

Abstract Submitted
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Designing and Testing Novel Antennas for In-Ice Neutrino Experiments¹ JULIEN ALFARO, California State University, Stanislaus, DR. STEPHANIE WISSEL, BRYAN HENDRICKS, Pennsylvania State University — Neutrinos are fundamental particles that are uncharged and only interact through the weak force. This makes them ideal messenger particles because they can propagate over cosmological distances undeflected and unimpeded. The highest energy neutrinos are produced in interactions involving high energy cosmic rays and therefore provide important information about the most energetic acceleration processes in the universe. In-ice radio arrays can detect ultra high energy (UHE) neutrinos in the PeV to >10 EeV range by detecting radio emission produced in showers when UHE neutrinos interact with the ice. This project aims to design, build, and test horizontally polarized antennas for improved gain and angular resolution in order to reconstruct neutrino arrival direction. We compare several designs including helical, folded dipoles, halo antennas, and sinuous antennas, evaluating each antenna for its gain, efficiency, and reproducibility. Designs are simulated using the XFDTD electromagnetics software and constructed in the lab, enabling a comparison of the performance of the realized antenna with models.

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