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What if cLFV was only detectable in tau decays?

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The observation of massive neutrino oscillations indicate that lepton flavour is violated beyond the renormalizable standard model (SM). However, extending the SM by merely the existence of neutrino oscillations does not predict an observably large signal in charged lepton flavour violating (cLFV) searches. Therefore, a detection of cLFV would represent a genuine signal of new physics effects in the lepton sector —perhaps the same underlying physics which generates nonzero neutrino masses. Many precision searches for cLFV have focussed on the muon-electron transition, and they have thus far set strong limits but not detected any events. Motivated by flavour symmetry models, we may construct theories based on a low-energy limit featuring lepton flavour triality that have flavour-violating tau decays as the main phenomenological signatures of BSM physics. These decay modes are expected to be probed in the near future with increased sensitivity by the Belle II experiment. In this talk I will discuss the motivation, model-building and phenomenology of simple extensions to the SM featuring doubly-charged scalars, for which the smoking-gun would be a detection of cLFV in these tau decay channels. This talk will be based around the work in arXiv 2212.09760 .

Name of collaboration or list of co-authors

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