

# Dark Matter from a Vector field in non-trivial $SU(2)_L$ Representations

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In this work we present 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 ( $V^0$ ) slightly lighter than the charged ones. We show that  $V^0$  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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