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Ray Propagation in Ice for Radio Cherenkov Neutrino Experiments CHRISTOPHER WEAVER, University of Wisconsin Madison — Understanding the propagation of radio signals in ice is important for existing and future south polar neutrino experiments to observe high-energy astrophysical neutrinos via radio emission from the Askaryan effect. This includes the Askaryan Radio Array (ARA), a new detector being constructed, which is planned to cover an approximately 80 km^2 area, and to detect GZK neutrinos at a rate of a few per year, with sensors placed at relatively shallow depths. In order to both simulate the behavior of the detector and reconstruct collected data, the paths of the radio signals through the ice must be accurately calculated, which involves nontrivial optics problems arising from the depth dependent properties of the naturally-occurring antarctic ice. Since analytical solutions for the ray paths are not known, it is necessary to use numerical ray-tracing. We show how existing optics results can be applied to increase the efficiency of the ray-tracing calculations, and present initial results with existing radio experiments using these tools.

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