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Dark matter in SUGRA models and the LHC

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The minimal supergravity (mSUGRA) model explains the observed dark matter content of the universe and requires the stau-neutralino co-annihilation mechanism in the early universe for a region of supersymmetry parameter space. This co-annihilation region is characterized by a small mass difference (~5-15 GeV) between the lightest stau and the lightest neutralino. An accurate measurement of the small mass difference at a collider is crutial to confirm the co-annihilation mechanism. In this talk, I will discuss the possible signals in the co-annihilation region and the accuracy of measuring this small mass difference at the LHC. I will use these accurately measured parameters to calculate the relic density and show that the accuracy of measuring the dark matter content can be comparable to those obtained from WMAP. I will also show that the gaugino universality condition at the GUT scale can be checked in this coannihilation region at the LHC. This talk is based on the following papers: Phys. Lett. B649 (2007) 73; Phys. Lett. B639 (2006) 46; paper in preparation

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