

Configurations of rotating compact stars

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With a compactness slightly smaller than that of the black hole, pulsar provides a perfect natural laboratory for us to learn gravity and strong interaction. However, due to non-perturbative effect of strong interaction at low energy levels, it's impossible to verify the interior structure of compact stars from QCD calculations. Therefore, the equation of state of dense matter such as compact stars is still in hot debate. Apart from the conventional neutron star model, the existences of hyperon/free quarks in compact stars are also suggested. Models such as solid quark cluster stars can also explain many puzzling observations of pulsars. In order to distinguish between different equation of states, I focus on the rigidity of typical neutron stars and quark cluster stars. For instance, neutron stars and quark cluster stars will have different deformation in external tidal fields or when they are spinning really fast. In my talk, I will to explain how to describe the deformability of a compact star with the tool of numerical relativity. I will also show the difference in the deformability between different EoSs and how we are going to test these differences by observation.

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