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High-density behavior of nuclear symmetry energy CHANG XU, BAO-AN LI, Texas A&M University-Commerce — One of the key issues in nuclear physics and astrophysics is to determine the density dependence of nuclear symmetry energy $E_{sym}(\rho)$. At sub-saturation densities, recent nuclear reaction experiments on isospin-sensitive observables of intermediate-energy have already provided us some constraints on the symmetry energy. However, at higher densities, there exists a large uncertainty in determining the stiffness or softness of the symmetry energy. We demonstrate the high-density behavior of nuclear symmetry energy within the framework of the Thomas-Fermi model. In a transparent way, the symmetry energy is decomposed into three parts: kinetic energy contribution, isoscalar potential contribution, and isovector potential contribution that arises from the difference of NN interactions in isospin singlet (T=0) and triplet (T=1) states. By incorporating the in- medium effect, it is found that the high-density behavior of symmetry energy is very sensitive to the competition between different spin-isospin channels. The circumstantial evidence of a rather soft symmetry energy at SIS/GSI is possibly due to the strong contribution of in-medium effect in the isospin singlet channel.

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