

SUMMARY

The results of the experimental investigation of muon and electron components of cosmic ray extensive air shower (EAS) of size 10^4 to 10^6 particles are presented in this thesis. The experiment was performed with NBU air shower array, which consisted of 21 plastic scintillation detectors for the measurement of electron density and two magnetic spectrographs for the detection and energy measurements of the muons associated with the EAS. During the experiment, more than 38,000 EAS events were recorded amongst which about 36,200 events were considered for the final analysis. The shower parameters viz. the shower size (N_e), the shower age (s) and the coordinates of the shower core (X_0, Y_0) were determined by fitting the measured electron densities with the Hillas structure function of electron distribution in EAS. The details of the experimental arrangement and the procedures of data analysis are described in Chapter III.

A brief review of the results obtained in different experiments investigating the electron and muon components of EAS are presented in first two sections of Chapter II. Similarly, a brief summary of the theoretical results representing different characteristic features of these two components of EAS calculated by different authors using various models of high energy particle interaction is presented in the last section of the Chapter II.

The results of the measurements obtained in present experiment representing various features of the distribution of electron and muons in EAS of sizes between $2 \cdot 10^4$ to 10^6 are presented in Chapter IV. The lateral distribution of electrons and muons for different muon energy thresholds between 2.5 to 100 GeV, the integral energy spectrum of the muons and the variation of muon densities with shower size are studied in detail. From the distribution of muons in an EAS of particular size, the total number of muons for different muon energy thresholds ($\geq E_{\mu}$) were calculated and their variation with the shower size and the threshold energies are studied.

Some of the representative measurements of the present experiment are compared with those obtained in other experiments. Especially, those measured in Moscow State University experiments are taken for comparison because apart from the similarities in the level of observation and the procedure of measurements, the range of muon energy and sizes of air shower investigated in this experiment overlaps with that of the present experiment. Similarly, a comparative study of the measurements of present experiment

with those calculated theoretically and reported by different authors using various models of particle interactions at high energies is presented and the results are discussed.

The results of the present experiment are summarised at the end of Chapter IV. The measurements of the present experiment are seen to be consistent with the measurements of other experiments and are found to be represented fairly well by the theoretical results calculated by different authors using Quark Gluon String (QGS) model of high energy particle interaction and normal mixed composition of the primary cosmic rays.