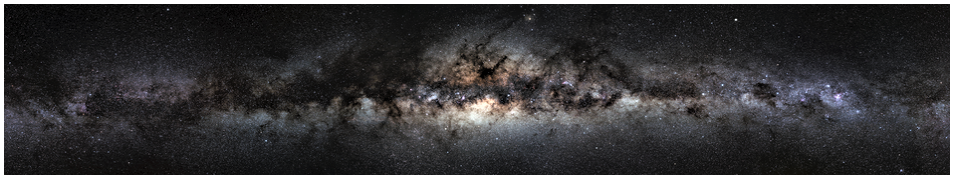

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Mixed Scalar Dark Matter and Dirac Neutrino Masses in an Extended B-L Model

Tuesday 7 December 2021 08:20 (30 minutes)

The standard model(SM) is augmented by a $U(1)_{B-L}$ gauge symmetry. Three right-handed neutrinos(RHN) are added with $B - L$ charge -4,-4 and 5 required for the anomaly cancellation. Two vector-like fermion doublets(N_i), a doublet scalar(\eta), and two singlet scalars(\chi_1,\chi_2) are also added having nontrivial charges under the B-L group except \chi_1 particle. A Z_2 symmetry is also imposed to find a stable dark matter(DM) candidate. We showed that the tree level generation of neutrino mass is not possible in this model due to the non-trivial charges of the new RHNs. However, small Dirac masses for the active neutrinos can be generated at one loop level. The even component of the neutral doublet scalar(\eta) and the complete singlet scalar(\chi_1) mix with each other after the spontaneous symmetry breaking of the model. The lightest particle among the two emerges out as a viable DM candidate of the universe. We see that the coannihilation of the doublet fermions to the SM fields plays an important role when the mass difference between the DM and the corresponding coannihilating partner is kept small. The relic density can be solely determined by the coannihilation by the new odd sector particles while keeping the direct detection cross-section small.

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