SUSY **2024**

Theory meets Experiment

Madrid
10-14 June 2024

Contribution ID: **93**   Type: **Parallel Talk**

Classes of complete dark photon models constrained by Z-Physics

Monday 10 June 2024 17:44 (17 minutes)

Dark Matter models that employ a vector portal to a dark sector are usually treated as an effective theory that incorporates kinetic mixing of the photon with a new U(1) gauge boson, with the Z boson integrated out. However, a more complete theory must employ the full SU(2)L×U(1)×U(1)' gauge group, in which kinetic mixing of the Z boson with the new U(1)' gauge boson is taken into account. The importance of the more complete analysis is demonstrated by an example where the parameter space of the effective theory that yields the observed dark matter relic density conflicts with a suitably defined electroweak ρ parameter that is deduced from a global fit to Z physics data.

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Session Classification: Dark matter, astroparticles and gravitational waves

Track Classification: Dark matter, astroparticles and gravitational waves