Contribution ID: **1174** Type: **Poster**

Modeling Biaxial Birefringence in Antarctic Ice with the Askaryan Radio Array

The Askaryan Radio Array (ARA) is a neutrino observatory at the South Pole designed to search for ultra-high energy (UHE) neutrinos by observing radio emission from the Askaryan effect in Antarctic ice. Ice is a preferred detection medium for neutrino observatories because it is a radio-transparent, dense medium available in large volumes in nature, which is necessary for searching for the low flux of UHE neutrinos. Accurately reconstructing UHE neutrino signals requires understanding radio propagation in the ice. South Pole ice may exhibit biaxial birefringence, which causes radio signals to split into two separate rays traveling at different speeds while undergoing polarization rotation. These two effects depend on both the direction of propagation and the initial polarization of the radio emission, and, if present, must be accurately modeled to correctly reconstruct neutrino trajectories. To investigate this, we analyze controlled radio signals from a transmitter lowered into the 1,751-meter-deep borehole of the South Pole Ice Core Experiment (SPICE). Using five ARA stations, we detect signals from the SPICE borehole to search for evidence of biaxial birefringence in Antarctic ice. In this talk, I will discuss the impact of birefringence on radio signal propagation, our approach to modeling these effects, and results from the ARA-SPICE data.

Collaboration(s)

ARA

Author: MACHTAY, Alex (The Ohio State University)

Presenter: MACHTAY, Alex (The Ohio State University)

Session Classification: PO-2

Track Classification: Neutrino Astronomy & Physics