Computational Techniques in Radio Neutrino Event Reconstruction M. BEYDLER, University of Wisconsin - Madison, ARA COLLABORATION — The Askaryan Radio Array (ARA) is a high-energy cosmic neutrino detector constructed with stations of radio antennas buried in the ice at the South Pole. Event reconstruction relies on the analysis of the arrival times of the transient radio signals generated by neutrinos interacting within a few kilometers of the detector. Because of its depth dependence, the index of refraction in the ice complicates the interferometric directional reconstruction of possible neutrino events. Currently, there is an ongoing endeavor to enhance the programs used for the time-consuming computations of the curved paths of the transient wave signals in the ice as well as the interferometric beamforming. We have implemented a fast, multi-dimensional spline table lookup of the wave arrival times in order to enable raytrace-based directional reconstructions. Additionally, we have applied parallel computing across multiple Graphics Processing Units (GPUs) in order to perform the beamforming calculations quickly.

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