

Renormalization of the U(1) gauge theory for tensor dark matter: preliminary results

Content

Tensor dark matter (TDM) is a recently explored proposal for describing dark matter (DM) as a spin-one field in the $(1, 0) \oplus (0, 1)$ representation of the homogeneous Lorentz group. In this work, we study the renormalization of the U(1) gauge theory for TDM at the one-loop level in the MS scheme. The interaction is found to be non-renormalizable due to the bad behavior of the TDM propagator in the ultraviolet region. Its similarity with the propagator of a massive vector particle, and by analogy with the solution of this problem in the Standard Model for W^\pm and Z bosons, leads us to study the renormalization of massless TDM and eventually to the search for some mechanism to give it mass. In the massless case, the TDM free Lagrangian has a gauge symmetry, which is lost when coupled with the U(1) gauge field. The U(1) gauge interaction for massless TDM is found to be renormalizable only for four specific values of the parameter, which, in the free case, is the massless TDM gauge parameter.

Summary

Primary author(s) : Mr. RANGEL-PANTOJA, Armando De La Cruz (Universidad de Guanajuato); Dr. NAPSUCIALE-MENDIVIL, Mauro (Universidad de Guanajuato)

Presenter(s) : Mr. RANGEL-PANTOJA, Armando De La Cruz (Universidad de Guanajuato)