

# Constraining Coupling Parameters of NJL Color Superconductivity for Compact Stars

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We study the Nambu-Jona-Lasinio (NJL) model and its extension to color superconductivity (CSC) by incorporating the Renormalization Group (RG)-consistent treatment. This refinement leads to significant updates in the understanding of the CSC phases including an improved speed of sound at higher densities.

For modeling the dense quark matter EoS, we determine and constrain the vector and diquark coupling parameters based on the current astrophysical constraints from various measurements. Varying the vector and diquark couplings shift the stellar configuration from self-bound to mimicking gravitational bound for pure strange stars. Furthermore, we observe both stable 2SC and CFL phases at low vector couplings which change to unstable CFL phases at high values.

We apply these refined couplings to the EoS for the strange stars and hybrid stars, particularly in the context of neutron star mergers to determine the signatures of CSC phases.

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