024110
E2011001131101	2011100122100	2000000123110	2000010211000	2000000221000
1020000100000	1001000100000	1000000100000	1000000110000	1000000100000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000010000000	5000112000000	5000001000000	5000001000000
4000100000000	4000110000000	4000021000000	4000121000000	4000010000000
3012333001121	3011223100100	3023322100000	3022322210000	3022322010000
2012322211211	2033202311001	2043111310000	2053211210000	2054311220000
1710000110000	1810000010000	1800000000000	1701000000000	1800000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
J88877658CFK	888787568IFJ	HC87676678HH	G87866658BDF	F88B876578DH
6000000000025	6000000000025	6000000000024	6000000000023	6000000000033
V5000001000233	5000000001343	5000011000244	5000011000254	5000001000435
O4000010002331	4000000014421	4000000103421	4000000004511	4000000003310
T3000000104200	3000000021100	3000000013100	3000000023000	3000000012000
E2000000120000	2000000220000	2000000230000	2001000210000	2000000130000
1000000310000	1000000200000	1000000100000	1000000300000	1000000300000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000001000000	5000001000000	5000001000000	5000001000000	5000001000000
4001122000000	4001122000000	4001021000000	4000012010000	4011112000000
3034242110000	3023421110000	3034422100000	3023231110000	3022322120000
2042300120000	2054220120000	2043311111000	2053410120000	2034430110000
1C00000000000	1700000000000	1800000000000	1A00000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

ACor/ NoSca/ NoL/ 005 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
846866576677	8766764677F8	A877884788II	888776578GHJ	E87766458AJI
6000000000000	6000000000000	6000000000012	6000000001112	6000000000122
V5000000001021	5000000000131	5000000001233	5000001000243	5000001001245
O4000000011121	4000000011343	4000000011333	4000001012322	4000000002221
T3000000111212	3000000121112	3000000023110	3000010013200	3000100113200
E2011010121110	2010100122000	2000000121000	2000000220000	2000000130000
1011000111000	1001000110000	1000000100000	1000000100000	1000000100000
I6000000000000	6000000000000	6000010000000	6000000000000	6000000000000
D5000200000000	5000121000000	5000124000000	5000021000000	5000012000000
4000223000101	4000222000000	4001132000000	4012222100000	4010322000000
3012221101110	3022211111000	3034301210000	3033310100000	3033220310000
2011010110010	2032000311000	2021100200000	2031100110000	2032100110000
1610000000000	1810000000000	1800000000000	1701000000000	1A00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
H88877558DHK	888787668JEK	D88767667EIK	F8786666BFGG	D88876658DG
6000000000125	6000000000024	6000000000035	6000010000034	6000000000135
V5000001000243	5000101001464	5000011001344	5000011001354	5000001001444
O4000010003430	4000000014300	4000000003410	4000000014410	4000000003310
T3000000013200	3000000022100	3000000112100	3000000122000	3000000112000
E2000000110000	2000000220000	2000000130000	2001000110000	2000000230000
1000000300000	1000000300000	1000000200000	1000000200000	1000000300000
I6000001000000	6000000000000	6000001000000	6000000000000	6000000000000
D5000102000000	5000013000000	5000002000000	5000002000000	5000001000000
4012142000000	4012222000000	4012122000000	4011121100000	4012212010000
3043320210000	3013220110000	3043420110000	3034421010000	3033321110000
2021200120000	2041210010000	2012110000000	2031100110000	2021220010000
1C00000000000	1700000000000	1800000000000	1800000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

ACor/ NoSca/ NoL/ 010 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
855776566577	876776356888	B87787478BGI	787875478GJG	D77766568DII
6000000000000	6000000000011	6000000000112	6000000001134	6000000000124
V5000000000111	5000001001232	5000000012244	5000001001343	5000000002253
O4000010011232	4001001011333	4000000012221	4000000022321	4000000002311
T3001000111111	3000100012100	3000000022210	3001011023000	3000101123200
E2011000210100	2000000110100	2000000110000	2000000210000	2000000120000
1011000101000	1000000000000	1000000000000	1000000100000	1000000100000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000101000000	5000133000000	5000033000000	5000021000000	5000013000000
4001443000201	4000221000000	4011123100000	4011122100000	4010211100000
3001111112000	3033200201000	3045310311000	3033410100000	3032310110000
2021000110010	2032000211000	2011100100000	2021100100000	2023100010000
1810000000000	1810000110000	1810000000000	1700000000000	1B00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
H88876668FFK	87878766BKFK	E8B766668HIK	F8885666DIIH	C78876668JJK
6000001001225	6000000000136	6000010000145	6000011000134	6000000000246
V5000001001154	5000000001353	5000010001244	5000011000444	5000002001343
O4000000102510	4000000014300	4000001014410	4000000014410	4000000004310
T3000000032000	3000000132100	3000000112000	3000000133000	3010000122000
E2000000110000	2000000210000	2000000130000	2000000110000	2000000220000
1000000200000	1000000200000	1000000100000	1000000200000	1000000200000
I6000001000000	6000001000000	6000001000000	6000001000000	6000000000000
D5000002000000	5000002000000	5000002000000	5000002000000	5000002000000
4012222000000	4011113000000	4012122000000	4011211110000	4011111010000
3043330210000	3023330110000	3034230100000	3033320100000	3024430010000
2022200010000	2033210100000	2021200000000	2032210010000	2012210000000
1C00000000000	1700000000000	1800000000000	1800000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

