

Charged lepton flavor violating decay of a muonic atom via $\mu^- e^- \rightarrow e^- e^-$

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The charged lepton flavor violation (CLFV) is considered as a promising process to search for new physics beyond the standard model.

Though various CLFV processes have been investigated, so far any clear signals of new physics have not yet found.

The CLFV decay of the muonic atom, $\mu^- e^- \rightarrow e^- e^-$, was proposed as a promising process by Koike et al. [1].

In this talk, We will report on our improved analysis of this process by taking into account the relativistic wave functions of a muon and electrons in the Coulomb potential of the finite nuclear size [2,3].

With our improved treatment of the lepton wave functions, the $\mu^- e^- \rightarrow e^- e^-$ decay rates are significantly modified from the initial estimation of Ref. [1].

For the contact CLFV interaction the decay rate increases for heavier nuclei, while it decreases for the photonic CLFV interaction.

The consequence of those effects on the atomic number Z dependence of the decay rate and also the angular and energy distributions of electrons will be discussed.

[1] M. Koike, Y. Kuno, J. Sato, and M. Yamanaka, Phys. Rev. Lett. 105, 121601 (2010).

[2] Y. Uesaka, Y. Kuno, J. Sato, T. Sato, and M. Yamanaka, Phys. Rev. D 93, 076006 (2016).

[3] Y. Uesaka, Y. Kuno, J. Sato, T. Sato, and M. Yamanaka, in preparation.

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