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Reconstructing the Energy of Cosmic Rays with IceTop¹ JONATHAN EISCH, ADAM WRIGHT, University of Wisconsin - Madison Department of Physics, ICECUBE COLLABORATION — The IceTop cosmic ray air shower array on the surface above the IceCube neutrino observatory detects the extensive air showers that result from cosmic ray primaries with energies between 0.1 PeV and 100 PeV. This energy range is of interest because of a characteristic drop in the flux of cosmic rays at 3 PeV (the "knee" of the cosmic ray spectrum). The reason for this feature in the cosmic ray energy spectrum is not yet known, but it may be a result of limits on the ability of supernova remnants to accelerate protons above 3 PeV. A precision measurement of the energy spectrum in this range with IceTop could lead to a better understanding of the origin of galactic cosmic rays. We outline a method for reconstructing the energy of primary particles from the lateral distribution of charge detected by IceTop using a maximum likelihood technique. The method involves a comparison of signals in the detector to simulated events of differing energy and composition. We present results on the performance of the method and its application to data taken with IceTop in 2009.

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Adam Wright University of Wisconsin - Madison Department of Physics

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