



Contribution ID: 5

Type: **not specified**

Flavor violating ℓ_i decay into ℓ_j and a light gauge boson

Tuesday 31 May 2022 14:00 (45 minutes)

The $\ell_i \rightarrow \ell_j \chi$ decays, with χ a boson associated to the $U(1)_\chi$ symmetry, have not been described satisfactorily so far for light spin-one χ . In particular, observables exhibited an unphysical divergence in the limit of massless χ , associated with its longitudinal polarizations. Based on gauge symmetry, we show how to correct this issue. To this end, we consider two general models realizing the effective field theory description. Being the LFV is generated either at tree level or at one loop, these processes are well behaved for light m_χ . We discuss the most salient phenomenological consequences and its relevance in the searches for this kind of decays.

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