



Contribution ID: 1340

Type: Parallel Talk

SMEFT Analysis of the W boson mass in light of the recent CDF measurement

Thursday, 7 July 2022 18:15 (15 minutes)

We use the Fitmaker tool to incorporate the recent CDF measurement of m_W in a global fit to electroweak, Higgs, and diboson data in the Standard Model Effective Field Theory (SMEFT) including dimension-6 operators at linear order. We find that including any one of the SMEFT operators $calO_{HWB}$, $calO_{HD}$, $calO_{\ell\ell}$ or $calO_{H\ell}^{(3)}$ with a non-zero coefficient could provide a better fit than the Standard Model, with the strongest pull for $calO_{HD}$ and no tension with other electroweak precision data. We then analyse which tree-level single-field extensions of the Standard Model could generate such operator coefficients with the appropriate sign, and discuss the masses and couplings of these fields that best fit the CDF measurement and other data. In particular, the global fit favours either a singlet Z' vector boson, a scalar electroweak triplet with zero hypercharge, or a vector electroweak triplet with unit hypercharge, followed by a singlet heavy neutral lepton, all with masses in the multi-TeV range for unit coupling.

In-person participation

Yes

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Session Classification: Top quark and EW Physics

Track Classification: Top quark and EW Physics