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Gravitational Waves as a Probe of Heavy Non-Annihilating Dark Matter

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Galactic Dark Matter (DM) particles can get captured inside celestial bodies if they have some non-zero but weak interaction with the nucleons. Due to their significant size and lifetime, these celestial bodies can capture huge amounts of DM particles, and eventually, an overly dense dark core is created. This core can further collapse and form a minuscule Balck Hole (BH) that can eat up the whole celestial body in the course of time and form a similar mass BH. Depending on the DM- nucleon interaction cross-section, this theory can be studied in non-compact stars like the Sun, and Jupiter, and compact objects like Neutron stars (NS). We show constraints on DM parameter space using gravitational wave detectors like LIGO (ground-based) and LISA (space-based), by studying low-mass (1-2.5 M_{solar}) compact object mergers and close stellar binaries in their inspiral phase respectively. We will argue how these gravitational wave experiments can work as a direct detection experiment for
DM searches.

Track type

Astroparticle Physics

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