ACor/ NoSca/ NoL/ 015 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
844776577687	A766753678D8	8877874888HI	787865578JKK	E7766557EFI1
6000000000000	6000000000011	6000000000123	6000001001233	600000100023
V5000000001221	5000000001233	5000000011345	5000001001254	500000000233
O4010010112222	4001001021232	4000000012120	4000010023311	400011001312(
T3001000210122	3000001112101	3001000122200	3000011122100	300001012210(
E2011000112100	2000100010000	2000000110000	2001000220000	200000012000(
1011000111000	1000000000000	1000000000000	1000000100000	100000010000(
I6000000000000	6000000000000	6000010000000	6000001000000	600000100000(
D5000101000000	5000132000000	5000034000000	5000011000000	500001300000(
4001453000100	4000131000000	4000221000000	4000122110000	401011010000(
3011100100001	3032101111000	3033310300000	3055410100000	302331010000(
2001000111000	2023100211000	2023100100000	2011200100000	203221011000(
1820000000000	1810000110001	1810000000000	1700000000000	180000000000(
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
G8886666CDII	A7777767FKFK	C88766668JGK	F8785575BIIJ	B7887676DII
6000000001147	6000001001237	6000010000256	6000010000245	600000100024(
V5000011011342	5000000011342	5000000001233	5000012001334	500000200124
O4000000113310	4000000015400	4000010014400	4001001014410	401001001441(
T3000000022000	3010000131000	3000000212000	3000000222000	300000011200(
E2000000110000	2000000200000	2000000120000	2000000200000	200000022000(
1000000300000	1000000200000	1000000100000	1000000200000	100000020000(
I6000001000000	6000001000000	6000001000000	6000000000000	600000000000(
D5000001000000	5000013000000	5000003000000	5000002000000	500000100000(
4011222000000	4011111000000	4011110000000	4001211100000	401200100000(
3043320210000	3023320110000	3033330110000	3022220000000	301342001000(
2022210000000	2032220100000	2022210000000	2032210020000	202233001000(
1C00000000000	1700000000000	1800000000000	1800000000000	181000000000(
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

ACor/ NoSca/ NoL/ 020 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
845776566687	B766753568C7	8877874788II	777865478IKK	D8766556FEII
6000000000011	6000000001111	6000000001234	6000001001245	6000001001345
V5000000101211	5000001011243	5000000011243	5000001001333	5000001001132
O4011000012122	4000000011222	4000000022210	4100010033211	4000100013220
T3001000110111	3001101011100	3000000222200	3001011122000	3000000122100
E2010001111100	2000100010000	2000000110000	2000000210000	2000000110000
1011000111000	1000000000000	1000000000000	1000000000000	1000000100000
I6000000000000	6000000000000	6000010000000	6000010000000	6000001000000
D5000111000000	5000132000000	5000133000000	5000012000000	5000012000000
4001543000200	4000121000000	4000112000000	4000022100000	4000100100000
3011010110001	3022201201000	3043310210000	3044400100000	3032320110000
2011000110001	2033010211000	2022100100000	2022210100000	2023110110000
1820000110000	1710000210001	1810000000000	1700000000000	1A00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
I8876666AEII	87777767JJGK	B88766668JGK	G7685576CHII	A6887575EHKK
6000000001257	6000001001247	6000010000267	6000010000146	6000001000257
V5000001001331	5000000011342	5000001011222	5000012011443	5000002001332
O4000110013310	4000000025310	4000000114400	4000000004310	4000010015410
T3000000113000	3010000222000	3000000211000	3000000222000	3000000212000
E2000000110000	2000000210000	2000000020000	2000000110000	2010000120000
1000000300000	1000000200000	1000000100000	1000000200000	1000000200000
I6000001000000	6000001000000	6000000000000	6000001000000	6000001000000
D5000002000000	5000003000000	5000003000000	5000001000000	5000001000000
4001111010000	4011011000000	4010101000000	4000101010000	4001001000000
3053310110000	3033320000000	3034230110000	3032320010000	3023320010000
2012210000000	2022310100000	2022310010000	2032320010000	2023331010000
1C00000000000	1700000000000	1800000000000	1800000000000	1810000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

XMat/ NoSca/ NoL/ 003 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
IHKJJK530000	HHGKJH520000	JKEKIG310101	JKIFHF211111	KKKIGJ11011
6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
V5000000000000	5000000000000	5000000000000	5000000000000	5000000000000
O4000000000000	4000000000000	4000000000000	4000000000000	4000000000000
T3000000000000	3000000000000	3000000000000	3000000000000	3000000000000
E2000000010000	2000000010000	2000000000000	2000000010000	2000000000000
1000000510000	1000000400000	1000000300000	1000000200000	1000000100000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000000000000	5000001000000	5000000000000	5000013000000
4000011000100	4000012000000	4000132000000	4000321000000	4000331000000
3004422013411	3004633112232	3005543013321	3016444013421	3007532013222
2084543344456	2073232255444	21C3211355465	2082100343354	2081010263534
1800002000012	1C11011000001	1800001210001	1C00011321001	1E1000251002
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
KJHGFI111122	KKKFIF111121	JIIDGE002123	KJHIHG010133	KIJIFJ0011
6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
V5000000000000	5000000000000	5000000000000	5000000000000	5000000000000
O4000000000000	4000000000000	4000000000001	4000000000001	4000000000002
T3000000001110	3000000000000	3000000001001	3000000000000	3000000000002
E2000000000000	2000000000000	2000000000010	2000000000000	2000000000000
1000000100000	1000000100000	1000000000000	1000000000000	1000000000000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000002000000	5000003000000	5000003000000	5000002000000	5000014000000
4000241000100	4001241000000	4000232000100	4001242000000	4000231000010
3006533012222	3006542012211	3006431012321	3006532013211	3006532002220
2182111075343	2172102045434	2082111054434	2172111035543	2071110036434
1A10001800011	1A20000820012	1D10000A20000	1A10000C30011	1I21000G50000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

XMat/ NoSca/ NoL/ 005 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
KKKJJJ530000	HIHKKH520000	IKFIIG320100	IKKFJH210011	IKKJHJ110110
6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
V5000000000000	5000000000000	5000000000000	5000000000000	5000000000000
O4000000000000	4000000000000	4000000000000	4000000000000	4000000000000
T3000000000000	3000000000000	3000000000000	3000000000000	3000000000000
E2000000010000	2000000010000	2000000010000	2000000000000	2000000010000
1000000410000	1000000410000	1000000300000	1000000100000	1000000100000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000001000000	5000001000000	5000001000000	5000003000000
4000213000311	4000445000221	4001356000120	4001465001121	4001473001121
3007543126333	3007431135442	3006430035532	3008310025533	3008400025422
20A1121332233	2080000233212	21A1000332134	2080000342112	2080000242214
1A00002000011	1811011000001	1800000210000	1A000012310001	1C10002510011
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
KKIHIG001012	KJJHKE010021	JGIEFF001123	KIGEFD010123	KKJFFC001123
6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
V5000000000001	5000000000000	5000000000000	5000000000001	5000000000000
O4000000000000	4000000000001	4000000000001	4000000000011	4000000000011
T3000000000000	3000000000000	3000000000000	3000000000101	3000000000000
E2000000000000	2000000010000	2000000001000	2000000000000	2000000000000
1000000000000	1000000000000	1000000000000	1000000000000	1000000000000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000004000000	5000004000000	5000005000000	5000015000000	5000016000000
4000572000112	4001372001310	4000471001301	4001462000210	4001561000210
3007300045422	3008401024322	3007310014332	3006400015321	3007300014521
2180000142322	2170000032223	2070100152212	2171000033222	2070000033022
1810001700000	1A20001D20001	1D10001820000	1A10000D30011	1G20000I40000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

