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Implications of Gravitational Waves Data on Dark Matter Admixed Neutron Stars

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A decade of Gravitational Wave observations by LIGO-Virgo collaborations has opened a new window to the Universe peeking into the exotic lives of stellar black holes and compact stars. With the observation of GW170817, the first GW observation from coalescence of binary neutron stars along with the associated multi-wavelength spectral observation such as γ-rays, X-rays, UV, IR and Radio, leading to plethora of information about such systems initiated what is fondly called as the multi-messenger era in Astronomy \& Astrophysics and cosmology. This particular observation provided vital inputs to constrain the theoretical aspects of the underlying equation of state (EoS) and therefore on the global properties of neutron stars as well, be it mass (2.73 - 3.29) $M_{\odot}$ or inferred radius of the canonical 1.4 $M_{\odot}$ object which turns out to be $\approx$ 14 km. In the present scenario, many such observations are expected to happen which may sprung surprises in the very domain of observational Astrophysics and therefore to the underlying theories as well.
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Theories, being the only way to understand the composition of neutron stars/ pulsars need to compliment the observations of their properties and signatures from various dynamical aspects of these compact systems. Within the mean field framework, we would present some of these results where the neutron star will be composed of various baryonic resonances as well as exotic particles such as dark matter. Finally the results will be tested to the compatibility of the GW data available.

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