

Neutron-Rich Hypernuclei Are Coming. What They Tell Us ?

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We continue the discussion of our suggestion presented at FINUSTAR [1]: to explore the potential of hypernuclear spectroscopy [2, 3] for investigation the structure of light nuclei beyond neutron dripline [4].

The hypernuclei ${}^6_{\Lambda}\text{H}$ and ${}^7_{\Lambda}\text{He}$ could be obtained in the nearest future [5, 6, 7]. So, it would be possible to compare energy spectra of the chain of four (hyper) nuclei with two neutron “halo” and different s -shell core: ${}^5\text{H}$, ${}^6_{\Lambda}\text{H}$, ${}^6\text{He}$ and ${}^7_{\Lambda}\text{He}$. Such a unique comparison could shed light on the role of continuum [8, 9] as well as on a limit of three-body model (core+n+n) [10, 11].

The hypernucleus ${}^8_{\Lambda}\text{H}$ might be stable also [12]. We expect that in ${}^6_{\Lambda}\text{H}$ and ${}^8_{\Lambda}\text{H}$ there is a low-lying state 1^+ . So we obtain a chain of three hypernuclei ${}^4_{\Lambda}\text{H}$, ${}^6_{\Lambda}\text{H}$ and ${}^8_{\Lambda}\text{H}$ ($N/Z = 2, 4$ and 6 respectively) with a similar and very simple ground state doublet. Hypernuclear community has accumulated experience how to extract the $\ell \cdot s$ and tensor components of YN interaction from doublet splitting [13]. We study their isospin dependence.

References

- [1] L. Majling *et al.*, in FINUSTAR, (Eds. S.V. Harissopulos, P. Demetriou, R. Julin), AIP Conference Proceedings, vol. 831, p. 493.
- [2] T. Bressani, in Proc. Int. School “E. Fermi”, Course **153**, (Ed. A. Molinari), IOS Press, Amsterdam 2003, p. 323.
- [3] O. Hashimoto, and H. Tamura, Progr. Part. Nucl. Phys. **57** (2006) 564.
- [4] B. Jonson, Phys. Reports **389** (2004) 1.
- [5] M. Agnello *et al.* (FINUDA Collaboration), Phys. Lett. B **640** (2006) 145.
- [6] S.V. Afanasiev *et al.*, EPJ A (2007) in press (Proceedings HYP06).
- [7] L. Yuan *et al.*, Phys. Rev. C **73** (2006) 044607.
- [8] N. Michel, W. Nazarewicz, J. Okolowicz, and M. Ploszajczak, Nucl. Phys. A **752** (2005) 335.
- [9] A. Volya, and V. Zelevinsky, Phys. Rev. C **74** (2006) 064314.
- [10] M.V. Zhukov, B.V. Danilin, D.V. Fedorov, J.M. Bang, I.J. Thompson, and J.S. Vaagen, Phys. Reports **231** (1993) 151.
- [11] A.S. Jensen, K. Riisager, D.V. Fedorov, and E. Garrido, Rev. Mod. Phys. **76** (2004) 215.
- [12] R.H. Dalitz, Nucl. Phys. A **754** (2005) 14c.
- [13] D.J. Millener, Nucl. Phys. A **754** (2005) 48c.