

Identification of displaced τ leptons for long-lived τ slepton searches at CMS

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Searches for the supersymmetric (SUSY) partner of the tau lepton are of high interest, since scenarios in which the tau slepton ($\tilde{\tau}$) is the next-to-lightest supersymmetric particle can lead to the observed relic density. In gauge mediated symmetry breaking scenarios, $\tilde{\tau}$ can have macroscopic lifetime. Direct searches of $\tilde{\tau} \rightarrow \tau \tilde{\chi}_0^1$, where $\tilde{\chi}_0^1$ is the lightest SUSY particle are limited by the reconstruction efficiency of displaced tau leptons at CMS, which are produced up to 50 cm away from the IP. In addition, the small cross-section of slepton production at the LHC makes such searches challenging. In our study, we explore a new displaced τ lepton tagger using a deep neural network.