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Lepton Flavour Violation from Doubly Charged Scalars: Mu-e Conversion

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Apart from naturally explaining their smallness, models in which neutrino masses are generated only at the loop level are particularly interesting as they often contain electrically charged scalar fields. These additional particles contribute in particular to lepton flavour and/or number violating processes, like mu -> e gamma or neutrinoless double beta decay. On the other hand, at LHC new charged scalars could be identified from several decay and production channels, generating complementarity with low energy experiments.

Using a radiative model based on an effective vertex as example, we discuss a setting involving a doubly charged scalar particle. We focus on a certain lepton flavour violating process, namely mu-e conversion in muonic atoms. This process is particularly interesting since future experiments will improve the bounds on the branching ratio by several orders of magnitude and thus will lead to strong constraints on the model space which could even challenge current LHC bounds. As this framework could stem from several known UV completions, our results are in fact rather general.

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