

Abstract Submitted
for the TSF12 Meeting of
The American Physical Society

Investigations of High-energy Gamma Rays through Cherenkov Radiation in Atmosphere JONATHAN CLARK, JOHN SANDY, CHRIS COWDEN, NURAL AKCHURIN, Texas Tech University — High-energy gamma rays from various sources interact with the atmosphere resulting in electromagnetic showers. Relativistic charged particles from the core of electromagnetic showers emit Cherenkov radiation which is highly directional and polarized. The size, temporal properties, as well as polarization of the Cherenkov radiation incident on the earth's surface reveal some of the fundamental properties of an incident gamma ray. The GEANT4 simulation package is used to model the electromagnetic showers resultant from gamma rays interacting with the atmosphere. We later analyze the collected data to estimate the signal generated by Cherenkov photons by an array of photo-multiplier tubes (PMTs). Our goal is to explore the feasibility of using the Cherenkov polarization information to improve measurements of high-energy cosmic rays by optimizing the configuration of an array of PMTs.

Jonathan Clark
Texas Tech University

Date submitted: 21 Sep 2012

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