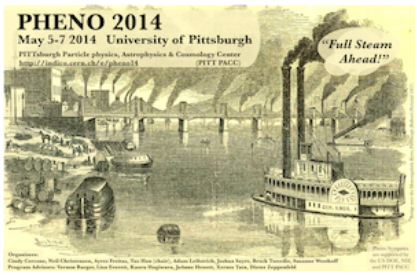

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Radiatively-driven natural SUSY with mixed axion/WIMP dark matter

Monday, 5 May 2014 17:30 (15 minutes)

Radiatively-driven natural SUSY (RNS) is a model within the context of supergravity grand unified theories that realizes low electroweak fine-tuning while satisfying Higgs mass and LHC SUSY constraints. To realize low EWFT, the RNS model requires 1. a small mu parameter ˜100-200 GeV, 2. up-Higgs soft mass driven to small negative values and 3. highly mixed TeV-scale top squarks. In RNS, the lightest neutralino is a higgsino-like WIMP with thermal relic density well below measured values. This leaves room for axions to function as co-dark matter particles. The local WIMP abundance is then expected to be below standard estimates, and direct and indirect detection rates must be accordingly rescaled. We find that ton-scale noble liquid detectors can probe the entire low fine-tuned higgsino-like WIMP parameter space, so that these experiments should either discover WIMPs or exclude the concept of electroweak naturalness in R-parity conserving natural SUSY models. Prospects for indirect detection of WIMPs via halo annihilations are more limited since then the rates depend on the square of the rescaled abundance. Prospects for IceCube are better since these rates depend on the solar equilibration time rather than on the
local WIMP abundance.

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