

The LHC Run II top quark data legacy on global PDF and SMEFT analyses

Tuesday 10 January 2023 16:40 (20 minutes)

We assess the impact of the full luminosity LHC Run II top quark measurements on global PDF and SMEFT analyses as well as on their mutual interplay. Starting from the widest LHC top quark dataset considered to date, we first assess the constraints it provides on the gluon PDF in the NNPDF4.0 framework and study its consistency with other gluon-sensitive measurements. We then carry out an extensive SMEFT interpretation of the same dataset to provide bounds on more than 20 Wilson coefficients, demonstrating the significant new information provided by Run II measurements. Subsequently we combine the two analyses within the SIMUnet approach to achieve a simultaneous extraction of the SMEFT PDFs and the Wilson coefficients from the LHC Run II top quark data and identify the regions of the parameter space where their interplay is most phenomenologically relevant. We also propose strategies to separate EFT corrections from QCD effects in the interpretation of the LHC top quark data.

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Session Classification: Parallel session B

Track Classification: QCD