

Dark Photon bounds in the dark EFT

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Dark photons are massive abelian gauge bosons that interact with ordinary photons via a kinetic mixing with the hypercharge field strength tensor. This theory is probed by a variety of different experiments and limits are set on a combination of the dark photon mass and kinetic mixing parameter. These limits can however be strongly modified by the presence of additional heavy degrees of freedom. Using the framework of effective field theories, I will show in this talk how robust the current experiments are when these new states are present. In particular, I focus on the possible existence of a dark dipole between standard model leptons and the dark photon and discuss UV extensions that can realize such scenario. Then, I will show that, under certain assumptions, the presence of this dipole can drastically change supernovae and terrestrial experiments up to cut-off scales of 100 TeV and 3 TeV, respectively. For terrestrial experiments, the modified bounds can even extend down to vanishing kinetic mixing.

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yes

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