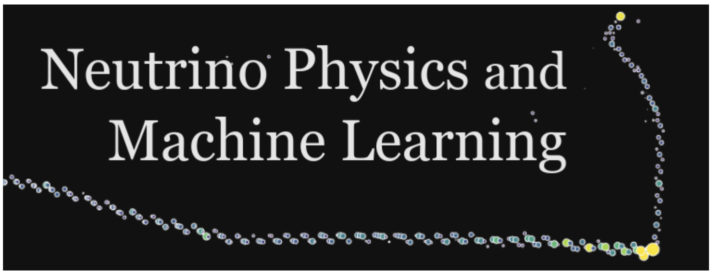

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Normalizing flows applications in neutrino physics: likelihood-free inference and efficient Monte Carlo generation

Tuesday, 14 July 2020 10:50 (25 minutes)

Normalizing flows present a powerful framework to sample and evaluate probability density functions via neural networks. In this work we address two applications of them in the domain of neutrino physics: i) Perform likelihood-free inference of the measurement of neutrino oscillation parameters in Long Baseline neutrino experiments. A method adapted to physics parameter inference is developed and applied to the case of the disappearance of muon neutrino analysis at the T2K experiment. ii) The generation of accurate neutrino-nucleus cross-section models needed for neutrino oscillation experiments require simultaneously the description of many degrees of freedom and precise calculations to model nuclear responses. The detailed calculation of complete models makes the Monte Carlo generators slow and impractical. We present Exhaustive Neural Importance Sampling (ENIS), a method based on normalizing flows to find a suitable proposal density for rejection sampling automatically and efficiently, and discuss how this technique solves common issues of the rejection algorithm.

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