

QCD in the Cores of Neutron Stars

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Gravity meets QCD in a very concrete way in neutron stars. Their cores contain ultra-dense hadronic matter whose densities reach as high as those realized in ultrarelativistic heavy-ion collisions at the LHC. In these collisions, ordinary nuclear matter melts into a new quark matter phase. This naturally raises the question: Does quark matter also exist inside neutron stars? The rapid advancement in neutron-star observations, in combination with state-of-the-art QCD calculations is providing us with an unprecedented view of the extreme matter deep in the cores of the stars. I describe how recent advancements in the theory of superdense matter inform us about what lies in the centers of neutron stars and how different constraints point to the existence of quark matter cores in large neutron stars.

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