

Measuring very light gravitino with stau NLSP at the ILC

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We report on the full simulation study of measuring the $O(1 \text{ eV})$ mass of the stable very light gravitino. Such a light gravitino typically appears in GMSB scenarios and is attractive from the point of view of cosmological constraints. Assuming NLSP stau of $\sim 120 \text{ GeV}$ mass and $\sim 100 \text{ um/c}$ lifetime, we simulate stau pair creation events at $E_{\text{cm}}=500 \text{ GeV}$ ILC with the ILD detector model. Tau decays are reconstructed in the 1-prong mode. Using the impact parameter distribution, the accuracy of the stau lifetime measurement is estimated. Two methods of stau mass reconstruction are compared: from the edge scan of the energy of tau decay products, and the cross section scan near the production threshold around 250 GeV . The accuracy of the gravitino mass is estimated using its relation with the NLSP mass and lifetime.

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