XMat/ NoSca/ NoL/ 010 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
KJIIIJ440000	HIIKIK420000	KKJIKF220000	KKKHJI110011	IIKJJI01001C
6000000000000	6000000000000	6000000000000	6000000000000	600000000000C
V5000000000000	5000000000000	5000000000000	5000000000000	500000000000C
O4000000000000	4000000000000	4000000000000	4000000000000	400000000000C
T3000000000000	3000000000000	3000000000000	3000000000000	300000000000C
E2000000030000	2000000010000	2000000010000	2000000010000	200000001000C
1000000310000	1000000410000	1000000200000	1000000100000	100000000000C
I6000000000000	6000000000000	6000000000000	6000000000000	600000000000C
D5000001000000	5000001000000	5000003000100	5000014000000	500001500000C
4002233001431	4002566003232	4002575001322	4001463001321	4001562001331
3006552136435	3005410144534	3006310037453	3007300126443	3007400035523
2080000311011	2180000222111	2180000320012	2180000331012	2080000331012
1C00002000001	1811011000001	1800000310001	1800112310001	1C10012510001
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
KIIJIE010111	KKKJIF021111	JGGHFE011021	KJIFJG001023	KKJGFG0110[illegible]
6000000000000	6000000000000	6000000000000	6000000000000	600000000000C
V5000000000000	5000000000000	5000000000000	5000000000000	500000000000C
O4000000000000	4000000000011	4000000000000	4000000000011	400000000001
T3000000000000	3000000000000	3000000000000	3000000000000	300000000000C
E2000000010000	2000000010000	2000000000000	2000000000000	200000000000C
1000000000000	1000000000000	1000000000000	1000000000000	100000000000C
I6000000000000	6000000000000	6000000000000	6000000000000	600000000000C
D5000005000000	5000015000000	5000016000011	5000016000011	500002600000C
4001571001422	4001372000421	4000570002421	4001471001511	4001560002421
3007300047333	3007500026333	3008300015422	3007400025211	3007300004322
2180000231011	2180000021111	2080000141012	2170000031012	2080000131012
1810001700000	1A20001B20001	1C10001820000	1810000C20011	1E1000185000C
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

XMat/ NoSca/ NoL/ 015 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
KHKIIJ440000	GIHKHJ420000	JJJJIE220000	KKJHIG110011	KJJKIH010001
6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
V5000000000000	5000000000000	5000000000000	5000000000000	5000000000000
O4000000000000	4000000000000	4000000000000	4000000000000	4000000000000
T3000000000000	3000000000000	3000000000000	3000000000000	3000000000000
E2000000030000	2000000010000	2000000010000	2000000010000	2000000010000
1000000300000	1000000310000	1000000200000	1000000100000	1000000000000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000001000000	5000001000000	5000014000100	5000013000000	5000025000000
4003353013442	4001576002233	4002673001433	4001663001431	4002651002433
3004531225435	3006300256643	3016200136332	3007100137344	3006200035432
2080000211011	2170000220001	2180000220012	2180000230011	2170000430011
1E00002000001	1811011000000	1800000310000	1800012310001	1810012410001
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
KKIIIF010011	KKIJID010111	KGIJGD011111	KKHHKJ011022	KKJGFE001022
6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
V5000000000000	5000000000000	5000000000000	5000000000000	5000000000000
O4000000000000	4000000000000	4000000000001	4000000000010	4000000000010
T3000000000000	3000000000000	3000000000000	3000000000000	3000000000000
E2000000000000	2000000010000	2000000000000	2000000010000	2000000000000
1000000000000	1000000000000	1000000000000	1000000000000	1000000000000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000016000000	5000025000010	5000027000001	5000027000000	5000036000010
4001671001432	4001561002321	4000550002332	4002661001631	4001650002431
3007300046333	3007300025423	3008200015433	3006300035222	3007200004323
2280000231011	2170000031011	2080000141011	2180000131001	2080000130001
1810001700000	1A20001C10001	1C10001820000	1810010A20011	1C10001850000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

XMat/ NoSca/ NoL/ 020 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
JIKIKF230000	EGIJGK420000	KJKKIE220000	KKKIII110001	KJIKIK010001
6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
V5000000000000	5000000000000	5000000000000	5000000000000	5000000000000
O4000000000000	4000000000000	4000000000000	4000000000000	4000000000000
T3000000000000	3000000000000	3000000000000	3000000000000	3000000000000
E2000000020000	2000000020000	2000000020000	2000000010000	2000000010000
1000000200000	1000000300000	1000000200000	1000000100000	1000000000000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000001000100	5000012000001	5000024000011	5000033000101	5000025000010
4004453112343	4002665002333	4003764002332	4003643012522	4001651003342
3004421236443	3006200246533	3005100136433	3006100135243	3007200024422
2080000210001	2070000220001	2180000220011	2180000220011	2180000440002
1F00012100001	1811011000001	1800000310000	1800112310000	1810012400001
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
KKIIIH010000	KKIKKH020110	KIKHJD011002	KKCHKJ010011	KKKGFG00001
6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
V5000000000000	5000000000000	5000000000000	5000000000000	5000000000000
O4000000000000	4000000000000	4000000000001	4000000000010	4000000000000
T3000000000000	3000000000000	3000000000000	3000000000000	3000000000000
E2000000010000	2000000010000	2000000000000	2000000010000	2000000000000
1000000000000	1000000000000	1000000000000	1000000000000	1000000000000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000036000010	5000026000111	5000026000001	5000037000010	5000036000001
4003641000523	4003651001322	4001660002441	4002650002623	4002741002431
3005200047333	3006200026322	3007100025422	3006200026122	3006100014322
2280000231011	2180000131011	2080000131011	2180000130001	2080000121011
1810002700000	1820011810001	1C10001820000	1810010820011	1C10001850000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

