Contribution ID: **13**   Type: **not specified**

Compact Stars with the Quark-Meson Model

Thursday 19 June 2025 09:00 (30 minutes)

To predict mass maxima for spherically symmetric compact stars, we use the Tolman-Oppenheimer-Volkoff equation together with an equation of state (EoS). The EoS relates the pressure and energy density, and can be derived for different types of matter. We expect nuclear matter EoSs to break down for a large enough energy density, a threshold which may be surpassed as one approaches the center of a compact star. At very large energy densities, perturbative QCD can be used to describe quark matter. For energy densities between these two extremes, we need another EoS. Therefore, we use the Quark-Meson (QM) model, a phenomenological model with quark degrees of freedom. The two-flavor QM model yields compact star mass maxima of approximately 2 solar masses, which is comparable to the most massive observed compact stars.

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Session Classification: Talks