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# A classification of UV models for higher-dimensional SMEFT operators for neutrinoless double beta decay

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The observation of lepton number violation (LNV) would be clear evidence for physics beyond the Standard Model. Famous examples for processes that violate lepton number by two units are neutrino mass mechanisms and neutrinoless double beta decay.

In the Standard Model Effective Field Theory (SMEFT), a ubiquitous framework used for indirect new physics searches,  $\Delta L = 2$  operators appear at dimension-5 and higher odd dimension.

The dimension-5 Weinberg operator, that can explain neutrino masses, does not have to be realised at tree-level but could arise at higher loop order in the UV models. These models, however, could produce higher dimensional operators at tree-level, leaving the question which contribution dominates the neutrinoless double beta decay.

We use a diagrammatic approach to systematically list all possible tree-level models for dimension-9 operators and perform a scan over which lower dimensional operators they produce. Finally, we address the question raised above for an explicit example.

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