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A hypernuclear potentials beyond linear density dependence

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In recent papers [PLB 837 (2023) 137669 and NPA 1039 (2023) 122795] we showed that all measured (1sA, 1pA) pairs of A binding energies in A-hypernuclei $12 \le A \le 208$, can be obtained from a A-nucleus optical potential with only two adjustable AN and AN N parameters, associated with leading linear and quadratic terms in the nuclear density. Consequences of suppressing AN N interactions between 'core'nucleons and 'excess'neutrons are studied and related predictions are made for (1sA, 1pA) binding energies in {40,48}^K, obtainable from upcoming {40,48}^Ca(e,e'K+) JLab experiments. We find A-nucleus partial potential depths of D(2) A = -38.6 ± 0.8 MeV (AN) and D(3) A = 11.3 ± 1.4 MeV (AN N), with a total depth DA = -27.3 ± 0.6 MeV at nuclear-matter density ρ =0.17 fm-3. Extrapolation to higher nuclear densities and possible relevance to the 'hyperon puzzle'in neutron-star matter are discussed.

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