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Exploring Dimension-8 Operators in W^+W^- Production via Gluon Fusion at the LHC

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The discovery potential of the Standard Model Effective Field Theory (SMEFT) is expanded by studying dimension-8 operators and their impact on W^+W^- production in gluon-gluon fusion at the Large Hadron Collider (LHC). This channel, which may contain large Beyond the Standard Model (BSM) contributions in the high-energy tail of its di-lepton mass distribution, presents unique challenges due to the reliance on jet-vetoes to suppress $t\bar{t}$ backgrounds. We investigate the interplay between dimension-6 and dimension-8 operators, highlighting their respective energy-growing contributions and the implications for EFT fits. In this talk I will present current constraints and sensitivity projections for the High Luminosity LHC using state-of-the-art accuracy predictions for both signal and background. I will show the effect that the jet-veto and other higher order effects have on the ability to constrain these operators. Additionally, we explore scenarios in which stringent dimension-6 constraints justify the independent examination of dimension-8 operators. This talk presents an interesting case study on how one channel can be used to constrain a subset of EFT operators and how it fits into the bigger picture of global EFT fits using large numbers of collider observables.

Primary author: GILLIES, Daniel (University of Sussex)

Presenter: GILLIES, Daniel (University of Sussex)

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