

A last chance for kinetic mixing: Explaining $(g - 2)_\mu$ with semi-visible dark photons

Tuesday, July 13, 2021 5:00 PM (15 minutes)

We revisit the solution to the $(g - 2)_\mu$ puzzle based on a kinetically mixed dark photon. Despite this scenario being excluded in minimal models with fully visible and fully invisible dark photon decays, we show that semi-visible scenarios are still allowed by explicitly re-evaluating constraints from B-factories and fixed-target experiments. Such a solution points to dark photons with masses around a few GeV that couple to dark sectors with co-annihilating dark matter particles or heavy neutral leptons. In all models, we predict a large rate of multi-leptons at Belle-II and NA64.

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Session Classification: Beyond Standard Model

Track Classification: Beyond Standard Model Physics