Eur. Phys. J. A (2024) 60:152
https://doi.org/10.1140/epja/s10050-024-01374-8

THE EUROPEAN PHYSICAL JOURNAL A

Erratum

Erratum to: Effects of many-body interactions in hypernuclei with Korea-IBS-Daegu-SKKU functionals

Soonchul Choi[1,a], **Emiko Hiyama**[2], **Chang Ho Hyun**[3], **Myung-Ki Cheoun**[4]

[1] Center for Exotic Nuclear Studies, Institute for Basic Science (IBS), Daejeon 34126, Korea
[2] Department of Physics, Tohoku University, Sendai 980-8578, Japan
[3] Department of Physics Education, Daegu University, Gyeongsan 38453, Korea
[4] Department of Physics and OMEG Institute, Soongsil University, Seoul 06978, Korea

Received: 22 May 2024 / Accepted: 1 July 2024

Communicated by Jérôme Margueron

Erratum to: Eur. Phys. J. A (2022) 58:161
https://doi.org/10.1140/epja/s10050-022-00817-4

We found a mistake in the evaluation of the many-body contribution to the total hypernuclear energy in the original publication. The correct form of the rearrangement term in the Λ interaction reads

$$E_{\mathrm{rearr}\,\Lambda} = -\frac{3}{16}\int d^3r \sum_{i=1}^{4} \frac{i}{3} u_{3i}\left(1+\frac{1}{2}y_{3i}\right)\rho_N^{1+i/3}\rho_\Lambda. \tag{1}$$

In the original publication, the factor $\frac{i}{3}$ was forgotten in the numerical calculation. Using a correct form for the rearrangement term, we refitted the parameters for the interaction of Λ hyperons. New results are tabularized in Table 1. Mean deviation (MD in the table) values in the original publication are in the range 0.1844–0.2229. New fitting gives the MD values slightly higher than the previous ones. To see the effect of the larger MD values, we compare the binding energy of single-Λ hypernuclei. With the new parameters, we calculate the binding energies of single-Λ hypernuclei and the results are compared with experimental data in Fig. 1. Compared to the figure in the original publication, there is no notable difference for all the data points, so the new parameters reproduce the data accurately.

While the results of hypernuclei are seldom affected by the new fitting, changes in the parameters are not negligible. Effect of the change could be explored by considering the equation of state of infinite nuclear matter. Nuclear matter equation of state is obtained by calculating h_0 and h_3 terms given by Eq. (9) in the original publication. Compared to the results in the original publication, new parameters give less attractive and less repulsive interactions. In the original publication, both h_0 and h_3 terms are weakly sensitive to the model, but the new results show more visible dependence on the models. Net result $h_0 + h_3$ also exhibits increasing dependence on the model at densities $\rho_N \gtrsim 0.3$ fm^3.

Table 1 New parameters with corrected form of the hypernuclear energy. Units are MeV fm^3 for u_0, MeV fm^5 for u_1 and u_2, and MeV fm^{3+i} for u_{3i}. y_0 and y_{3i} are dimensionless

	KIDS0	KIDS-A	KIDS-B	KIDS-C	KIDS-D
u_0	−113.8	−95.17	−60.63	−75.14	−100.4
u_1	97.9	88.56	87.93	97.22	95.57
u_2	−22.58	−40.76	−22.88	−11.26	−28.18
u_{31}	−51.42	−284.3	−179.8	−266.8	−236.0
u_{32}	348.4	237.3	174.4	331.9	382.8
u_{33}	462.6	249.8	407.6	4.643	472.3
u_{34}	−79.04	−4.062	−370.1	−227.1	−137.9
y_0	3.815	3.688	8.166	9.152	3.283
y_{31}	2.999	3.588	−0.1729	−5.806	4.062
y_{32}	−1.985	8.903	−2.476	2.412	1.102
y_{33}	8.419	9.953	7.275	6.583	7.461
y_{34}	−5.700	−3.248	−6.885	−8.176	−4.510
MD	0.2090	0.2875	0.2413	0.2441	0.2313

The original article can be found online at https://doi.org/10.1140/epja/s10050-022-00817-4.

