

Neutrino Experiment Design Optimization with Machine-Learning

Monday, 25 May 2026 11:45 (15 minutes)

The geometrical layout of any experiment or detector can have a large impact on its ability to produce meaningful outcomes for physics. Oftentimes we see that optimal geometries can be unintuitive. Studying and optimizing this is therefore essential. This has become a relevant topic for the optimization of cubic-kilometer-scale neutrino telescopes, in particular, the Pacific Ocean Neutrino Experiment (P-ONE), which is planned to be constructed in the coming years. With more than 70 lines across multiple kilometers of seafloor, the P-ONE geometry is yet to be finalized and studies on how to place these lines can inform crucial design decisions. Here, possible geometric optimization of such an experiment will be discussed, in particular, how it will employ machine-learning techniques to apply end-to-end optimization.

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Session Classification: Topical Sessions

Track Classification: Analysis Tools, ML Algorithms, Low-Level Reconstructions, Triggers, ...