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Towards an End-to-End Optimization of IceCube-Gen2 Neutrino Observatory

Tuesday 13 September 2022 16:50 (20 minutes)

I will present the status of optimizing the radio detector of the planned IceCube-Gen2 neutrino observatory at the South Pole. IceCube-Gen2 will enable neutrino astronomy at ultra-high energies (UHE) and will provide insights into the inner processes of the most violent phenomena in our universe. Detecting these UHE neutrinos would be one of the most important discoveries in astroparticle physics in the 21st century. However, the radio detector has not been optimized for its primary objective of measuring the neutrino's energy and direction because of the limitations of current methods. We plan to solve that using differential programming and deep learning to optimize the detector design end-to-end. The project is timely as the detector design can still be influenced over the next three years before production starts in 2025.
I will present first results from surrogate models to replace the time-consuming MC simulations, as well as DNNs for event reconstruction to quantify the detector resolution.

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