## List of Tables

2.1 EAS experiments done so far ......................................................... 27

3.1 Parameters from the variation of $s_{\perp}$ with $\sec \Theta$ for three different $N_e$ intervals. The NBU data are shown for one $N_e$ interval only. ........................................ 46

4.1 Analysis showing the dependence of mean minimum local age parameter with electron size at 44 m from shower core. ......................................................... 75

4.2 Analysis showing the dependence of mean local age($s_{\text{local}}^{\text{min}}$) with truncated muon size at 44 m from shower core. ......................................................... 76

4.3 Analysis showing the dependence of mean segmented slope parameter ($\beta_{\text{max}}^{ss}$) with electron size at 71 m from shower core. ......................................................... 76

4.4 Analysis showing the dependence of mean segmented slope parameter ($\beta_{\text{max}}^{ss}$) with truncated muon size at 71 m from shower core ......................................................... 76

7.1 Analysis showing an implementation of the selection of best possible muon detection regions in opposite sides keeping several factors in mind. Here, we have used Fe showers with $E = 98 - 102$ PeV, $\Theta = 63^\circ - 68^\circ$ and $\Phi = 47.5^\circ - 57.5^\circ$. The selection is made for charged muons with $p_\mu = 10^2 - 10^3$ GeV/c. Highlighted figures correspond qualified (Q) data from the selection - Y: Yes; N:No. ......................................................... 143

7.2 Analysis showing an implementation of the selection of muons momenta in selected detection regions obtained from Table 7.1. Here, we have used Fe showers with $E = 1 - 3$, $8 - 12$, and $98 - 102$ PeV, and $\Theta = 63^\circ - 68^\circ$, and $\Phi = 47.5^\circ - 57.5^\circ$. Highlighted figures correspond qualified data from the selection. ......................................................... 144

7.3 The eccentricity parameters for showers initiated by proton and iron primaries and coming from the North direction: QGSJet model (Upper) and EPOS model (Lower). ......................................................... 156

7.4 Details of the geomagnetic field components of some geographical locations with nearly constant latitude. ......................................................... 159

7.5 Details of the geomagnetic field components of some geographical locations with nearly constant longitude. ......................................................... 159

7.6 Details of latitude, longitude and GF components for two geographical locations. ......................................................... 161

7.7 Latitude and GF components for the geographical location A, obtained from Fig. 7.14 ......................................................... 163

7.8 Longitude and GF components for the geographical location B, obtained from Fig. 7.13 ......................................................... 163

7.9 Simulation results at KASCADE level with reduced magnetic field. ......................................................... 164

7.10 Simulation results at a nearby level of KASCADE experiment with reduced magnetic field. ......................................................... 164
7.11 Analysis showing azimuthal dependence of MTMBS parameter for $\theta = 55^\circ$ and $E = 100$ PeV. Column 2 and 3 for proton initiated showers while column 4 and 5 for iron initiated showers. ................................. 169

7.12 Analysis showing zenith angle dependence of MTMBS parameter for $\Phi = 52.5^\circ$ and $E = 100$ PeV. Column 2 and 3 for proton initiated showers while column 4 and 5 for iron initiated showers. ................................. 169