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The interpolation approach to dense QCD and neutron-star phenomenology

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Neutron stars (NSs) contain the densest observable matter in the universe. Within their cores lies QCD matter compressed to multiple times the density of common nuclei. Unfortunately, this matter is too dense to be studied from first-principles nuclear-physics calculations, and not dense enough to be studied using first-principles perturbative-QCD calculations. In this talk, I will detail a model-independent approach to bridge this unknown region of the equation of state (EOS) of NS matter. By using interpolating functions to parametrize our ignorance of the EOS between the extremes of nuclear and quark matter, and by demanding that a few robust astrophysical constraints hold for each interpolated EOS, we are able place bounds on the allowed region in pressure and energy density where the EOS of NS matter must lie. Furthermore, we are also beginning to be able to draw conclusions about the physical properties of this matter, and to address such questions as whether NSs are dense enough to contain quark matter in their cores.

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