



Contribution ID: 322

Type: **not specified**

Pseudo-Goldstone Dark Matter in $SO(10)$

Tuesday, 24 August 2021 22:30 (20 minutes)

We propose a pseudo-Goldstone boson dark matter (pGDM) particle in $SO(10)$ grand unified theory (GUT). Due to its Goldstone nature, this pGDM evades the direct DM detection experiments which, otherwise, severely constrain the parameter space of DM models. In $SO(10)$, the pGDM is embedded as a linear combination of the Standard Model (SM) singlet scalars in $\mathbf{16_H}$ and $\mathbf{126_H}$ representations. We consider two scenarios for the intermediate route of $SO(10)$ symmetry breaking (SB) to the SM: $SU(5) \times U(1)_X$ and Pati-Salam the $SU(4)_c \times SU(2)_L \times SU(2)_R$ gauge groups. The vacuum expectation value of $\mathbf{126_H}$, which triggers the breaking of $U(1)_X$ and 4-2-2 symmetry in the two scenarios, respectively, determines the pGDM lifetime whose astrophysical lower bound provides one of the most stringent constraints. The proton lifetime in the $SU(5)$ case is predicted to be 4.53×10^{34} years, which lies well within the sensitivity reach of the Hyper-Kamiokande experiment.

Primary authors: OKADA, Nobuchika (University of Alabama); RAUT, Digesh (University of Delaware); SHAFI, Qaisar

Presenter: RAUT, Digesh (University of Delaware)

Session Classification: Grand Unified Theories

Track Classification: Grand Unified Theories