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Search for Long-Lived Particles via Muon Detector Shower at the CMS Experiment

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Long-lived particles are predicted by many Beyond the Standard Model (BSM) theories, such as the Supersymmetry and Hidden Valley Models, and can serve as a viable candidate for the Dark Matters (DM). We have searched for Long-Lived Particles (LLPs) that decays in the muon chambers in the Compact Muon Solenoid (CMS) experiment at the Large Hadron Collider with Run 3 Data. The search targets LLPs that decays in the muon detector, creating a large-multiplicity muon detector shower (MDS) that is not matched to muons or punch-through jets. The search will utilize a new dedicated Level 1 high multiplicity trigger developed in Run 3 to target a new low missing transverse momentum (MET) phase space as well as boosted LLPs that are associated with a high MET greater than 200 GeV. The search is sensitivity to a large LLP mass range of 1 — 55 GeV. In this talk, we will present the current status and an estimated sensitivity of the search.

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