

Search for long-lived supersymmetric decays in CMS

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Abstract

The standard model is an effective theory but a low-energy approximation to a more complete theory. Supersymmetry (SUSY) extends the Standard Model but is expected to be broken and mediated to the visible sector via mechanisms like gravity or gauge mediation. In the search for beyond the standard model processes, we present an ongoing analysis based on simplified models to study the pair production and semileptonic decay of the hypothetical SUSY partner of the tau lepton, known as the stau ($\tilde{\tau}$) within the CMS experiment at the CERN Large Hadron Collider (LHC). In gauge-mediated SUSY-breaking scenarios, the stau has macroscopic lifetime, and decays via $\tilde{\tau} \rightarrow \tau \tilde{\chi}_0^1$. This study focuses on events where one tau lepton decays to a muon, and the other decays hadronically, forming a jet. Using a dedicated machine learning algorithm for displaced tau tagging, we reconstruct the stau.