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Properties of quark matter and structure of compact stars in the perturbation model with a rapidly convergent matching-invariant running coupling

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The properties of dense quark matter are investigated in the perturbation theory with a rapidly convergent matching-invariant running coupling constant. The fast convergent speed is mainly due to the resummation of an infinite number of known logarithmic terms in a compact form. The only parameter in this model, the ratio of the renormalization subtraction point to the chemical potential, is restricted to be about 2.64 according to the Witten-Bodmer conjecture, which gives the maximum mass and the biggest radius of quark stars to be, respectively, two times the solar mass and 11.7 kilometers.

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