

P R E F A C E

The work presented in this thesis was carried out by the candidate during the period June' 81 to April' 83 (when he was a university research fellow and then from May' 83 to December'86 as a part-time teacher fellow from the Department of Physics, Darjeeling Govt. College, Darjeeling (West Bengal).

In 1981 he took active part in organising the Department of Atomic Energy (DAE) project entitled "Studies on extensive air showers (EAS) in the size-range $10^4 - 10^6$ particles." His contribution to the NBU air shower project is stated below :

1. In the development of large-area plastic scintillation detectors for the basic air shower array.
2. In the development of neon flash tube chamber as a muon detector.
3. In the setting up of two solid iron magnets to use as muon magnetic spectrographs in air shower studies.
4. Analysis of air shower data to study electron lateral distributions, muon lateral distributions, size spectrum of air showers, and energy spectrum of the primary cosmic rays (CR).

In addition to his work in the air shower project he made a study on the differential energy spectrum of vertical single muons in the energy range (10-1000) GeV.

The thesis work of the candidate has been presented in a number of chapters. In chapter - II - chapter - V, the air shower work as stated above is described. A separate chapter-VI presents the work on differential single muon energy spectrum based on the available experimental inclusive cross sections for single-pion and kaon production in the proton-proton collisions (for incident-proton laboratory energies in the range (12-1500) GeV as well as a recent primary nucleon spectrum.