

Long-lived staus in a simplified model approach

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We present the phenomenology of the gravitino dark matter scenario at the LHC. We consider the case that the next-to-lightest supersymmetric particle (NLSP) is the lighter stau. For a wide range of gravitino masses the lighter stau is stable on the scale of a detector. Such a particle will give rise to a prominent signature as a 'slow muon'. The dominant production channel of staus depends strongly on the hierarchy of the mass spectrum. However, due to the directly detectable stau one is not forced to rely solely on the observation of highly energetic standard model particles coming either from decay chains or from initial state radiation. This is why in a long-lived stau scenario there are barely any regions in parameter space where the theory is hidden from observation, compared to the neutralino LSP scenario where compressed spectra as well as highly stretched spectra are very hard to observe. We study the LHC sensitivity and examine its dependence on the spectrum with an emphasis on the strong production and decay. Unlike most existing studies we do not restrict ourselves to specific supersymmetry breaking models and benchmark points but aim for a signature driven analysis along the lines of the so-called simplified models. We will show that simplified models are particularly suitable in these classes of scenarios and, in fact, allow us to derive conservative model-independent limits on the SUSY mass parameters from the current LHC data.

Primary author: Mr HEISIG, Jan (University of Hamburg)

Co-author: Dr JOERN, Kersten (University of Hamburg)

Presenter: Mr HEISIG, Jan (University of Hamburg)

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