

# Preliminary Results on Size spectrum and age parameter of EAS from the KGF Experiment

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## Abstract

Preliminary results from the Kolar Gold Fields (KGF) EAS experiment are presented here. The results are based on analysis of ~2 million showers collected during an effective live time of ~3600 hours, which is only ~15% of the data collected between 1987 and 1994. Further analysis is in progress.

## 1 Introduction:

The KGF EAS experiment operated a 127-detector array for nearly 10 years. All data collected have been analysed to obtain shower parameters ( Core location , Size and age). In the present work we present analysis based on a very small fraction( ~ 10%) of the analysed data . Details of the array and data recording system, have been given elsewhere (Acharya et al, 1993). Data presented here consist of about 2 million showers collected over a total operating period of  $1.3 \cdot 10^7$  seconds , spread over the period of the experiment ( 1984 – 1994). The size range covered is  $8.0 \cdot 10^4 - 10^7$  particles , corresponding to a primary energy range of approximately (0.2 – 50) PeV.

## 2 Data Analysis:

All recorded showers that passed an off-line triggering requirement were fitted to the NKG function to estimate the shower parameters, viz., size (Ne), age (s) and core coordinates (x0,y0), as well as the arrival direction  $\theta$  and  $\phi$ . At present all results are based on showers that landed within 60m from the centre of the array and arriving within  $45^\circ$  from the zenith. This resulted in a data base of  $1.4 \cdot 10^6$  showers. Results on the size spectrum for different zenith angle regions have been obtained and compared with expected spectra based on a set of simulated showers obtained using the CORSIKA code (Heck *et al.*, 1998).

**2.1 Simulations for comparison:** We have used the CORSIKA code to simulate protons and Iron showers, with simulations of other components in progress. We have simulated 200 showers in each of the 5 primary energy bins, each covering a factor of 2 in energy, the lowest bin starting from 0.2 PeV. Each of these showers is then uniformly thrown 500 times over the array (within 150m from the centre) and the estimated detector response, for each throw, becomes a simulated shower. The complete set of simulated data consists of  $10^5$  showers for each primary energy bin and each primary type and is subject to the same analysis procedure as the experimental data.

## 3 Results:

For the present we shall qualitatively set out the results and give more firm numbers at the time of the conference, when analysis will be more complete.

The size spectrum shows a knee around a size of  $10^6$  particles and shows a slight dependence on zenith angle, the spectral exponent changing from  $\sim -2.55$  , below the knee, to  $\sim -2.9$  above it. Comparison with other data, from KASCADE, EASTOP, shows reasonable consistency and detailed analysis is in progress.

## References

Acharya B.S., *et al* 1993 J. Phys. G 19 , 1053.

Acharya B.S., *et al* 1995 Nucl. Inst. Meth. A 365, 224.

Heck D., *et al.*, 1998 Report FZKA 6019, (Forschungszentrum Karlsruhe)