Contribution ID: **57**   Type: **Talk**

Optimization of the Future P-ONE Neutrino Telescope

Wednesday 14 September 2022 09:00 (20 minutes)

P-ONE is a planned cubic-kilometer-scale neutrino detector in the Pacific ocean. Similar to the successful Ice-Cube Neutrino Observatory, P-ONE will measure high-energy astrophysical neutrinos to help characterize the nature of astrophysical accelerators. Using existing deep-sea infrastructure provided by Ocean Networks Canada (ONC), P-ONE will instrument the ocean with optical modules - which host PMTs as well as readout electronics - deployed on several vertical cables of about 1km length. While the hardware design of a first prototype cable is currently being finalized, the detector geometry of the final instrument (up to 70 cables) is not yet fixed.

In this talk, I will present the progress of optimizing the detector design using ML-based surrogate models, which replace computationally expensive MC simulations, and, by providing gradients, allow efficient computation of the Fisher Information Matrix as an optimization target.

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Session Classification: Applications in AstroHEP

Track Classification: Astrophysics and Cosmology