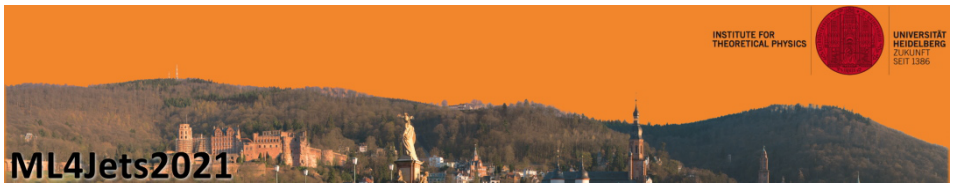

Contribution ID: **25** Type: **not specified**

Uncertainty Aware Learning for High Energy Physics

Thursday, July 8, 2021 3:20 PM (20 minutes)

Machine learning techniques are becoming an integral component of data analysis in High Energy Physics (HEP). These tools provide a significant improvement in sensitivity over traditional analyses by exploiting subtle patterns in high-dimensional feature spaces. These subtle patterns may not be well-modeled by the simulations used for training machine learning methods, resulting in an enhanced sensitivity to systematic uncertainties.
Contrary to the traditional wisdom of constructing an analysis strategy that is invariant to systematic uncertainties, we study the use of a classifier that is fully aware of uncertainties and their corresponding nuisance parameters. We show that this dependence can actually enhance the sensitivity to parameters of interest. Studies are performed using a synthetic Gaussian dataset as well as a more realistic HEP dataset based on Higgs boson decays to tau leptons. For both cases, we show that the uncertainty aware approach can achieve a better sensitivity than alternative machine learning strategies.

https://arxiv.org/abs/2105.08742

Affiliation

University of California, Irvine, Lawrence Berkeley National Laboratory

Academic Rank

Postdoctoral researcher

Primary authors: GHOSH, Aishik (University of California Irvine (US)); NACHMAN, Ben (Lawrence Berkeley National Lab. (US)); WHITESON, Daniel (University of California Irvine (US))

Presenter: GHOSH, Aishik (University of California Irvine (US))

Session Classification: Interpretability, Robustness, and Uncertainties