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Constraining properties of neutron stars with heavy-ion reactions

BAO-AN LI, Arkansas State University, LIE-WEN CHEN, Shanghai JiaoTung University, CHE MING KO, Texas A&M University, ANDREW W. STEINER, Los Alamos National Laboratory — Nuclear reactions induced by stable and/or radioactive neutron- rich nuclei provide the opportunity to pin down the equation of state of neutron-rich matter, especially the density (ρ) dependence of its isospin-dependent part, i.e., the nuclear symmetry energy E_{sym} . A conservative constraint, $32(\rho/\rho_0)^{0.7} < E_{\text{sym}}(\rho) < 32(\rho/\rho_0)^{1.1}$, around the nuclear matter saturation density ρ_0 has recently been obtained from the isospin diffusion data in intermediate energy heavy-ion collisions. We review this exciting result and discuss its consequences and implications on nuclear effective interactions, radii and cooling mechanisms of neutron stars.

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