



Contribution ID: 49

Type: Flash Plenary Talk

## Probing charged lepton flavor violation and quantum entanglement in muon on-target experiments

*Tuesday, 27 May 2025 19:00 (8 minutes)*

Firstly, we'd like to share a novel and cost-effective experiment proposal to probe the charged lepton flavor violation (CLFV) process mediated by an extra massive neutral gauge boson  $Z'$  beyond the Standard Model, as a part of the Peking University Muon (PKMuon) Experiment. The considered process can be uniquely sensitive to specific CLFV parameter combinations, such as the coupling coefficient product  $\lambda_{e\mu}\lambda_{\mu\mu}$ . Additionally, we will present a realistic proposal and a comprehensive study of quantum entanglement in a state composed of different-flavor fermions in muon-electron scattering. Entanglement in the resulting muon-electron qubit system and the violation of the Bell inequality can be observed with a high event rate. This paves the way for performing quantum tomography with muons.

**Muon dipole moments (magnetic and electric): theory, experiments and future perspectives**

**Charged lepton flavor violation: theory, experiment and future perspectives**

none

**New Physics opportunities with low and high energy muon beams**

none

**Neutrino physics with muon beams: theory, experiments and future perspectives**

**Muons beams technologies: production, cooling and acceleration at different energy**

**Advancements in Muon-based Facilities and Broader Applications**

## **Muons in other fields: muography, muon spin spectroscopy, muon-catalyzed fusion**

none

**Primary authors:** Mr GAO, Leyun (Peking University); ET AL.,

**Presenter:** Mr GAO, Leyun (Peking University)

**Session Classification:** Charge Lepton Flavor Violation