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The equation of state of dense matter

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With an average density higher than the nuclear density, neutron stars provide a unique test bed for nuclear physics, quantum chromodynamics, and nuclear superfluidity. Determination of the fundamental interactions that govern matter under such extreme conditions is one of the major unsolved problems of modern physics and - since it is impossible to replicate these conditions on Earth - a major motivation for future telescopes. Relativity, however, plays a key role in efforts to measure the equation of state. It is using relativistic effects that we measure neutron star mass and radius, and it is the relativistic equations of stellar structure that relate mass and radius to the equation of state. I will review our current state of understanding of the dense matter equation of state, and the prospects for better constraints to come from future telescopes.

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