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## **NLO prediction for the decays $\tau \rightarrow \ell \ell' \ell' \nu \nu^-$ and $\mu \rightarrow e e e \nu \nu^-$**

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We present the differential decay rates and the branching ratios of the tau and muon decays with internal conversion,  $\tau \rightarrow \ell \ell' \ell' \nu \nu^-$  and  $\mu \rightarrow e e e \nu \nu^-$ , in the Standard Model at NLO in the on-shell scheme.

These five-body leptonic decays are a tool to study the Lorentz structure of the weak interactions and to test lepton flavor universality. They are also a source of SM background for charged-lepton-flavor-violation searches of the forbidden decays  $\mu \rightarrow e e e$  and  $\tau \rightarrow \ell \ell' \ell'$ .

Even if the shift in the branching ratios induced by radiative corrections turns out to be small and of order 1% – mainly due to a running effect of the fine-structure constant  $\alpha$  – locally in the phase space these corrections can reach the 5-10 % level, depending on the applied cuts.

We found for instance that in the phase space region where the neutrino energies are small, and the momenta of the three charged leptons have a similar signature as in the  $\mu \rightarrow e e e$  and  $\tau \rightarrow \ell \ell' \ell'$  decays, the NLO corrections decrease the leading-order prediction by about 10-20 %.

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