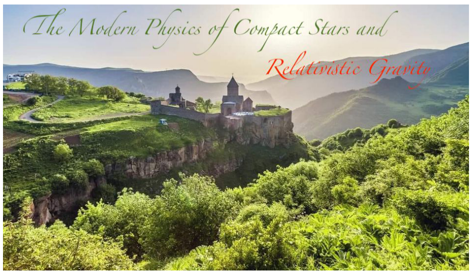

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High-density nuclear symmetry energy from neutron star observations

Monday 27 September 2021 19:00 (45 minutes)

The density dependence of nuclear symmetry energy is among the most uncertain parts of the Equation of State (EOS) of dense neutron-rich nuclear matter. It is currently poorly known especially at suprasaturation densities partially because of our poor knowledge about isovector nuclear interactions at short distances. Because of its broad impacts on many interesting issues, to pin down the density dependence of nuclear symmetry energy has been a longstanding and shared goal of both astrophysics and nuclear physics. New observational data of neutron stars including their masses, radii, and tidal deformations since GW170817 have helped improve our knowledge about nuclear symmetry energy especially at high densities. In this talk, after reviewing existing constraints on characteristics of nuclear symmetry energy around the saturation density of nuclear matter from terrestrial nuclear experiments and observations of canonical neutron stars, we discuss how the lower radius boundary $R_{2.01} = 12.2$ km from NICER's very recent observation of PSR J0740+6620 of mass $2.08 \pm 0.07\ M_{\odot}$ and radius $R = 12.2 - 16.3$ km at 68\% confidence level sets a tight lower limit for nuclear symmetry energy at densities above **twice** the saturation density of nuclear matter.

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