Contribution ID: **96** Type: **not specified**

Constraints on dark matter mass-momentum space in light of GW170817 data

Wednesday, October 9, 2024 9:50 AM (12 minutes)

We investigate the effects of dark matter (DM) on neutron star (NS) properties using the relativistic mean-field (RMF) theory. By integrating a DM model, we analyze how DM parameters, specifically DM mass and Fermi momentum, influence nuclear saturation properties, the equation of state (EoS), and the mass-radius relationship of NSs. Our research also examines the universal relation between dimensionless tidal deformability and compactness in the presence of DM. The inclusion of DM significantly alters nuclear saturation properties, resulting in higher incompressibility and symmetry energy values. Higher DM Fermi momenta and masses lead to more compact NS configurations with reduced radii and lower maximum masses, indicating a complex interplay between DM and nuclear matter. Deviations from the universal relation are observed, notably for NSs with lower compactness. Using observational data from PSR J0740+6620, GW170817, and NICER measurements of PSR J0030+0451, we derive stringent constraints on the DM parameter space within NSs. Our findings highlight the necessity of considering DM effects in NS modeling and suggest potential refinements to current theoretical frameworks to accurately predict NS properties under various astrophysical conditions. Future work will focus on further refining these models and exploring additional observational data to tighten constraints on DM properties. Furthermore, we acknowledge the importance of investigating potential decay processes of DM particles and their implications for stellar evolution.

Presenter: KUMAR, Ankit (ABBL, RIKEN, Japan)