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Search for a leptophibic B-boson via eta decay at Jlab

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A leptophibic B-boson couples predominantly to quarks and arises from a new U(1) baryon number gauge symmetry [1]. Its leading decay is B⟶π^0+γ for the mass range of 140-620 MeV [2]. This offers a great experimental opportunity to search for such weakly-coupled gauge boson in the sub-GeV mass range through eta doubly-radiative decay η⟶Bγ⟶π^0γγ. Jlab Eta Factory (JEF) experiment [3] has been recently developed to search for B through this decay channel, with sensitivity to the baryonic fine structure constant as low as 10E−7, indirectly constraining the existence of anomaly cancelling fermions at the TeV-scale. Proposed experiment to search for B in three-photon final states (B⟶π^0γ⟶3γ) is complementary to a world wide effort searching for a dark photon A' at the high-intensity frontiers.

Reference:
[1] B. Batell et. al., Phys. ReV., D90, 115014 (2014).
[2] S. Tulin, Phys. Rev., D89, 14008 (2014).
[3] L. Gan et. al., https://www.jlab.org/exp_prog/proposals/14/PR12-14-004.pdf.

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