ChiS/ NoSca/ NoL/ 003 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
KC8888886588	I88CBC87C88D	KB8AGED88JIK	I8DEDB88CKKK	HF8GCD86AHKK
6000000000000	6000000000001	6000000000012	6000000000013	6000000000014
V5000000000002	5000000000012	5000000000024	5000000000044	5000000000144
O4000000001211	4000000001232	4000000000331	4000000000231	4000000001540
T3000000022131	3000000014222	3000000014321	3000000015510	3000000005200
E2000000132120	2000000132210	2000000152100	2000000153000	2000000141000
1000000510000	1000000610000	1000000710000	1000000710000	1001000710000
I6000000000000	6000000000000	6000001000000	6000012000000	6000002000000
D5000011000000	5000023000000	5000011000000	5000121000000	5000122000000
4001122000000	4001422000000	4002445000000	4003433000000	4001443000000
3004432011100	3004332000000	3015331000000	3005210000000	3005201000000
2072111001101	2071000010000	2071000001000	2070000010000	2081100020000
1C10000000000	1C00000000000	1G00000000000	1C00000000000	1800000010000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
K8EB8I668KKK	KCCFCK76BKKK	K8CEDI66IKKK	K8DHBG65IJKK	KACJCG64IKKK
6000000000016	6000000000018	6000000000007	6000000000008	600000000000C
V5000000000053	5000000000161	5000000000182	5000000000181	500000000000A0
O4000000001520	4000000001620	4000000001710	4000000000700	4000000001800
T3000000016300	3000000017200	3000000008100	3000000018100	3000000008000
E2000000141000	2000000050000	2010000250000	2010000240000	2000000030000
1000000500000	1000000600000	1000000400000	1000000400000	1000000400000
I6000003000000	6000014000000	6000013000000	6000002000000	6000004000000
D5000133000000	5000152000000	5000132000000	5000132000000	5000132000000
4002431000000	4001321000000	4001533000000	4002433000000	4002521000000
3006201100000	3005401100000	3005100100000	3004301000000	3004210000000
2070000120000	2081100020000	2171110130000	2071100130000	2071010240000
1K00000000000	1G00000010000	1A00000000000	1C00000100000	1E00000110000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

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DATA SUMMARY PLOT:      #
       ChiS/       NoSca/         NoL/    005 Vote/
---------0---------0---------0---------0---------0---------0---------0---

   5 Detectors    10 Detectors    15 Detectors    20 Detectors    25 Detectors
  JB88B7F86688    H88EAA878B8B    J888GDE87IJK    I8AGDA88BKKK    FF8FCD86FIKI
 6000000000002   6000000000001   6000000000013   6000000000024   600000000001(
V5000000000213   5000000000112   5000000000123   5000000000035   500000000015:
O4000000012021   4000000001342   4000000001321   4000000000330   400000000152(
T3000001111220   3000000034211   3000000014420   3000000015510   300000000620(
E2000000231010   2000000121100   2000000141100   2000000152000   200000015100(
 1000000500000   1000000610000   1000000810000   1000000700000   100000070000(
I6000000000000   6000011000000   6000013000000   6000023000000   600001300000(
D5000134000100   5000145000000   5001245000000   5000243000000   500025400000(
 4003421000100   4002622000000   4003421000000   4004511000000   400451000000(
 3003200011000   3004100010000   3003010001000   3003100000000   300200000000(
 2070010001100   2070000011000   2070000010000   2070000010000   208000003000(
 1D10000000000   1B00000000000   1E00000000000   1C00000000000   180000000000(
  123456123456    123456123456    123456123456    123456123456    12345612345(

   Correct ID      Correct ID      Correct ID      Correct ID      Correct ID

---------0---------0---------0---------0---------0---------0---------0---

   30 Detectors    35 Detectors    40 Detectors    45 Detectors    50 Detector
  K8DABH67AKKK    KCEEAK778KKK    K8BDCI66IKKK    J8DHBF66EKKK    K8AJAG54HKI
 6000000000017   6000000000018   6000000000008   600000000000A   600000000000I
V5000000000152   5000000000172   5000000000081   5000000000180   50000000000E(
O4000000000530   4000000001610   4000000000810   4000000000710   400000000080(
T3000000026300   3000000007200   3000000018100   3000000008100   300000000B10(
E2000000151000   2000000160000   2010000240000   2010000150000   200000013000(
 1000000500000   1000000600000   1000000300000   1000000400000   100000030000(
I6000025000000   6000025000000   6000015000000   6000013000000   600001500000(
D5000153000000   5000262000000   5000252000000   5000255000000   500025300000(
 4005610000000   4003500000000   4004511000000   4004511000000   400451000000(
 3003000200000   3004000000000   3003000100000   3004100000000   300311010000(
 2070000110000   2081000021000   2161000130000   2070000120000   207000025000(
 1K00000000000   1C00000000000   1800000000000   1C00000100000   1E00000100000(
  123456123456    123456123456    123456123456    123456123456    12345612345(

   Correct ID      Correct ID      Correct ID      Correct ID      Correct ID

---------0---------0---------0---------0---------0---------0---------0---
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DATA SUMMARY PLOT: #

ChiS/ NoSca/ NoL/ 010 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
I888C788668A	EA8B8C867888	K888FAC77GIK	IB8DC8888KKK	EG7E8A86FHKK
6000000000002	6000000000001	6000000000004	6000000000024	6000000000016
V5001000000213	5000000001113	5000000000033	5000000000033	5000000000153
O4000000002121	4000000001232	4000000001221	4000000000331	4000000001420
T3000000012121	3000000024211	3000000013421	3000000016410	3000000007300
E2000000140000	2000000131100	2000000042100	2000000052000	2000000051000
1000000510000	1000000600000	1000000810000	1000000700000	1001000700000
I6000000000000	6000022000000	6000024000000	6000035000000	6000125000000
D5001244000100	5000255000000	5000344000000	5001332000000	5000142000000
4003532000000	4003511000000	4004310000000	4004410000000	4004611000000
3002000001000	3003100010000	3002000000000	3003000000000	3002000000000
2070000000000	2070000011000	2070000011000	20700000010000	2080000020000
1C10000000000	1800000000011	1E00000000000	18000000000000	17000000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
K8B8BG67AJKK	KBBDAJ778KKK	K8A8BI67HKKK	I8DDAC57DKKK	K8AH8F44GKKK
6000000000017	6000000000017	6000000000008	60000000000008	6000000000000C
V5000000000151	5000000000072	5000000000182	50000000000181	500000000000A0
O4000000001520	4000000001710	4000000001710	40000000000710	4000000001800
T3000000016200	3000000006200	3000000018100	30000000018100	3000000008100
E2010000151000	2000000160000	2010000150000	20100000250000	2010000240000
1000000400000	1000000500000	1000000400000	1000000300000	1000000100000
I6000026000000	6000026000000	6000015000000	60000140000000	6000017000000
D5001243000000	5000262000000	5000253000000	50012630000000	5000242000000
4004400000000	4003500000000	4004510000000	40044000000000	4004610000000
3003000200000	3004100100000	3002000100000	30031001000000	3013100100000
2070000121000	2071000121000	2050000120000	20600001200000	2051000240000
1I00000000000	1C00000000000	1810000000000	1C00000000000	1E00000100000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

