GW170817 constraints on the properties of a neutron star in the presence of WIMP dark matter

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We have studied the properties of a neutron star in the presence of dark matter core [1]. A relatively light neutralino has been considered as a dark matter candidate with properties suggested by the results of DAMA collaboration realized within the framework of the Next-to-Minimal Supersymmetric Standard Model (NMSSM) [2]. The variables of interaction Lagrangian of dark matter with the hadronic matter through Higgs boson are constrained from the results of DAMA experiments. We have used effective field theory motivated relativistic mean field formalism with recently generated force parameters such as IOPB-I [3], and G3 [4] along with the widely used NL3 [5] set to study equation of states in the presence of dark matter. These equations of states are used in TOV equations to predict mass-radius relations, moment of inertia, and effects of tidal deformability on neutron star. The equations of state become softer in the presence of dark matter, and consequently, predict less mass and tidal deformability of neutron star. The calculated properties are compared with the corresponding data of GW170817 [6].

[1] Abdul Quddus, Grigorios Panotopoulos, Bharat Kumar, Shakeb Ahmad, and S. K. Patra, submitted in Phys. Rev. D

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