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Dark Matter from a Vector field in non-trival SU(2)_L Reepresentations

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In this work we present a simple extensions of the Standard Model
that contain, as the only new physics component, a massive spin-one matter field in a non-trivial representation of SU(2)_L. In the first case, we consider a vector field in the adjoint representation. In order
to be consistent with perturbative unitarity, the vector field
must be odd under a Z_2 symmetry. Radiative corrections make
the neutral component of the triplet (Vˆ{0}) slightly lighter than
the charged ones. We show that Vˆ{0} can be the dark matter particle while satisfying all current bounds if it has a mass between 2.8 and 3.8 TeV.
We present the current limit on the model parameter space from highly
complementary experimental constraints including dark matter relic density measurement, dark matter direct and indirect detection searches, LHC data on Higgs couplings to photons and LHC data on disappearing track searches. We also show that the two-dimensional parameter space can be fully covered by disappearing track searches at a future 100 TeV hadron collider, which will probe, in particular, the whole mass range relevant for dark matter, thus giving an opportunity to discover or exclude the model.

In a second mode, we consider a vector field in the fundamental representation of SU(2)_L. In this case we found that the model is more severely constrained.

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