



Contribution ID: 75

Type: **Afternoon Session**

Natural SUSY at the ILC: from M_Z to the GUT scale

Wednesday, April 19, 2017 6:05 PM (15 minutes)

The most basic requirement for naturalness in supersymmetric models is the existence of rather light partners of the Higgs boson, the Higgsinos, at masses not too far above M_Z . Despite the pressure from LHC data on the simplest high-scale models (like the $m\text{SSM}$), such light Higgsinos can still be realised in different types of GUT-scale models from NUHM2 to mirage unification models. The ILC will offer the unique discovery potential for the elusive higgsino particles and allow for precision measurements of their properties. In this contribution, prospects for the achievable precisions for masses, the very small mass splittings and polarised production cross sections will be presented. Based on these, we studied the possibilities to determine the SUSY parameters at the weak scale, and to extrapolate their running to the GUT scale. We will discuss the prospects to thereby differentiate between various GUT-scale models and SUSY breaking schemes and to predict the masses of the remaining SUSY particles. In particular the latter could provide important guidance for the energy scale of the next hadron collider after the LHC.

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Session Classification: Wednesday Afternoon

Track Classification: Physics Beyond the Standard Model