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Neutron star equations of state and quark-hadron continuity

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The properties of dense QCD matter are delineated through the construction of equations of state which should be consistent with QCD calculations in the low and high density limits, nuclear laboratory experiments, and the neutron star observations. These constraints, together with the causality condition of the sound velocity, are used to develop the picture of hadron-quark continuity in which hadronic matter continuously transforms into quark matter (modulo small 1st order phase transitions). The resultant unified equation of state at zero temperature and μ -equilibrium, which we call Quark-Hadron-Crossover (QHC18 and QHC19), is consistent with the measured properties of neutron stars and in addition gives us microscopic insights into the properties of dense QCD matter.

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