ChiS/ NoSca/ NoL/ 015 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detector
IA88E8C8668B	D88A8A767878	I878FAB76GHK	IB8DC8788KKK	EG7F8886FCK
6000000000003	6000000000002	6000000000004	6000000000024	600000000001
V5000000010213	5000000001112	5000000000032	5000000000034	500000000015
O4000000001121	4000000001232	4000000001231	4000000000431	400000000143
T3000000012110	3000000023210	3011000013420	3000000025410	300000000720
E2000000231000	2000000121100	2000000041100	2000000042000	200000005100
1000000510000	1000000510000	1000000800000	1000000700000	100100070000
I6000001000000	6000033000000	6000044000000	6000035000000	600013600000
D5001244000100	5000245000000	5000344000000	5001242000000	500123200000
4003431001100	4004501000000	4003300000000	4005510000000	400351000000
3002000001000	3002000010000	3002000010000	3002000200000	300200000000
2070000000000	2070000021000	2060000012000	2070000011000	208000002000
1C10000000000	1800000000011	1C00000000000	1800000000000	170000000000
123456123456	123456123456	123456123456	123456123456	12345612345
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
K8A88F67AJKK	KBBBAJ778KKK	K8888I57EKKK	I8EB8A47DKKK	K88H8E35EI
6000000000017	6000000000017	6000000000008	600000000000A	600000000000
V5000000000142	5000000000072	5000000000081	5000000000180	50000000000A
O4000000000540	4000000001710	4000000001710	4000000001710	400000000180
T3000000017300	3000000006200	3000000018100	3000000018100	300001001800
E2011000161000	2000000260000	2010100250000	2010000150000	201000014000
1000000400000	1000000500000	1000000300000	1000000300000	100000010000
I6000035000000	6000026000000	6000026000000	6000014000000	600000700000
D5001243000000	5000252000000	5000253000000	5001253000000	500125200000
4005500000000	4003400000000	4004410000000	4004410000000	400361000000
3011000200000	3004000000000	3012000100000	3013000200000	301310020000
2060000111000	2071100121000	2050000120000	2060000130000	205000024000
1I00000000000	1C00000000000	1810000000000	1C00000000000	1C0000010000
123456123456	123456123456	123456123456	123456123456	12345612345
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

ChiS/ NoSca/ NoL/ 020 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
IA88E7C75678	F88B88756778	J878CA876FGK	HB8CB8778IKK	EG7F8886EBKK
6000000000103	6000000000002	6000000000013	6000000000014	6000000000016
V5000000010113	5000000000112	5000000000023	5000000000034	5000000000143
O4000000001111	4000000001232	4000000000231	4000000000431	4000000001430
T3000000011121	3000000023211	3001100012421	3000000005400	3000000007200
E2000000131000	2000000111100	2000000042100	2000000061000	2000000150000
1000000520000	1000000510000	1000000810000	1000000700000	1001000600000
I6000010000000	6000023000000	6000134000000	6000044000000	6000045000000
D5002344000200	5001354000000	5000343000000	5001332000000	5000322000000
4002432001000	4003400000000	4004310000000	4005510000000	4004510000000
3002100011000	3003000110000	3002000010000	3002000100000	3002000100000
2070000011000	2070000022000	2070000012000	2070000011000	2080000020000
1C10000000000	1A00000000011	1C00000000000	1800000000000	1700000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
K8A88E57AHKK	KBAAAG678KKK	K8878H57DKKK	I8DA8837CKKK	K88H8B35FIKK
6000000000017	6000000000017	6000000000007	600000000000A	600000000000C
V5000000000052	5000000000062	5000000000082	5000000000080	500000000000A0
O4000000001630	4000000000720	4000000001710	4000000001710	4000000000800
T3000010016200	3000000007200	3000000017100	3000000017100	3000010018000
E2011000161000	2000000260000	2010100250000	2010000150000	2010000140000
1000000300000	1000000400000	1000000200000	1000000200000	1000000000000
I6000035000000	6000026000000	6000016000000	6000015000000	6000017000000
D5001243000000	5000252000000	5000252000000	5000252000000	5001351000000
4005500000000	4003410000000	4004400000000	4005510000000	4002400000000
3012000200000	3003000100000	3012000100000	3002000200000	3013100200000
2060000121000	2071000121000	2050000120000	2070000130000	2051000240000
1I00000000000	1C00000000000	1810000000000	1C00000100000	1C00000100000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

EMat/ NoSca/ NoL/ 003 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
JJJHIK311111	KIGHIK323234	JIHKIF333567	JJGJJJ235677	KIIFGG34668
6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
V5000000000000	5000000000000	5000000000000	5000000000011	5000000000012
O4000000000000	4000000000011	4000000000223	4000000000134	4000000000243
T3000000000000	3000000001112	3000000002222	3000000003332	3000000003322
E2000000000000	2000000021000	2000000020000	2000000021100	2000000032000
1000000200000	1000000200000	1000000300000	1000000200000	1000000300000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000000000000	5000000000000	5000000000000	5000001000000
4000000000000	4000011000000	4000021000000	4000012000000	4000012000000
3003432111101	3004323102110	3006433101100	3006543010000	3006623010000
2076445565444	20A4564453422	2073443443211	20B2432352210	20C2252132201
1F20000001122	1E00000011133	1E10000011111	1C00000301001	1E00000310000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
JHJFKK246888	KIIKJK35678A	KJJGJE236888	KJKJGH247787	KHIJJK137CI
6000000000001	6000000000001	6000000000003	6000000000005	6000000000006
V5000000000013	5000000000024	5000000000033	5000000000051	5000000000062
O4000000000443	4000000000231	4000000000441	4000000000620	4000000000620
T3000000003320	3000000004421	3000000005300	3000000005100	3000000006100
E2000000032000	2000000031000	2000000010000	2000000020000	2000000021000
1000000200000	1000000300000	1000000210000	1000000200000	1000000100000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000000000000	5000001000000	5000001000000	5000012000000
4000023000000	4000123000000	4000212000000	4000233000000	4000232000000
3005542111000	3006443010000	3006543000000	3006532000000	3005532010000
2073222131111	2072322022110	2082122042110	2082222032102	2083121021000
1A10000410000	1E10000510000	1I10000620000	1G00000710000	1K00000820000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

