Abstract Submitted
for the MAS21 Meeting of
The American Physical Society

Analyzing the Radio Wavefront of Cosmic Ray Air Showers at the South Pole using CoREAS Simulations BENJAMIN FLAGGS, ALAN COLEMAN, FRANK SCHROEDER, University of Delaware, ICECUBE COLLABORATION — Air showers, initiated by high energy cosmic rays interacting with atmospheric nuclei, generate radio emission which can be measured by antennas. Based on previous studies, the incident radio wavefront is proposed to be either spherical, conical, or hyperbolic in shape; however, the shape of the radio wavefront has never been investigated in the IceCube radio antenna frequency band of 70-350 MHz. We studied the wavefront shape using CoREAS (Corsika-based Radio Emission from Air Showers) simulations for several hundred air showers of varying energies and zenith angles where the simulated emission is measured at various locations in the shower coordinate system. For each air shower, the radio wavefront is fit to a hyperbolic shape. A relationship between the air shower geometry and radio wavefront is suspected. Hence, the radio wavefront shape could be used to probe the atmospheric depth of shower maximum, which is related to the mass of the primary particle although more research is needed to form a definite conclusion.

Benjamin Flaggs
University of Delaware

Date submitted: 01 Nov 2021 Electronic form version 1.4