Contribution ID: **48** Type: **not specified**

Phenomenology of LNV in SMEFT at dimension 7

Monday 27 June 2022 18:40 (20 minutes)

If Majorana neutrino masses are not generated via the dimension 5 Weinberg operator, the next simplest solution would be to generate them at dimension 7. We present a comprehensive analysis of dimension 7 lepton number violating (LNV) SMEFT operators and their phenomenological consequences for a range of experimental searches. Comparing low-scale observables such as flavour violating rare decays and neutrinoless double beta decay with collider searches as well as neutrino mass constraints, we show limits on each of the different $\Delta L = 2$ SMEFT operators at dimension 7. Furthermore, we systematically consider all possible tree-level UV-completions of these operators in a covariant derivative expansion framework, leading to the identification of the most phenomenologically promising New Physics scenarios as well as capturing the effect of a hierarchy in the internal heavy degrees of freedom.

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Session Classification: Flavour physics: Theory and Experiment