ANISOTROPY STUDIES OF THE HIRES EHECR

By

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Abstract

In this thesis I present studies of the EHECR ($E > 10^{18}$ eV) arrival directions using the data from the HiRes cosmic ray detector. The aims are to look for evidence of any cosmic ray anisotropy in any particular direction, especially in the directions of *a priori* selected source candidates (Cygnus X-3, Virgo A, the AGASA triplet and the supergalactic plane). To perform these anisotropy studies it was necessary to determine in advance the uncertainties of the reconstructed cosmic ray arrival directions.

The early chapters of my thesis give an introduction to cosmic ray physics and a review of anisotropy studies undertaken by several groups. In Chapter 4, I describe in some detail the High Resolution Fly's Eye (HiRes) detector. In Chapters 5, 6, and 7, I present details of the geometry reconstruction of the arrival directions of cosmic rays (monocular and stereo events) and estimations of the uncertainties in the reconstructed arrival directions. In Chapter 8, I present the results of the arrival direction anisotropy analysis. Finally in Chapter 9, I present a summary and conclusions.