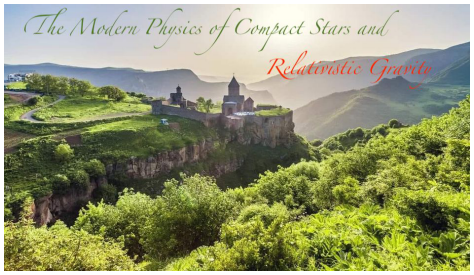

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Constraining the properties of superdense matter with observations of low-mass X-ray binaries: the case of HETE J1900.1−2455

Monday 27 September 2021 15:00 (35 minutes)

New observations of a transient neutron star in a low mass X-ray binary HETE J1900.1−2455 were carried out in 2018. Despite detecting only six net photons, it was still possible to infer the effective surface temperature of the star. It turned out to be quite low, ≈30 −39 eV (for an observer at infinity) depending on the assumed mass, radius and distance to the star. Taking into account the amount of energy deposited during the ≈10 years accretion outburst as well as previous temperature measurements in 2016, these values can either indicate that the core has a very high heat capacity or that it undergoes rapid neutrino cooling. Unfortunately, current observational data does not allow us to distinguish between these two possibilities. However, both of them suggest that a significant fraction of the core is not superfluid (superconductor). Also, our modeling shows that the star can cool even further, up to the temperature of ≈15 eV. In this case future observations (that are already scheduled) might allow us to obtain constraints on the fraction of unpaired baryons in the core.

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