LLP2025: Fifteenth workshop of the Long-Lived Particle Community



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Exploring Long-Lived Hidden Valleys

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Hidden Valley (HV) scenarios featuring confining dark sectors can offer compelling collider signatures known as "dark-showers". This confinement gives rise to dark mesons, some portions of which are expected to be long-lived particles (LLPs). We consider HV LLPs at lifetimes where it is necessary to reinterpret existing CMS searches targeting LLP decays in the muon system. Using a model-agnostic approach, we show that the existing CMS search is sensitive to the fundamental parameters of the confining dark sector itself through their influence on the LLP multiplicity and boost. The results can be used for model dependent exclusions on HV parameter space and motivates new pathways to explore HV phenomenology.

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