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Alpha-decay half-lives and symmetry energy in KIDS model

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We studied alpha-decay half-lives of $84 \leq Z \leq 92$ in the semiclassical WKB approximation frame work using the density-dependent cluster model and the density distribution described by various Korea-IBS-Daegu-SKKU (KIDS) models. Main goal of this work is to find a correlation between alpha-decay half-lives and the stiffness of the symmetry energy. Parameters of KIDS model are determined to reproduce the nuclear data (energy and charge radii of ^{40}Ca , ^{48}Ca and ^{208}Pb) and the neutron star observations including constraints by NICER, tidal deformability from GW170817, and the maximum mass limit of neutron star observations. We used the KIDS models (A-D) which have distinctive values for the parameters controlling the stiffness of the nuclear matter equation of state. We found that alpha-decay half-lives increase systematically from KIDS-A model to KIDS-D model. This implies a correlation between alpha-decay half-lives and the symmetry energy. In this talk, we present our results and discuss their implications.

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