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Searching for U(2) New Physics with Flavour, Electroweak, and Collider Data

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TeV-scale new physics is generally very constrained by a plethora of measurements at different energy scales, ranging from flavour observables to the LHC's proton-proton collisions, with stronger bounds typically associated with fermions of the first two generations and with flavour-changing transitions.
It is therefore clear that any such low-scale new physics requires an organising principle regarding the flavour structure of its couplings.
In this context, the U(2) paradigm has received a lot of attention in the past decade, also due to its possible connection with the flavour puzzle and the Higgs hierarchy problem.
In a model-independent approach, we consider the SMEFT at dimension six, which has 124 independent structures in the exact U(2) limit.
Under this assumption, we study the constraints on all the operators coming from flavour, Electroweak precision tests as well as collider data, including effects arising from resummed RGE.
We identify the most stringent bounds in each case, and the overall conditions U(2)-symmetric new physics must satisfy in order to live in the few TeV range, discussing also future projections for the FCC-ee Z-pole run.

Summary

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