



Contribution ID: 408

Type: **not specified**

Search for dark photons decaying to lepton jets with the CMS experiment

Monday 13 May 2024 16:00 (15 minutes)

The possibility of a dark sector photon that couples to standard model lepton pairs has received much theoretical interest. Dark photons with GeV scale masses could have decays with substantial branching fractions to simple decay modes such as opposite-sign muon pairs. If the dark photon originates from a heavy particle, for example a BSM Higgs, the dark photon is boosted in the lab frame (CMS detector) resulting in decay products in a narrow angular cone containing a lepton pair referred to as a “lepton jet”. If the dark photon is short-lived, it appears to originate directly from the primary interaction vertex. In several production models, the dark photons are produced in pairs, resulting in events with two lepton jets. Such a distinctive signature is rarely produced from SM processes. We present the status of an analysis for Run 2 (139 inverse fb) for the dimuon decay channel. Selection criteria are based on simulated signals for a Higgs portal model with prompt production and simulated standard model backgrounds. Run 2 data is compared with simulated backgrounds for a control sample of like-sign muon pairs. A multivariate classifier method shows good separation of signal and background. Expected sensitivity to production cross section is discussed.

Mini Symposia (Invited Talks Only)

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Session Classification: Dark Matter

Track Classification: Dark Matter