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Interacting scalar–fermion two-component dark matter in a gauged $U(1)_{B-L}$ model

Thursday, 3 December 2026 15:00 (30 minutes)

We propose an interacting two-component dark matter model based on a gauged $U(1)_{B-L}$ extension of the Standard Model, which also accommodates neutrino masses through the type-I seesaw mechanism. The dark sector consists of a Dirac fermion χ and a complex scalar S, which can both be stable without imposing an additional discrete symmetry and are directly coupled by a gauge-invariant Yukawa interaction. The resulting conversion, semi-conversion, and semi-annihilation processes lead to a genuinely coupled freeze-out. After imposing collider and dark matter constraints, we identify viable solutions away from the Z' resonance for both mass hierarchies, $m_S > m_\chi$ and $m_S < m_\chi$. Despite the strong direct-detection constraints, part of the surviving parameter space remains within the reach of next-generation experiments.

Academic position of the presenting author

Professor

Primary author: YAGUNA, CARLOS (UPTC)

Presenter: YAGUNA, CARLOS (UPTC)

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