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ΛNN input to neutron stars from hypernuclear data

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This work is a sequel to our two publications from 2023 (1,2) where 14 experimental 1s and 1p single-particle binding energies of Λ in hypernuclei led to a quite well-defined optical potential for the Λ -nucleus interaction. The potential contains a traditional linear density term and a quadratic density term, the latter representing ΛNN interaction, within an approach based on a simplest possible formulation. The present work reports on extending the above analysis to 21 data points input, including also 1d and 1f states in medium-weight and heavy hypernuclei. The upgraded results agree, within errors, with the earlier results and could indicate a direction towards solving the so-called hyperon puzzle in the core of neutron stars (3). We show that a need to suppress the ΛNN interaction involving an excess neutron and a core nucleon can be tested with a forthcoming experiment at JLab.

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