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Correlations between charge radii differences of mirror nuclei and stellar observables

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The correlation between the charge radii differences in mirror nuclei pairs and the neutron skin thickness has been studied with the so-called finite-range effective interaction over a wide mass region. The so far precisely measured charge radii differences data within their experimental uncertainty ranges in ^{34}Ar - ^{34}S , ^{36}Ca - ^{36}S , ^{38}Ca - ^{38}Ar and ^{54}Ni - ^{54}Fe mirror pairs are used to ascertain an upper limit for the slope parameter of the nuclear symmetry energy

$L \approx 100$ MeV. This limiting value of L is found to be consistent with the upper bound of the NICER PSR J0704+6620 constraint at 1σ level for the radius $R_{1.4}$ of the $1.4M_{\odot}$ neutron stars. The lower bound of the NICER $R_{1.4}$ data constraints the lower limit of $L \approx 70$ MeV. Within the range for $L=70$ - 100 MeV the tidal deformability $\Lambda^{1.4}$ extracted from the GW170817 event at 2σ level and the recent PREX-2 and CREX data on the neutron skin thickness are discussed.

session

I. Nuclear Structure and Reactions

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