

## MEASUREMENT OF THE LOCAL DENSITY SPECTRUM

Liu Z.H., Liu J.G. Li G.J.

Bai G.Z., Geng Q.X., Ling J.

Chongqing Institute of Architecture and Engineering  
Chongqing, People's Republic of China

Hazen W.E., Hazen E.S.

University of Michigan, Ann Arbor, Michigan, U.S.A.

## ABSTRACT

Since there is still disagreement among the results of various groups, we are doing a measurement of the local density spectrum with a close-packed array of four scintillators, each of area  $0.14 \text{ m}^2$ . Data are taken with conventional electronics, supervised by an on-line microcomputer. The data are stored on audio cassettes and analyzed with the aid of another microcomputer. Since we have four independent samples for each shower, uncertainties inherent in results from many earlier experiments can be minimized.

1. Introduction.

The local density spectrum provides important data for comparison with those from energy spectrum determinations and have some advantages from the experimental viewpoint. Although the measurements of density spectrum have been made for many years, there is still disagreements among the results of various groups. In order to get more detail and useful data of local particle density, some measurements and experimental plan have been made by our groups.

2. Method and experimental arrangement

The experimental arrangement consists of a small array of four plastic scintillators and a computerized

recording and analysing system. The area of each scintillator is  $0.14 \text{ m}^2$  and the thickness is 2.5 cm. The light signals are collected by a photomultiplier of model GDB-44 with a photocathode area of  $15.2 \text{ cm}^2$ . The scintillator is closed packed in a container of aluminum cone shell, and the inside surface of the container has been well polished, so the light of scintillator will be uniformly diffused.

The output from the scintillator counter has been calibrated against the response of a single particle to determine the particle number.

In order to obtain the correct value, the pre- and main amplifier has been well adjusted.

### 3. Computerized recording system.

Fig. 1 shows the associated recording and discriminating system.

The output signal from each photomultiplier are digitized through the electronics and transmitted to the computer's memory, therefore the data of each detector can be analysed separately. Use of the micro-computer offers advantages in data handling as well as provides overall system simplicity and flexibility.

### 4. Discussion.

Since we have four independent samples for each shower, uncertainties inherent in results from many earlier experiments can be minimized.

In the present measurement, only four scintillators have been operated, but it may be increased up to 8 photomultipliers.

### 5. Acknowledgements.

This work was supported by Chongqing Science and Technology Committee. We are grateful for the interest and support of Professor B.E.Wei, and we are also thank

up to 8  
PMT's

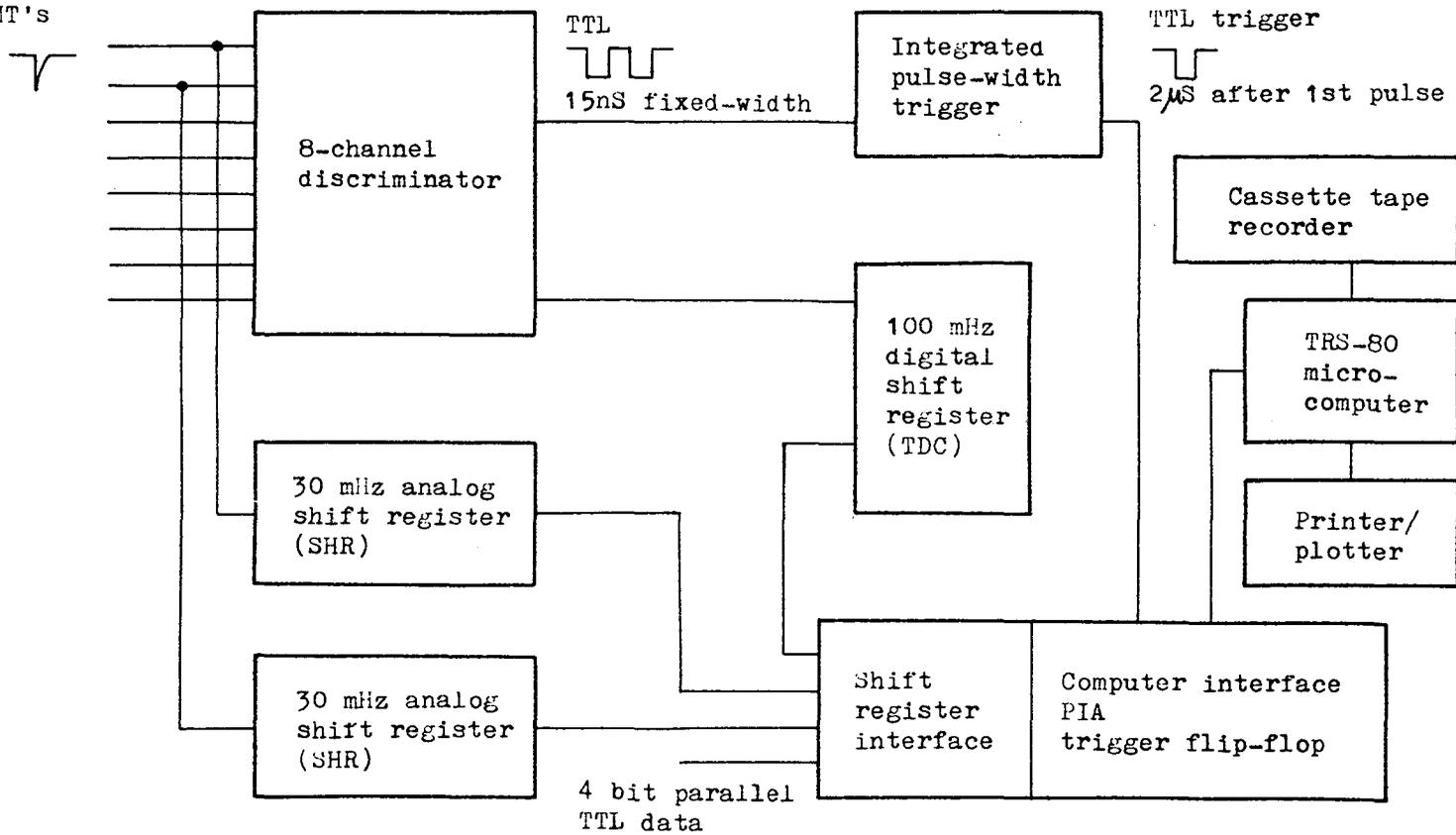


Fig. 1. Block Diagram of the Computerized Recording System

to Mr Y.H.Tan and Mr Y.F.Dai for valuable discussion.

References

- (1) Porter, M.R. et al., 17th ICRC, Conference Papers, Vol. 6, 308, 1981.
- (2) Hatano Y. et al., 16th ICRC, Conference Papers, Vol. 11, 161, 1979.
- (3) Hazen W.E. and Hazen E.S., 18th ICRC, Conference Papers, Vol. 6, 14, 1983.