[a] e-mail: scchoi0211@ibs.re.kr (corresponding author)

Published online: 22 July 2024

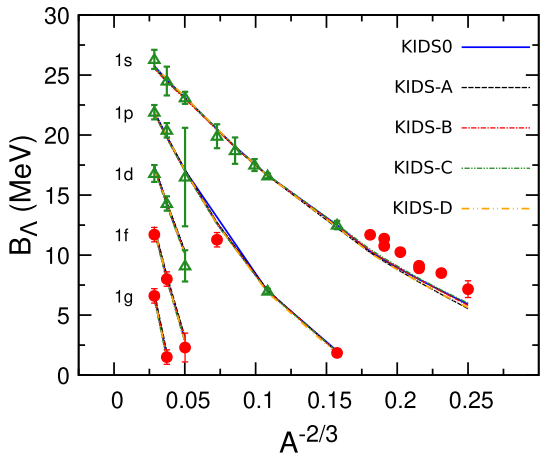

Fig. 1 Binding energies of single-Λ hypernuclei calculated with new parameters in Table 1. Results are compared with the data. Green triangles denote that data used in the fitting, and red circles for the data not used in the fitting

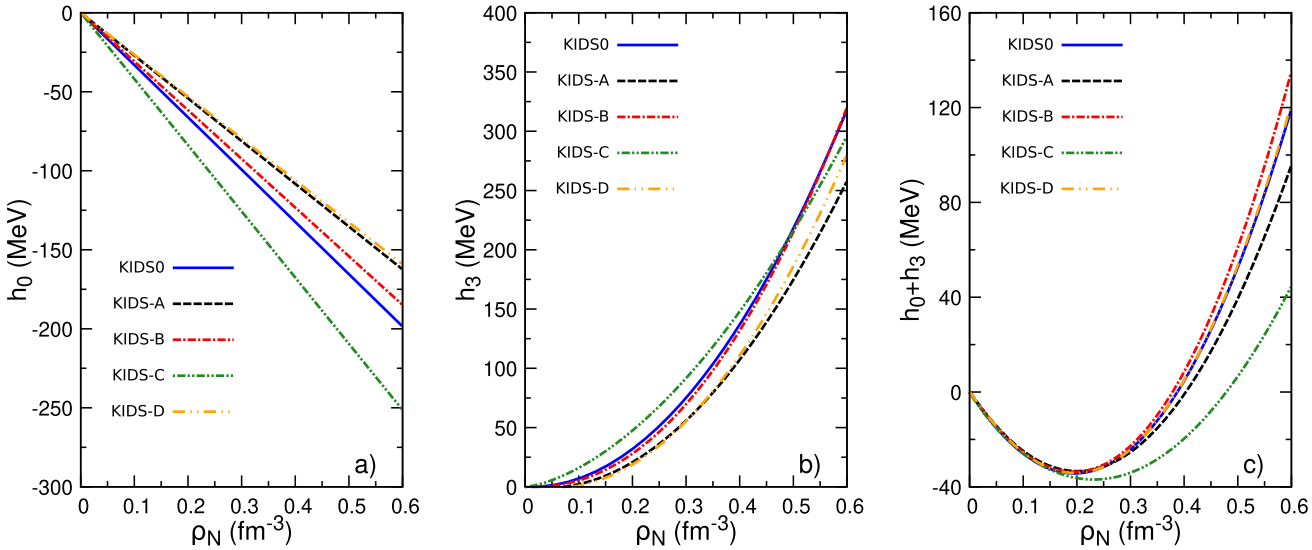

Fig. 2 Density dependence of the Λ-N potential in Eq. (9) in the original paper. **a** h_0, **b** h_3 defined in Eq. (9) in the original paper, and **c** $h_0 + h_3$ as a function of the nucleon density ρ_N