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Theorie-Palaver

March 20, 2024 at 2 p.m.
Lorentz room (Staudingerweg 7, 5th floor)

Note: Special Seminar with KPH

Tom Tong
Siegen U.

Fitting SMEFT with a CLEW

The SMEFT global analyses commonly encounter two significant challenges:
1. An incomplete set of observables.
2. Ad-hoc flavor assumptions.
These issues significantly undermine the reliability and applicability of the results.

In our recent work, we merged LHC data with EWPO and revealed that global fits to this data set exhibit striking discrepancies with low-energy data. Our findings underscore the necessity of including low-energy observables, such as neutron and nuclear beta decay, along with meson decays, in SMEFT global fits.

By integrating insights from collider processes (C), low-energy processes (L), and electroweak precision observables (EW), we introduce a holistic CLEW approach, and as a case study, we shed light on potential BSM sources of the Cabibbo Angle Anomaly (CAA), which demonstrates roughly a 3-sigma deviation. We were able to apply strong phenomenological constraints instead of relying on flavor assumptions to reduce the number of operators involved, facilitating a nearly flavor-assumption-independent global analysis.

Moreover, to aid in model building and guide experimental searches, we utilized the Akaike Information Criterion (AIC) to identify the most relevant operators. The AIC helps select a group of operators that not only fit well with the experimental data but also avoid unnecessary complexity.

Additionally, I aim to further discuss the importance of including low-energy neutral current data. The remarkable precision of the P2 experiment at MESA will be competitive with existing collider measurements. We are currently upgrading our CLEW framework to fully incorporate low-energy parity violation, including the future projection of P2.

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