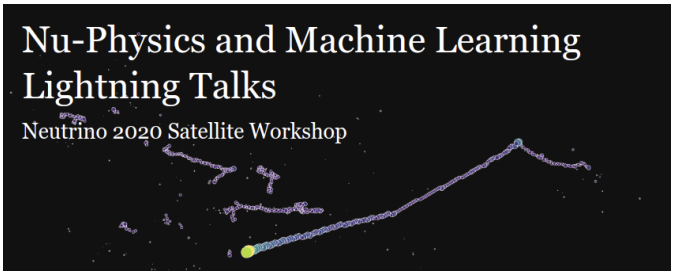

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Efficient neutrino oscillation parameter inference using Gaussian processes

Friday, 19 June 2020 13:15 (15 minutes)

The unified approach of Feldman and Cousins allows for exact statistical inference of small signals that commonly arise in high energy physics. It has gained widespread use, for instance, in measurements of neutrino oscillation parameters in long-baseline experiments. However, the approach relies on the Neyman construction of the classical confidence interval and is computationally intensive as it is typically done in a grid-based fashion over the entire parameter space. In this article, we propose an efficient Bayesian optimisation algorithm for the Feldman-Cousins approach using Gaussian Process to construct confidence intervals iteratively. We show that in the neutrino oscillation context, one can obtain confidence intervals fives times faster in one dimension and ten times faster in two dimensions, while maintaining an accuracy above 99.5%.

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