

Sampling the $\mu\nu$ SSM for displaced decays of the tau left sneutrino LSP at the LHC

Abstract

Within the framework of the $\mu\nu$ SSM, a displaced dilepton signal is expected at the LHC from the decay of a tau left sneutrino as the lightest supersymmetric particle(LSP) with a mass in the range 45–100 GeV. We compare the predictions of this scenario with the ATLAS search for long-lived particles using displaced lepton pairs in pp collisions, considering an optimization of the trigger requirements by means of a high level trigger that exploits tracker information. The analysis is carried out in the general case of three families of right-handed neutrino superfields, where all the neutrinos get contributions to their masses at tree level. To analyze the parameter space, we sample the $\mu\nu$ SSM for a tau left sneutrino LSP using a likelihood data-driven method, and paying special attention to reproduce the current experimental data on neutrino and Higgs physics, as well as flavor observables. We find that important regions of the parameter space can be probed at the LHC run 3.

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