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Dynamical origin of neutrino masses and dark matter from a new confining sector

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A dynamical mechanism, based on a confining non-Abelian dark symmetry, which generates Majorana masses for hyperchargeless fermions, is proposed. We apply it to the inverse seesaw scenario, which allows us to generate light neutrino masses from the interplay of TeV-scale pseudo-Dirac mass terms and a small explicit breaking of lepton number. A single generation of vectorlike dark quarks, transforming under a SU(3)D gauge symmetry, is coupled to a real singlet scalar, which serves as a portal between the dark quark condensate and three generations of heavy sterile neutrinos. Such a dark sector and the Standard Model (SM) are kept in thermal equilibrium with each other via sizable Yukawa couplings to the heavy neutrinos. In this framework, the lightest dark baryon, which has spin 3/2 and is stabilized at the renormalizable level by an accidental dark baryon number symmetry, can account for the observed relic density via thermal freeze-out from annihilations into the lightest dark mesons. These mesons, in turn, decay to heavy neutrinos, which produce SM final states upon decay. This model may be probed by next generation neutrino telescopes via neutrino lines produced from dark matter annihilations.
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