

# Unravelling New Physics Signals at the HL-LHC with Low-Energy Constraints

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Recent studies suggest that global fits of Parton Distribution Functions (PDFs) might inadvertently ‘fit away’ signs of new physics in the high-energy tails of the distributions measured at the high luminosity programme of the LHC (HL-LHC). This could lead to spurious effects that might conceal key BSM signatures and hinder the success of indirect searches for new physics. In this talk, I describe how future deep-inelastic scattering (DIS) measurements at the Electron-Ion Collider (EIC), and at CERN via FASERv and SND@LHC at LHC Run III, and the future neutrino experiments to be hosted at the proposed Forward Physics Facility (FPF) at the HL-LHC, provide complementary constraints on large- $x$  sea quarks. These constraints are crucial to mitigate the risk of missing key BSM signals, by enabling precise constraints on large- $x$  PDFs through a ‘BSM-safe’ integration of both high- and low-energy data, which is essential for a robust interpretation of the high-energy measurements.

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