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## **Probing BSM with High-Multiplicity Muon Decays**

We discuss a class of exotic muon decay signatures that extend beyond the well-studied lepton flavor-violating channels such as  $\mu \rightarrow e\gamma$  and  $\mu \rightarrow eee$ . We focus on rare processes featuring final states with 2m+1 electrons and n photons, exploring their theoretical origin and experimental relevance. Our analysis begins in the framework of the Standard Model Effective Field Theory (SMEFT), where we examine the conditions under which an EFT description remains valid for such processes. We then identify the minimal single-particle EFT interactions capable of inducing these decays and investigate explicit ultraviolet completions that give rise to the relevant operators. Finally, we present a simple numerical study assessing the experimental prospects for observing these muon decay channels.

Secondary track

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