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ALICE - non parametric and parametric models, dealing with uncertainty

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ALICE, one of the four big experiments at the CERN LHC, is a detector dedicated to heavy-ion physics. A high interaction rate environment causes pile-up which necessitates the use of advanced methods of data analysis.

Over the recent years machine learning (ML) has come to dominate multi-dimensional data analysis. However, it is more difficult to interpret the ML models and to evaluate their uncertainties, which are offered by classical approaches.

In this presentation, I will show how ML is used in ALICE for reconstruction, calibration, and MC simulations. In more detail, We will demonstrate how we combine ML with a parametric model, in order to yield a compact representation of physics processes. Our main use case is the calibration of space charge distortions, which requires estimates of reducible and irreducible uncertainties. We will demonstrate how this and other use cases (PID, V0 reconstruction, MD/data remapping) are solved with our approach and will describe the features of the software we developed.

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