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Impact of asymmetric bosonic dark matter on neutron star properties

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We study an accumulation of asymmetric bosonic dark matter inside neutron stars and its further impact on star's evolution. We present the conditions at which dark matter particles tend to condensate in a core of the star or create an extended halo. We show that dark matter condensed in a core leads to a decrease of the total gravitational mass and tidal deformability compared to a pure baryonic star. In addition, at some conditions self-gravitating dark matter can collapse gravitationally and form a black hole that can destroy the star. We study the range of particle mass, coupling constant and fraction of dark matter inside the neutron star that lead to the formation of a black hole inside a compact star. By imposing an existing astrophysical and gravitational wave constraints we set a new limit on the mass and fraction of dark matter particles.

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