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Unbinned measurements in global SMEFT fits from machine learning

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Global interpretations of particle physics data in the context of the Standard Model Effective Field Theory (SMEFT) rely on the combination of a wide range of physical observables from many different processes. We present ongoing work towards the integration of unbinned measurements into such global SMEFT interpretations by means of machine learning tools. We use a deep-learning parametrisation of the extended log-likelihood to perform an optimal unbinned multivariate analysis in the EFT parameter space, taking model uncertainties into account via the replica method. We carry out a variant of the SMEFiT global analysis using unbinned particle-level predictions of top-quark pair production and Higgs production in association with vector bosons as a proof of concept. We demonstrate the impact that such measurements would have on the EFT parameter space as compared to traditional unfolded binned measurements.

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