Equation of state for hybrid stars with strangeness

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Considering the mass constraints from the resent pulsar observations, we study the properties of neutron stars including hyperons and quarks explicitly. Using the chiral quark-meson coupling model with relativistic Hartree-Fock approximation, the equation of state (EoS) for hadronic matter is calculated by taking into account the strange (σ^* and ϕ) mesons as well as the light non-strange (σ, ω, $\boldsymbol{\pi}$ and $\boldsymbol{\rho}$) mesons in SU(3) flavor symmetry. On the other hand, the EoS for quark matter is constructed with the Nambu-Jona-Lasinio or MIT bag models, and we investigate the effect of the transition between hadron and quark phases on the neutron-star properties, imposing smooth crossover or Gibbs criterion for chemical equilibrium. We then present the mass-radius relation of a neutron star, as well as physical quantities such as EoSs, particle fractions, and the speed of sound in matter. In addition, we estimate the total amount of strangeness in the core part to study the observed neutron stars with 2 solar mass, and discuss the lower bound of the critical chemical potential for the hadron-quark transition at zero temperature.