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Strange Quark Matter from a Baryonic Approach

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Cold and dense matter can be explored in a systematic way both in the high-density (perturbative QCD) and low-density (Chiral EFT) regime. However, the path connecting them is yet to be discovered. As a result, these descriptions are usually extrapolated into the intermediate density regime and then connected at some transition point. In this work I will present a model that has features of both, but within a unified description. The model contains hadronic degrees of freedom and is calibrated using nuclear matter properties; yet it exhibits a phase transition towards a "quark matter"phase that has approximately restored chiral symmetry, strangeness, and asymptotes to the conformal limit of the speed of sound. While this model can describe different qualitative scenarios regarding the phase transition and the strangeness onset, empirical constraints significantly narrow down the allowed parameter range. Moreover, hybrid stars above two solar masses are predicted, exhibiting a stiff "quark matter"core. This approach has implications for the hyperon puzzle and is also crucial for future exploration of inhomogeneous phases and the surface tension between hadron and quark phases.

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