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A Search for Vector-Like Leptons (VLLs)

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The Standard Model is the current theoretical description of fundamental particles and their interactions. While it is able to describe the majority of phenomena that we observe, there are many that it cannot accommodate for. Such phenomena are dark matter, dark energy, and lepton non-universality. New theories have been proposed that extend the Standard Model in order to answer these long standing questions. One such extension is the 4321 model that predicts several new particles, one of which is the vector-like lepton (VLL). A search for pair produced vector-like leptons (VLLs) is proposed using the Run II data that was produced by proton-proton collisions at $\sqrt{s}$ = 13 TeV and collected by the Compact Muon Solenoid (CMS) at the Large Hadron Collider (LHC). In this search, the modes where the decays of the VLLs result in two Standard Model leptons are examined. This search employs a set of optimized kinematic selection criteria to enhance the signal, with respect to the Standard Model background, and a data based approach to determine the dominant ttbar background process. The goal of this search is to determine whether we see an excess of events in our data and set limits on the cross section of the VLL pair production.

[in person]

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