1 - 18 Density Dependence of Nuclear Symmetry Energy Constrained by Mean-field Calculations

Dong Jianmin, Zuo Wei, Gu Jianzhong and Lombardo Umberto

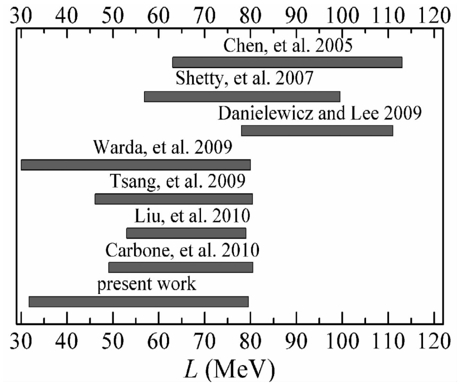

Fig. 1 Comparison between the L values obtained in the present work and those from other recently various analyses.

The symmetry energy that characterizes the isospin-dependent part of the equation of state (EOS) of asymmetric nuclear matter plays a crucial role in many issues of nuclear physics as well as astrophysics. We established a relation for three quantities S_0, L, and K_{sym} in widely different mean-field interactions[1]. With this relation and other constraint conditions, the density dependence of the nuclear symmetry energy $S(\rho)$ has been investigated in the present work and compare the results with those by other analyses[2−8], as shown in Fig. 1. With the obtained density dependence of the symmetry energy, the neutron skin thickness of ^{208}Pb and some properties of neutron stars were analyzed.

It is found that the expression $S(\rho) = S_0(\rho/\rho_0)\gamma$ or $S(\rho) = 12.5\,(\rho/\rho_0)^{2/3} + C_p(\rho/\rho_0)^{\gamma}$ does not reproduce the density dependence of the symmetry energy as predicted by the mean-field approach around nuclear saturation density. The L and K_{sym} values in the present study are (56±24) and (−125±79) MeV, respectively, and the neutron skin thickness of ^{208}Pb is (0.185±0.035) fm.

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1 - 19 Exotic Hill Problem: Hall motions and symmetries

Zhang Pengming and P. A. Horvathy[1]

The Hill problem arises as an approximation for nearly circular trajectories to Newton's gravitational equations written in rotating coordinates for bodies moving around a central mass. The original example is provided by the "Moon-Earth-Sun" system from[1]. Hill's equations have been also applied to stellar dynamics, with a "star cluster" replacing Moon and Earth, and the "Galactic Center" playing the role of the Sun.

Guided by the analogy with the noncommutative-Landau problem[2], we extended our previous study of Hill's equation to exotic particles. Our most interesting result states that for a critical angular-velocity i. e. for a critical radius determined by the noncommutative parameter θ, the only motions are those determined by the Hall law. The role of θ is to enhance the "Hall-type" behavior, eliminating all the others in the critical case $\Delta=0$.

Except for the lack of rotational symmetry due to the anisotropic oscillator-term, our results are reminiscent of those for the noncommutative-Landau problem, and generalize those for $\theta=0$. It is also worth

1 Laboratoire de Mathématiques et de Physique Théorique, Université de Tours, Tours, France.