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The Matrix Element Method at the LHC: status and prospects for RunII

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The Matrix Element reweighting Method (MEM) is a powerful multivariate method allowing to maximally exploit the experimental and theoretical information available to an analysis. Several applications of the MEM at LHC experiments are discussed, such as searches for rare processes and measurements of properties of the Standard Model Higgs boson. The MadWeight phase-space generator, allowing for a fast and automated computation of MEM weights for any user-specified process, is briefly reviewed. A new implementation of the MEM in the C++ language, MEM++, is presented. MEM++ builds on the changes of variables used by MadWeight to accelerate the rate of convergence of the calculations, while aiming at a much improved modularity and maintainability, easing the use of the MEM for high-statistics data analyses. As examples of this modularity, the possibility to efficiently compute several weights in parallel (propagation of systematic uncertainties such as Jet Energy Scale, variations of theoretical parameters), and the straightforward implementation of the Differential MEM (DMEM), are discussed.

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