

COLOR SUPERCONDUCTING QUARK MATTER IN COMPACT STARS

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Recently, observations of compact stars have provided new data of high accuracy which put strong constraints on the high-density behaviour of the equation of state of strongly interacting matter otherwise not accessible in terrestrial laboratories [1]. Recent indications for high neutron star masses ($M \sim 2 M_{\odot}$) and large radii ($R > 12$ km) could rule out soft equations of state and have provoked a debate whether the occurrence of quark matter in compact stars can be excluded as well.

We show that modern quantum field theoretical approaches to quark matter including color superconductivity and a vector meanfield allow a microscopic description of hybrid stars which fulfill the new, strong constraints [2,3,4].

For these objects color superconductivity turns out to be essential for a successful description of the cooling phenomenology in accordance with recently developed tests [5]. We discuss QCD phase diagrams for various conditions [6,7] astrophysics and in future generations of nucleus-nucleus collision experiments

References

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