

PULSED EMISSION OF TeV GAMMA RAYS FROM VELA PULSAR

P. N. Bhat, S. K. Gupta, P. V. Ramana Murthy, B. V. Sreekantan
and P. R. Vishwanath

Tata Institute of Fundamental Research, Bombay 400 005
India

The Ooty atmospheric Cerenkov array, consisting of 10 parabolic mirrors of 0.9m diameter and 8 of 1.5 m diameter, has been used for observations on the Vela pulsar for the last few years to see if it emits gamma rays in the TeV energy range. Signals from the pulsar were seen in 1978-79 and in 80-81.

During the winter of 1984-85, the array has been split into two parts, one consisting wholly of the smaller mirrors and other wholly of the bigger mirrors. The two arrays were operated at two different sites separated by 11 Km. This is done with the aim of distinguishing a marginally significant genuine pulsar signal from spurious signals produced trivially by chance fluctuations in the background rates; for, a genuine signal should appear simultaneously at both the places at the same phase unlike the spurious signals. The arrays were operated during clear moonless nights for a total of 27.8 hours at one site and for 8.9 hours at the other of which 6.9 hours' data were simultaneous. All the mirrors were pointed at the celestial object under investigation and made to track it for durations of the order of 1 to 6 hours during clear moonless nights. Each mirror is equatorially mounted and viewed by a fast photomultiplier, RCA 8575, mounted at the focus. Signals from 2 or 3 mirrors are added to make up a total of 4 banks and a majority logic (any 3 out of 4) is used to generate a trigger. Event times were recorded for each trigger. In addition, at one of the sites, pulse height of the Cerenkov signal from each of the reflectors was recorded. The event time data is being analysed to detect a possible pulsed emission of TeV gamma rays using the contemporaneous pulsar elements made available to us by Dr. A. R. Klekociuk (University of Tasmania, Australia) on the basis of their radio observations on the Vela pulsar.

During 1982-83 all the 18 mirrors were operated at one place and an observation lasting about 36 hours was carried out. The data were

analysed using pulsar parameters supplied by Dr. G.W.R. Royle (Univ. of Tasmania, Australia).

Results from the analyses of observations made during the winters of 1982-83 and 84-85 on steady pulsed emission as well as on possible transient emission will be presented.