Contribution ID: **10** Type: **not specified**

Treating Detector Systematics via a Likelihood Free Inference Method

Tuesday 3 October 2023 16:25 (20 minutes)

Estimating the impact of systematic uncertainties in particle physics experiments is challenging, especially since the detector response is unknown analytically in most situations and needs to be estimated through Monte Carlo (MC) simulations. Typically, detector property variations are parameterized in ways that implicitly assume a specific physics model, which can introduce biases on quantities measured by an analysis. This talk presents a method to recover a model-independent, event-wise estimate of the detector response variation by applying a likelihood-free inference method to a set of MC simulations representing discrete detector realizations. The method provides a re-weighting scheme for every event, which can be used to apply the effects of detector property variations decoupled from the assumed physics model. We demonstrate the performance of the method on a simplified MC model of a neutrino oscillation experiment and show that it fully decouples the modeling of the detector response from the physics parameters to be measured in an MC forward-folding analysis.

Author: Ms TRETTIN, Alexandra (University of Manchester)

Co-authors: Mr FISCHER, Leander (DESY); Mr NAAB, Richard (DESY)

Presenter: Ms TRETTIN, Alexandra (University of Manchester)

Session Classification: Methods