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Hidden sector explanation of B decay and cosmic ray anomalies

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Abstract:

There are presently several discrepancies in $b \rightarrow s l^+ l^-$ decays of B mesons suggesting new physics coupling to b quarks and leptons. We show that a Z' , with couplings to quarks and muons that can explain the B-decay anomalies, can also couple to dark matter in a way that is consistent with its relic abundance, direct detection limits, and hints of indirect detection. The latter include possible excess events in antiproton spectra recently observed by the AMS-02 experiment. We present two models, having a heavy (light) Z' mass to be 600(12)GeV and fermionic dark matter with mass of 50(2000)GeV, producing excess antiprotons with energies of 10(300)GeV. The first model is also compatible with fits for the galactic center GeV gamma-ray excess.

Presenter: WATANABE, Ryoutaro (University of Montreal)