

SUSY dark matter: waxing, not waning

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Solving the SM finetuning problems requires introduction of both SUSY and PQ symmetry, all in a stringy context for unification with gravity. Discrete R-symmetries which emerge from string compactifications can generate an approximate, accidental PQ symmetry in the SUSY DFSZ type model with axion decay constant related to the SUSY breaking scale in the cosmological sweet spot, with R-parity conservation as a byproduct while solving the SUSY mu problem and axion quality problem. In such a context, the dark matter is of mixed axion/higgsino-like neutralino (multicomponent) where the presence of axinos, saxions, gravitinos and moduli all influence the ultimate dark matter abundance. Thus, the early universe is likely much more complex than the standard thermal WIMP paradigm.

Primary author: BAER, Howard

Presenter: BAER, Howard

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