Constraining neutron star equation of state using multi-band independent measurements of radii and tidal deformabilities

Margherita Fasano[†], Tiziano Abdelsalhin[†], Andrea Maselli[†] & Valeria Ferrari[†]

[†]*Dipartimento di Fisica, "Sapienza" Università di Roma & Sezione INFN Roma1, Piazzale Aldo Moro 5, 00185, Roma, Italy*

arXiv:1902.05078 [astro-ph.HE] contact: margherita.fasano@roma1.infn.it

Using a Bayesian approach, we combine measurements of neutron star (NS) macroscopic observables obtained by astrophysical and gravitational observations to derive joint constraints on the equation of state (EoS) of matter at supranuclear density. In our analysis we use two sets of data: (i) the masses and tidal deformabilities measured in the binary neutron star event GW170817, detected by LIGO and Virgo; (ii) the masses and stellar radii measured from observations of nuclear bursts in accreting low-mass X-ray binaries. Using two different parametrizations of the equation of state, we compute the posterior probability distributions of the EoS parameters, and then we infer the posterior distribution for the radius and the mass of the two neutron stars of GW170817. The constraints we set on the radii are tighter than previous bounds.