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Z' portal for a keV dark matter

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While astrophysical evidences for the existence of dark matter (DM) have been accumulated during the past decades, it is still not understood the fundamental physics involved. No unambiguous positive signal of DM particles have been found in searches specially dedicated to the well motivated WIMP candidates, whose mass vary from GeV to a few TeV. This encourage us to consider non-standard scenarios such as keV DM in the wake of an elusive 3.5 keV gamma-ray line. Such a very light DM must have been decoupled from the primordial thermal bath while relativistic. In order to reach the observed relic density, we could include a huge amount of new particles or, as we will consider in this work, one very heavy field that decays into standard particles. Such “diluton” field would inject a huge amount of entropy into the thermal bath, diluting the abundance of the already decoupled keV DM. In this work we will explore the case in which the diluton field is a new neutral gauge boson, Z' , that also constitute a portal between dark matter and standard particles.

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