Abstract Submitted
for the APR21 Meeting of
The American Physical Society

Radio Wave Propagation in Depth-Dependent Anisotropic Media, With Application to Neutrino Vertex Reconstruction[1] NICHOLAS HARTY, DAVID SECKEL, University of Delaware — High energy neutrinos interact with glacial ice at the South pole. These interactions produce radio frequency emissions through the Askaryan effect. The Askaryan Radio Array (ARA) studies these emissions using radio antennas placed in the ice to reconstruct individual neutrino events. The second generation IceCube (IceCube Gen-2), includes plans for an array of radio stations to enhance sensitivity at the highest neutrino energies. Past studies have suggested glacial ice sheets behave as a biaxial, depth dependent medium. Here we develop a theoretical model for radio-frequency electromagnetic propagation in South Pole ice using coupled ordinary differential equations (ODEs). We then test this model against experimental radio sounding data, using several different index of refraction profiles. Lastly, we implement a Python package to deal with general anisotropic, depth-dependent radio propagation into NuRadioMC, a monte carlo simulation package used to simulate neutrino interactions.

[1]This conference participation is supported by NSF grant 2019597 'RII Track-2 FEC: The IceCube EPSCoR Initiative (IEI) - IceCube and the Data Revolution'

Nicholas Harty
University of Delaware

Date submitted: 08 Jan 2021 Electronic form version 1.4