Phenomenology 2025 Symposium



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Singlet-Doublet Fermionic Dark Matter in Gauge Theory of Baryons

Monday 19 May 2025 15:15 (15 minutes)

We are considering a minimal $U(1)_B$ extension of the Standard Model (SM) by promoting the baryon number as a local gauge symmetry to accommodate a stable dark matter (DM) candidate. The gauge theory of baryons induces nontrivial triangle gauge anomalies, and we provide a simple anomaly-free solution by adding three exotic fermions. A scalar S spontaneously breaks the $U(1)_B$ symmetry, leaving behind a discrete Z_2 symmetry that ensures the stability of the lightest exotic fermion originally introduced to cancel the triangle gauge anomalies. Scenarios with weakly interacting DM candidates having non-zero hypercharge usually face stringent constraints from experimental bounds on the DM spin-independent direct-detection (SIDD) cross-section. In this work, we consider a two-component singlet-doublet fermionic dark matter scenario, which significantly relaxes the constraints from bounds on the DM SIDD crosssection for suppressed single-doublet mixing. We show that the model offers a viable parameter space for a cosmologically consistent DM candidate that can be probed through direct detection searches, collider experiments, and gravitational wave (GW) experiments.

Mini Symposia (Invited Talks Only)

Plenary (Invited talks only)

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