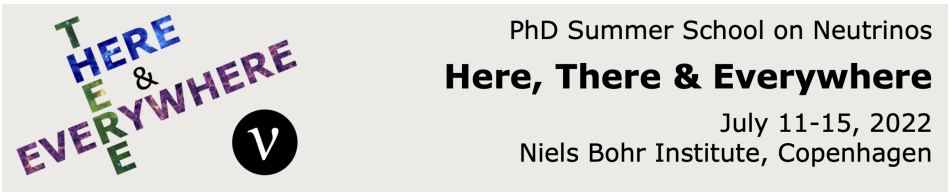

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Machine-learning aided experimental design for P-ONE

Wednesday 13 July 2022 14:48 (12 minutes)

The Pacific Ocean Neutrino Experiment (P-ONE) is a collaboration of Ocean Networks Canada (ONC) and Universities from Germany, Canada, and the USA to build a large volume neutrino telescope in the Pacific Ocean. Similar to other neutrino telescopes, P-ONE wants to instrument the ocean with photosensors deployed on vertical cables (lines) to detect high-energy neutrino interactions by the Cherenkov light emitted from secondary particles.
The design of such telescopes has a variety of free parameters, such as the sensor spacing and sensor density, trigger algorithms and thresholds, or hardware used for signal digitization. These parameters directly impact the physics potential of the telescope and need to be optimized under external constraints (cost, bandwidth, site limitations). These optimization studies typically require expensive Monte-Carlo simulations that limit the explorable parameter phase space.
This talk presents a framework that uses graph-neural networks and multi-parameter optimization to comprehensively explore the parameter phase space while reducing the simulation time. The framework facilitates a data-driven decision process for the design of P-ONE, maximizing the physics potential while minimizing the expenses.

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