

Dark matter in a 4 Higgs doublet model with S3 symmetry

Abstract

It has been proposed in the past, that the three families of fermions are related by a symmetry, given that before Electro Weak Spontaneous Symmetry Breaking (EWSB), the particles have no mass and it is impossible to distinguish between generations. The symmetry that represents this situation, is the S3 permutational symmetry. The S3 symmetry group has three irreducible representations, one doublet, one symmetric singlet and one antisymmetric singlet, giving four SU(2) scalar doublets when all S3 representations are occupied.

We imposed an extra Z2 symmetry, under which, the scalar in the antisymmetric singlet representation transforms as $H_a \rightarrow -H_a$, to ensure its stability, making it possible to have a dark matter candidate in the model.

We calculated the masses and trilinear couplings of the scalar particles and constrained the range of their masses by unitarity and stability conditions. We found two possibly good dark matter candidates: the two neutral Higgses in the H_a doublet. Finally, we performed a scan for possible configurations that give the measured value for the Dark Matter relic density.

Primary author(s) : Dr. GARCES, Estela A. (IFUNAM); Dr. ESPINOZA-HERNANDEZ, Maria Catalina (Instituto de Fisica, UNAM.); Mr. REYES, Humberto (Instituto de Fisica, UNAM); Dr. MONDRAGON CEBALLOS, Myriam (Instituto de Fisica, UNAM)

Presenter(s) : Mr. REYES, Humberto (Instituto de Fisica, UNAM)