

Scale invariant extension of the SM with strongly interacting hidden sector and dark pion DM (WIMP vs. SIMP)

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Scale invariant extension of the SM with QCD-like strongly interacting hidden (dark) sector is interesting, since the dimensional transmutation and chiral symmetry breaking in the hidden sector could be the origin of electroweak symmetry breaking (EWSB), and all the masses of the SM particles as well as dark pions and dark baryons that could be good cold dark matter candidates. In this talk I discuss dark pion DM as WIMP vs. SIMP. Ignoring the West-Zumino-Witten (WZW) interaction, I first discuss dark pion as a WIMP using two different approaches, the chiral perturbation theory (ChPT) and AdS/QCD. Then I include the WZW interaction and discuss dark pion within SIMP scenario. However, the analysis based on ChPT indicates that the viable parameter space for SIMP seems to be outside the validity region of ChPT. I show that this problem can be resolved if we include dark vector mesons, and the SIMP idea can be realized in the dark pion sector.

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