EMat/ NoSca/ NoL/ 005 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
JKJGHK411112	JJHIIJ324224	JHIHIF334567	JJGHJK235678	KIHHIG336688
6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
V5000000000000	5000000000000	5000000000001	5000000000012	5000000000023
O4000000000000	4000000000001	4000000000123	4000000000234	4000000000242
T3000000000000	3000000002111	3000000002322	3000000003420	3000000004312
E2000000000000	2000000011000	2000000020000	2000000021000	2000000021000
1000000400000	1000000200000	1000000300000	1000000200000	1000000300000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000000000000	5000000000000	5000001000000	5000012000000
4001011000001	4000121000000	4000133000000	4000256000000	4000155000000
3006756023311	3007765122220	3008755203100	3008631121100	3008721010100
2082121454432	20A1111442232	2070000341111	20D0000242110	2080000142100
1D20000000022	1D00000000112	1E10000110000	1C00000300000	1E00000400000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
JGGFKJ247888	KJFKII24778D	KJJGHD23688D	KIIJHG146888	KHHJJJ137GEC
6000000000001	6000000000001	6000000000004	6000000000006	6000000000006
V5000000000123	5000000000134	5000000000034	5000000000042	5000000000072
O4000000000443	4000000000332	4000000000440	4000000000620	4000000000710
T3000000004210	3000000004200	3000000005300	3000000005100	3000000006100
E2000000031000	2000000031000	2000000020000	2000000030000	2000000020000
1000000200000	1000000200000	1000000210000	1000000100000	1000000110000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000001000000	5000001000000	5000012000000	5000013000000	5000024000000
4001366000000	4001255000000	4000554000000	4001454000000	4000364000000
3007420011000	3007621011000	3008321011000	3008411011000	3007510011000
2070001221111	2070011121110	2081000032110	2080000021001	2081000021000
1C10000410000	1E10000610000	1G10000610000	1G00000700000	1D00000810000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

EMat/ NoSca/ NoL/ 010 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
KKIEHJ411011	IIJHJJ312223	HHHHGH324466	JGGGFJ125668	KIEHHG236688
6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
V5000000000000	5000000000000	5000000000001	5000000000011	5000000000013
O4000000000000	4000000000011	4000000000133	4000000000234	4000000001244
T3000000000000	3000000001100	3000000002111	3000000003312	3000000004311
E2000000000000	2000000000000	2000000021000	2000000021000	2000000030000
1000000400000	1000000300000	1000000200000	1000000100000	1000000100000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000000000000	5000001000000	5000012000000	5000013000000
4000111000001	4001133000000	4000144000000	4001356000000	4001365000000
3007767124422	3007755224430	3008643123210	3008520122110	3007520122200
2071010352333	20A0000353133	2070000352111	20C0000342110	20A0000231100
1C20000000011	1C00000000112	1C10000000000	1C00000200000	1C00000300000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
JGEEKI146888	KHEJHI24778B	KIHHGB136888	KHIHGC147D8C	KDHIHI037BG
6000000000001	6000000000002	6000000000004	6000000000007	6000000000006
V5000000000024	5000000000034	5000000000042	5000000000051	5000000000082
O4000000000432	4000000000432	4000000000531	4000000001620	4000000000710
T3000000004310	3000000005200	3000000005200	3000000005100	3000000007100
E2000000030000	2000000031000	2000000020000	2000000030000	2000000020000
1000000100000	1000000200000	1000000100000	1000000100000	1000000000000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000013000000	5000013000000	5000023000000	5000026000000	5000024000000
4001464000000	4002555000000	4001644000000	4002552000000	4002664000000
3006421012000	3006310011100	3007221011100	3006410011000	3007310020000
2071000321010	2070000121010	2080000031000	2080000031000	2180000121000
1C10000300000	1E10000510000	1G10000710000	1C00000700000	1A00000810000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

EMat/ NoSca/ NoL/ 015 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
KKJFFJ611011	IHJIGI312223	HHGGGF224457	JIHGGI125667	KHEFGF236688
6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
V5000000000000	5000000000000	5000000000001	5000000000011	5000000000013
O4000000000000	4000000000001	4000000000234	4000000000324	4000000000254
T3000000000000	3000000000110	3000000002101	3000000004220	3000000004310
E2000000000000	2000000000000	2000000020000	2000000021000	2000000030000
1000000500000	1000000300000	1000000200000	1000000100000	1000000100000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000000000000	5000012000000	5000002000000	5000012000000
4002112001001	4002234000000	4001354000000	4001466000100	4001355000000
3006765124522	3007653234421	3007522023310	3007410122110	3007521122200
2071010251333	2080000342122	2070000542111	20D0000342010	2080000231100
1C10001000011	1C00000000012	1A10000000000	1C00000200000	1C00000400000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
JHFEJI136888	KGDJGI147788	KIFGFB1468BE	KFHHGD147EAD	KCGJII038CGJ
6000000000001	6000000000002	6000000000004	6000000000008	6000000000006
V5000000000034	5000000000034	5000000000043	5000000000060	5000000000072
O4000000001432	4000000000432	4000000000530	4000000000720	4000000000711
T3000000005300	3000000005300	3000000006200	3000000016100	3000000007100
E2000000030000	2000000031000	2000000020000	2000000020000	2000000020000
1000000100000	1000000100000	1000000110000	1000000100000	1000000000000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000014000000	5000014000000	5000024000000	5000026000000	5000016000000
4001573000000	4001664000000	4002653000000	4002652000000	4001573000000
3007311021100	3007310011100	3006211021100	3007310011000	3007300020000
2070000320000	2080000230000	2080000021000	2070000130000	2180000110000
1C10000400000	1E10000500000	1G10000710000	1C00000700000	1800000710000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

