

Oblique Parameters in the Two-Higgs Doublet Model with Vector-Like Quarks: An Approach to explain the W Boson Mass Anomaly

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Abstract

The CDF collaboration has released a new measurement of the W boson mass using their complete data set with 8.8 fb^{-1} in $p\bar{p}$ collisions. This result deviates from the Standard Model prediction by around 7σ . This intriguing anomaly could potentially be explained by the two-Higgs doublet model (2HDM) with vector-like quarks, aligning with the newly published results. α angle, measured by the SLD collaboration in addition to the CDF W -boson mass, is used to determine the S and T parameters. Our talk presents a new approach for the calculation of oblique parameters within the context of the 2HDM with vector-like quarks. These parameters, are pivotal in assessing the impact of new physics on electroweak interactions, providing a framework to constrain a the parameter space of the model. The crux of our calculation lies in its potential to restrict the parameter space of the 2HDM with vector-like quarks, enabling us to scrutinize its ability to account for the W boson mass anomaly observed by CDF. Our findings are indeed promising, suggesting that the 2HDM with vector-like quarks could offer a plausible explanation for this anomaly. Nevertheless, further data collection and analysis are essential for confirming these preliminary conclusions.

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