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Missing energy in rare B-decays in the light of GeV scale dark matter

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Abstract- Belle-II has reported a 2.8 sigma deviation from standard model prediction in the branching ratio of B+ ⟶ K+ +inv decay mode. We enlighten this missing energy using a GeV scale scalar dark matter in an anomaly-free U (1)B–L framework. The new vector and scalar bosons coming from the gauge extension act as mediators for dark matter by providing annihilation channels and also participate in b ⟶ s transition through one loop penguin diagrams. We constrain the new parameters by using consistency with existing bounds on B ⟶ K∗ν¯ν branching ratio performed at the Belle II experiment and from Dark matter relic density, direct detection, and collider. We analyse couplings between the mediator and the SM fermions as well as the dark matter particle. We then investigate the b ⟶ sν¯ν decay modes such as B ⟶ (K+, K∗)ν¯ν, Bs ⟶ (η, η′)ν¯ν,Bs ⟶ φν¯ν and Bc ⟶ (Ds, D∗ s)ν¯ν in a common parameter space, meeting the current experimental bounds of both sectors simultaneously.

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