Abstract Submitted
for the APR20 Meeting of
The American Physical Society

Simulation Study of Radio Signals from Cosmic Ray Air Showers for an Antenna Array at IceTop ABDUL REHMAN, FRANK SCHROEDER, Bartol Research Institute, Department of Physics and Astronomy, University of Delaware, ICECUBE COLLABORATION — Finding sources of high-energy cosmic rays (CRs) is about a century-old question. However, the mass composition of CRs contains important clues that can lead to the answers. At high energies, the mass composition of CRs is only inferred from the detection of mass-sensitive parameters of extensive air shower (EAS), like the depth into the atmosphere at which the shower contains the most number of particles ($X_{\max}$). Radio waves are emitted due to the time-varying distributions of charged particles (mostly electrons and positrons) in EASs. Most of the emission occurs from the region around $X_{\max}$ which makes the radio signal on ground sensitive to $X_{\max}$. To facilitate the computationally expensive methods for $X_{\max}$ reconstruction, we investigate an interpolation method. We use COREAS to simulate the radio signal at fixed grid positions and then use an interpolation to shift the core position at various locations. This method will be applied to the planned enhancement of the IceCube surface array (IceTop) at the South Pole. The IceTop upgrade with scintillators and radio antennas will improve its sensitivity and will open new science cases like the search for PeV gammas from the Galactic Center.

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Date submitted: 14 Jan 2020 Electronic form version 1.4