

Direct Detection of Ultralight Dark Matter via Charged Lepton Flavor Violation

Tuesday 26 August 2025 12:00 (20 minutes)

I will discuss a proposed dark matter direct-detection strategy using charged particle decays at accelerator-based experiments. If ultralight ($m_\phi \ll \text{eV}$) dark matter has a misalignment abundance, its local field oscillates in time at a frequency set by its mass. If it also couples to flavor-changing neutral currents, rare exotic decays such as $\mu \rightarrow e\phi'$ and $\tau \rightarrow e(\mu)\phi'$ inherit this modulation. Focusing on such charged lepton flavor-violating decays, we show that sufficient event samples can enable detection of ultralight dark matter candidates at Mu3e, Belle-II, and FCC-ee.

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