

Supersymmetric dark matter candidates: wimps and axions

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In this talk I will review the present status of supersymmetric dark matter candidates for 2020, in light of recent LHC and wimp direct detection limits.

Naturalness in the EW sector implies higgsino-like LSPs which are thermally underproduced while naturalness in the QCD sector seems to require the axion.

In fact, SUSY helps solve a major problem for axions: it can generate the needed global PQ as an accidental, approximate symmetry from an underlying $Z_{24}R$ symmetry which may emerge from compactification of the underlying 10-d Lorentz symmetry

of string theory. Then there is a common origin for both PQ symmetry and R-parity, and a natural solution to the SUSY μ problem via SUSY DFSZ axions.

Dark matter production is calculated via eight coupled Boltzmann equations tracking wimps, axions, axinos, saxions, gravitinos and radiation. While axions typically comprise the bulk of dark matter, their coupling is diminished by the presence of higgsinos in the $ag\gamma$ coupling. However, prospects for direct detection are good for multi-ton noble liquid detectors, even though wimps typically constitute only about 10% of dark matter.

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