



High Energy Physics - Phenomenology

Hidden SUSY at the LHC: the light higgsino-world scenario and the role of a lepton collider

Howard Baer, Vernon Barger, Peisi Huang

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While the SUSY flavor, CP and gravitino problems seem to favor a very heavy spectrum of matter scalars, fine-tuning in the electroweak sector prefers low values of superpotential mass μ . In the limit of low μ , the two lightest neutralinos and light chargino are higgsino-like. The light charginos and neutralinos may have large production cross sections at LHC, but since they are nearly mass degenerate, there is only small energy release in three-body sparticle decays. Possible dilepton and trilepton signatures are difficult to observe after mild cuts due to the very soft p_T spectrum of the final state isolated leptons. Thus, the higgsino-world scenario can easily elude standard SUSY searches at the LHC. It should motivate experimental searches to focus on dimuon and trimuon production at the very lowest $p_T(\mu)$ values possible. If the neutralino relic abundance is enhanced via non-standard cosmological dark matter production, then there exist excellent prospects for direct or indirect detection of higgsino-like WIMPs. While the higgsino-world scenario may easily hide from LHC SUSY searches, a linear e^+e^- collider or a muon collider operating in the $\sqrt{s} \sim 0.5-1$ TeV range would be able to easily access the chargino and neutralino pair production reactions.

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