

Neutron star configurations confronting dark matter and neutron lifetime anomaly

Saturday, 29 June 2019 17:50 (15)

The nature of dark matter (DM) has been one of major problems in physics. The stability and abundance of dark matter suggest possibility that the DM may play an important role for compact stellar objects. Confronting the recent neutron lifetime anomaly measurement in laboratories in Beam experiments and Bottle experiments. We propose the neutron decays into a DM and a new scalar boson to resolve the anomaly. The new scalar boson and a new U(1) dark gauge symmetry are the portals with dark sectors and visible sectors. We study the stability and formation of neutron star result from the interplay between DM and neutrons. The DM mass and mediator mass suggest different mass-radius relation of the two components neutron star. We further investigate its tidal deformability and the corresponding gravitational waveforms. The results might help to reveal the nature of underlying physics in the future gravitational wave detection.

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Session Classification : Afternoon sessions