

Response Matrix Estimation in Unfolding Differential Cross Sections (20+20)

Tuesday 11 June 2024 16:40 (40 minutes)

In unfolding problem, the response matrix is the forward operator which models the detector response. In practice, the response matrix is not known analytically. Instead, it needs to be estimated using Monte Carlo simulation, which introduces statistical uncertainty into the unfolding procedure. This raises the question of how to estimate the response matrix in a sensible way. In most analyses at the LHC, this is done by binning the events and counting the corresponding numbers of events from bins to bins. However, this approach can suffer from undersmoothing, especially with a small sample size. To address this issue, we propose a two-step approach to response matrix estimation. First, we estimate the response kernel on the unbinned space. Second, we propagate the estimated response kernel into an integral equation to obtain an estimate for the response matrix.

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