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Neutron Skins and Neutron Star Properties

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The neutron skin thickness of medium to heavy nuclei provides a fundamental link between nuclear structure and neutron star properties via the equation of state of neutron-rich matter. In particular, it is strongly correlated with the pressure of a pure neutron matter which pushes against the surface tension thus allowing a finite nucleus to form a neutron skin. It is precisely this same pressure that supports a neutron star against gravitational collapse and therefore has a direct influence on the neutron-star radii, moments of inertia, tidal deformabilities, crust-core transition properties, transport properties, particle compositions and nuclear pasta phases. In this talk, I will present an overview of our recently published works on these topics. Notably, I confront the first model-independent experimental neutron skin thickness result obtained by the pioneering Lead Radius Experiment ("PREX") at the Jefferson Laboratory against the neutron star tidal deformability that was recently measured in the historical first detection of gravitational waves from a binary neutron star merger by the LIGO-Virgo Collaboration. I will also discuss observational implications of the upcoming measurements of the neutron skin thickness by the PREX-II and CREX experiments.

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