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The Effects of Sterile Neutrinos in the Presence of a Gauged Flavour Symmetry

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The Standard Model contains four accidental, or potentially emergent, global $U(1)$ symmetries. It is possible that these symmetries are indicative of a hidden gauge structure that would couple to some anomaly-free combination of the associated currents. This would result in a new Abelian gauge boson known as a Z' , which would be massive if the gauge-symmetry were spontaneously broken.

Shuve and Yavin managed to show that the existence of a massive Z' coupled to a sterile neutrino via mass-mixing provides a viable Dodelson-Widrow-esque dark matter production mechanism. In this talk we will investigate the implications of adding an order parameter charged under the new symmetry, a set of sterile neutrinos, and the new Z' to the Standard Model. The sterile neutrinos will induce an active neutrino mass matrix, whose compatibility with the Shuve-Yavin mechanism will be investigated. We find a generic relationship that suggests sterile neutrino dark matter should not contribute significantly to active neutrino phenomenology.

Summary

emphasized text

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