EMat/ NoSca/ NoL/ 020 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
IKIHIJ511010	HIKIHH312223	HHEFFI223456	IGGGIH125567	JIFGFG136688
6000000000000	6000000000000	6000000000000	6000000000000	6000000000001
V5000000000000	5000000000000	5000000000011	5000000000012	5000000000023
O4000000000000	4000000000001	4000000000123	4000000000232	4000000000343
T3000000000000	3000000000110	3000000002211	3000000003221	3000000004310
E2000000100000	2000000000000	2000000011000	2000000020000	2000000030000
1000000400000	1000000300000	1000000200000	1000000100000	1000000100000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000000000000	5000000000000	5000011000000	5000012000000	5000003000000
4001112001111	4001234000100	4001355000000	4001566000000	4001564100000
3007655135532	3007754235431	3007522224320	3007311232310	3007320012100
2071110342223	20C0000342122	2070000441111	20C0000331001	2080000331000
1C10011000012	1C00011000012	1A10000000000	1C00000200001	1A00000300000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detector
JIFCHH136888	KGDIGH14778B	KIGED80368AF	KGHHFD047BAE	KCGIHI0378G
6000000000000	6000000000002	6000000000005	6000000000007	6000000000006
V5000000000034	5000000000044	5000000000053	5000000000061	5000000000082
O4000000001442	4000000000532	4000000000531	4000000000720	4000000000700
T3000000004200	3000000005200	3000000006200	3000000006100	3000000006100
E2000000020000	2000000030000	2000000020000	2000000030000	2000000020000
1000000100000	1000000100000	1000000000000	1000000000000	1000000000000
I6000000000000	6000000000000	6000000000000	6000000000000	6000000000000
D5000014000000	5000014000000	5000024000000	5000026000000	5000016000000
4001664000000	4001564000000	4002744000000	4012651000000	4002672000000
3007211021100	3007410011100	3006110021100	3006310011000	3007200021000
2070000331000	2080000221000	2080000021000	2080000120000	2180000120000
1A10000400000	1C10000500000	1E10000810000	1C00000700000	1800000720000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

CanC/ NoSca/ NoL/ 003 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
K87E8AC66667	KEGGJK8767FD	IGDHEIC888HK	KDFGGKF88DKJ	JBGIKJ888KKK
6000000000001	6000000000002	6000000000001	6000000000014	6000000000015
V5000000000021	5000000000133	5000000000036	5000000000244	5000000000162
O4000000000323	4000000001323	4000000001432	4000000001340	4000000000611
T3001000003110	3000000012110	3000000015310	3000000006300	3000000006200
E2001000251000	2000000251000	2000000051000	2000000071000	2000000071000
1000000600000	1000000600000	1000000810000	1000000800000	1000000700000
I6000000000000	6000011000000	6000002000000	6000013000000	6000014000000
D5000002000000	5000022000000	5000022000000	5000122000000	5000132000000
4000133000010	4002333000100	4002532000000	4002633000000	4002642000000
3004542001110	3005422001000	3005222000100	3005221000000	3006200000000
2071201022000	20A1000011000	2070000011000	2080000010000	2080000010000
1G10000000000	1E00000000000	1E00000000000	1I00000000000	1H00000100000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
ICKJJJ88FKKK	KKJIGK86GKKK	KDEJKKC8HKKK	KAKJIK87JKKK	IDKKKI87KKKK
6000000000006	6000000000017	6000000000008	6000000000007	6000000000007
V5000000000163	5000000000162	5000000000171	50000000001C2	5000000000182
O4000000001630	4000000001720	4000000000810	4000000001700	4000000000800
T3000000008100	3000000008100	300000000A000	3000000008000	300000000G000
E2000000070000	2000000050000	2000000070000	2000000070000	2000000070000
1000000700000	1000000800000	1000000C10000	1000000800000	1000000800000
I6000014000000	6000015000000	6000016000000	6000014000000	6000006000000
D5000142000000	5000132000000	5000141000000	5000243000000	5000151000000
4003532000000	4003641000000	4003531000000	4003431000000	4003522000000
3005200000000	3005200000000	3005310000000	3005310000000	3005110000000
2070000010000	2080000030000	2070000010000	2070000010000	2071000010000
1G10000100000	1E00000100000	1G10000000000	1E10000100000	1A00000000000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

CanC/ NoSca/ NoL/ 005 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
JA6G8EA75678	KFAGIKA767BC	JDDGEIF788IK	KAEIHKF8CDKK	I8FIKI788IKK
6000000000012	6000000000012	6000000000012	6000000000005	6000000000016
V5000000000222	5000000000243	5000000000145	5000000000244	5000000000172
O4000000001322	4000000001222	4000000002431	4000000001440	4000000000610
T3001000012100	3000000013100	3000000014200	3000000006200	3000000007100
E2000000351000	2000000250000	2000000041000	2000000071000	2000000070000
1000000500000	1000000600000	1000000810000	1000000B00000	1000000700000
I6000000000000	6000012000000	6000023000000	6000035000000	6000037000000
D5000235000100	5000166000000	5000155000000	5000144000000	5000252000000
4001432001000	4003610000100	4004711000000	4004710000000	4003510000000
3004111012100	3005000011000	3013000000000	3004000000000	3004100000000
2070000000000	2080000001000	2070000010000	2070000010000	2070000010000
1G10000000000	1E00000000000	1E00000000000	1I00000000000	1G00000200000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
IAKJII88IKKK	KKIJGK76FKKK	KBDJJKAAGKKK	JCKHHK88JKKK	IEKKKH87KKK
6000000000006	6000000000017	6000000000008	6000000000008	6000000000008
V5000000000163	5000000000171	5000000000171	50000000001G2	50000000000C2
O4000000001720	4000000001710	4000000000810	4000000001800	4000000001800
T3000000007100	3000000008100	3000000008000	3000000008000	300000000A00C
E2000000070000	2000000050000	2000000070000	2000000070000	200000006000C
1000000800000	1000000700000	1000000A10000	1000000800000	100000080000C
I6000027000000	6000016000000	6000016000000	6000017000000	600001800000C
D5001362000000	5000273000000	5000272000000	5000362000000	500028100000C
4004510000000	4004600000000	4005710000000	4004410000000	400460000000C
3004000000000	3014000000000	3003000000000	3004100000000	300410000000C
2070000000000	2080000020000	2080000010000	2070000010000	218000002000C
1C10000100000	1C00000100000	1E00000100000	1B00000100000	180000010000C
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

