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Probing hybrid stars and tihe properties of the special points with radial oscillations

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We study the properties of hybrid stars containing a color superconducting quark matter phase in their cores, which is described by the chirally symmetric formulation of the confining relativistic density functional approach. It is shown that depending on the dimensionless vector and diquark couplings of quark matter, the characteristics of the deconfinement phase transition are varied, allowing us to study the relation between those characteristics and mass-radius relations of hybrid stars. Moreover, we show that the quark matter equation of state can be nicely fitted by the Alford-Braby-Paris-Reddy model that gives a simple functional dependence between the most important parameters of the equation of state and microscopic parameters of the initial Lagrangian. Based on it, we analyze the special points of the mass-radius diagram in which several mass-radius curves intersect. Analyzing a found empirical relation between the mass of the special point, maximum mass of the mass-radius curve and onset mass of quark deconfinement, we constrain the range of values of the vector and diquark couplings of quark matter. To find a distinguishable observational characteristic of the stars with the same mass and radius in the special points and probe their interior composition we calculate the frequencies of the fundamental mode of radial oscillations

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