

## Neutralino dark matter in gauge mediation

We explore the potential of neutralino dark matter within the framework of gauge-mediated supersymmetry (SUSY) breaking. Gauge mediation offers an advantage over gravity mediation, as SUSY CP/flavor problems are avoided more easily, leading to significantly milder fine-tuning for electroweak symmetry-breaking compared to gravity mediation. In our models, the lightest neutralino, as the lightest SUSY particle (LSP), is a viable dark matter candidate, assuming a gravitino mass of  $O(100)$  TeV. The models are formulated in five-dimensional space-time, where the SUSY breaking field and the matter fields are placed on separate branes to avoid issues related to flavor and CP violation. Four distinct neutralino dark matter scenarios are studied: bino-wino coannihilation, higgsino dark matter, wino dark matter, and entropy-diluted bino dark matter. For each case, we determine the allowed parameter spaces and evaluate their consistency with existing experimental limits. Additionally, we examine the potential for testing these models through future investigations at the High-Luminosity Large Hadron Collider (HL-LHC) and through dark matter direct detection experiments.

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