CanC/ NoSca/ NoL/ 010 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
KD7H8G874577	JD8FJK87578B	JDDFDID788IK	IB8GGKE8CCKK	I8EFKI788IKK
6000000000012	6000000000012	6000000000013	6000000000016	6000000000026
V5000000000123	5000000000133	5000000000144	5000000000152	5000000000163
O4000000000111	4000000001322	4000000002531	4000000001431	4000000001510
T3000000012110	3000000013100	3000000015200	3000000006200	3000000006200
E2000000251000	2000000350000	2000000050000	2000000071000	2000000070000
1000000600000	1000000500000	1000000810000	1000000C00000	1000000700000
I6000000000000	6000025000000	6000035000000	6000046000000	6000047000000
D5000357000110	5000254000000	5001253000000	5001233000000	5000352000000
4001521001110	4004510001100	4004601000000	4005600000000	4005500000000
3004000012000	3004000011100	3013000011000	3002000000000	3003000000000
2060000010000	2080000011000	2170000010000	2070000010000	2070000010000
1E10000000000	1C00000000000	1800000000000	1E00000000000	1G00000100000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
IBKKII7BIKKK	KKGJGK77GKKK	KCEIHJ88CKKK	I8IFHK78JKKK	I8JKIG88KKKK
6000000000006	6000000000007	6000000000008	6000000000007	6000000000008
V5000000000062	5000000000282	5000000000181	500000000001E2	500000000000A1
O4000000001820	4000000002710	4000000001710	4000000001800	4000000001810
T3000000007100	3000000007000	3000000007000	3000000008000	3000000008000
E2000000080000	2000000060000	2000000070000	2010000070000	2000000070000
1000000700000	1000000700000	1000000800000	1000000600000	1000000800000
I6000037000000	6000027000000	6000017000000	6000028000000	6000018000000
D5000351000000	5001352000000	5001272000000	5001351000000	5000271000000
4005600000000	4004610000000	4004700000000	4004410000000	4005600000000
3004000000000	3003000000000	3003000000000	3003100000000	3003100000000
2070000000000	2180000020000	2080000010000	2160000010000	2170000010000
1C10000100000	1A00000200000	1C00000100000	1800000200000	1800000100000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

CanC/ NoSca/ NoL/ 015 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
JB7GAED74468	IDBFJK865688	KDFFDGB788IK	IA8GFKB88CKK	I8EGKI788IKK
6000000000012	6000000000012	6000000000013	6000000000014	6000000000017
V5000000000123	5000000000133	5000000000145	5000000000144	5000000000161
O4000000000111	4000000001331	4000000002441	4000000001431	4000000001611
T3001000012010	3000000013100	3000000015200	3000000006200	3000000006200
E2000000250000	2000000250000	2000000050000	2000000071000	2000000070000
1000000600000	1000000600000	1000000810000	1000000800000	1000000700000
I6000000000000	6000145000000	6000035000000	6000047000000	6000047000000
D5000346000200	5000343000000	5001253000000	5000233000000	5000242000000
4002531001110	4004400001100	4003500000000	4005610000000	4004600000000
3013000012100	3003000011000	3003000010000	3012000000000	3003000000000
2060000011000	2080000001000	2170000000000	2070000010000	2070000010000
1F10000000000	1C00000000000	1800000000000	1C00000000000	1G00000100000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
I8KKII7BGKKK	KIGIGK77HKKK	KCFIII78DKKK	K8JFHK68JKKK	I8HKIG78KKK
6000000000017	6000000000018	6000000000008	6000000000007	6000000000007
V5000000000052	5000000000271	5000000000171	50000000001C2	50000000001A2
O4000000001830	4000000002710	4000000002810	4000000001800	4000000000810
T3000000007000	3000000007000	3000000006000	3000000008000	300000000C000
E2000000070000	2000000060000	2000000070000	2010000070000	2000000080000
1000000600000	1000000700000	1000000700000	1000000600000	1000000700000
I6000038000000	6000037000000	6000017000000	6000028000000	6000018000000
D5001450000000	5000352000000	5001281000000	5001361000000	5000281000000
4004500000000	4006610000000	4003600000000	4005410000000	4005600000000
3004000000000	3002000000000	3004000000000	3003100000000	3003100000000
2070000100000	2180000010000	2070000010000	2160000010000	2170000010000
1C10000100000	1A00000200000	1C00000200000	1810000300000	1800000200000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

DATA SUMMARY PLOT: #

CanC/ NoSca/ NoL/ 020 Vote/

5 Detectors	10 Detectors	15 Detectors	20 Detectors	25 Detectors
J87GAIC64468	JCBFKK865688	KBFFEG8788IK	I88GDKA88CKK	I8EEKI788IKK
6000000000012	6000000000013	6000000000014	6000000000015	6000000000016
V5000000000124	5000000000142	5000000000134	5000000000154	5000000000262
O4000000000210	4000000001322	4000000001441	4000000001430	4000000001511
T3000000012000	3000000002100	3000000015200	3000000006200	3000000006200
E2000000340000	2000000240000	2000000050000	2000000070000	2010000070000
1000000500000	1000000500000	1000000810000	1000000800000	1000000700000
I6000001000000	6000145000000	6000035000000	6000048000000	6000047000000
D5001357000210	5000443000000	5001353000000	5001242000000	5000242000000
4002530001110	4004310001100	4004400000000	4004600000000	4005500000000
3013000012000	3003100011000	3003000010000	3013000000000	3003000000000
2060000011000	2080000011000	2170000000000	2060000010000	2070000010000
1F10000000000	1B00000000000	1800000000000	1C00000000000	1C00000100000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

30 Detectors	35 Detectors	40 Detectors	45 Detectors	50 Detectors
I8KKIH78GKKK	KJGJGI77HKKK	K8EIHI78CKKK	J8IFHK68JKKK	I8HKIG7AKKKK
6000000000017	6000000000017	6000000000008	6000000000007	6000000000007
V5000000000152	5000000000271	5000000000181	50000000001A2	50000000001A2
O4000000001730	4000000002720	4000000001810	4000000001800	4000000001800
T3000000007100	3000000007000	3000000007000	3000000008000	300000000A000
E2000000070000	2000000070000	2000000070000	2010000070000	2000000080000
1000000600000	1000000700000	1000000700000	1000000600000	1000000700000
I6000047000000	6000037000000	6000017000000	6000028000000	6000018000000
D5001441000000	5001351000000	5000271000000	5001361000000	5000271000000
4003410000000	4004610000000	4005700000000	4005410000000	4005600000000
3004000000000	3002000000000	3003000000000	3003100000000	3003100000000
2070000010000	2180000010000	2070000010000	2160000010000	2170000000000
1C10000100000	1A00000200000	1C00000200000	1810000300000	1800000200000
123456123456	123456123456	123456123456	123456123456	123456123456
Correct ID	Correct ID	Correct ID	Correct ID	Correct ID

Total CPU Time (seconds) = 0.1891E+05