

## Radiative corrections to the muon-electron conversion and the muon decay in orbit

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I am going to deliver two theoretical predictions during the term of my Intensity Frontier Fellowship at Fermilab: the spectrum of the electron created in the muon-electron conversion and the spectrum of the main background to the conversion search, due to the muon decay in orbit.

The signature of the muon-electron conversion is a mono-energetic electron whose kinetic energy is approximately equal to the muon mass, slightly decreased by the muon binding energy and the nuclear recoil. In addition, the conversion may involve radiation of one, or more photons. This radiation, together with the virtual photon effects, lead to a modification of the spectrum. I will evaluate the corrected spectrum. The corrections will likely depend on the structure of the lepton-flavor violating interaction that causes the conversion. Various Lorentz structures have to be considered.

When the muon is bound in an atom, as it is in the conversion search, the spectrum of the so-called muon decay in orbit (DIO) extends all the way to the end point around  $m_\mu$  and can mimic the conversion signal. Therefore I will also evaluate the DIO spectrum including radiative corrections in the vicinity of the end point.