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Color Superconductivity in Two-Flavor QCD and Its Role in Neutron Stars

We explore the emergence of color superconductivity in two-flavor QCD and its implications for the equation of state of dense matter inside neutron stars. Employing a quark-meson-diquark model truncation within the functional renormalization group framework, we study the interplay between diquark and chiral condensates and the resulting superconducting phase at high baryon density. Our findings provide insights on the QCD phase structure under extreme conditions and point to color-superconducting quark matter as a possible component of neutron star cores and related astrophysical phenomena.

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