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SÉMINAIRE du SPhN

Le vendredi 30 octobre 2015 à 11h
CEA-Saclay, Orme des Merisiers, b703 room 135

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Recent progress of hypernuclear physics

Recently, in hypernuclear physics, we had three neutron-rich Λ hypernuclei, *nn*Λ, $^{6}_{\Lambda}$H and $^{7}_{\Lambda}$He. These observations are very important by following reason: one of the research goals in hypernuclear physics is to study new dynamical features by injecting a Λ particle into a nucleus. Since there is no Pauli principle between nucleons and a Λ particle, the Λ participation gives rise to more bound states and significant contraction of nuclear cores, especially in light systems. If a Λ particle is added to neutron-rich nuclei to have a weakly bound state or resonant one, a resultant hypernucleus will become more stable against neutron decay. Three observed hypernuclei are such systems. Currently, it is important to investigate structure of these Λ hypernuclei theoretically. For this purpose, I will report these hypernuclei within the framework of *nn*Λ, *tnn*Λ and αΛ*NN* three- and four-body models.
The following will be reported together with my calculation method:
(1) To study *nn*Λ system, the coupled channel calculation of *NN*Λ and *NN*Σ is performed. We do not find any *nn*Λ bound state, which is inconsistent with the interpretation of the data.
(2) Interactions among the constituent subunits in $^{6}_{\Lambda}$H are determined so as to reproduce reasonably well the observed low energy properties of the *tn*, *t*Λ and *tnn*. As long as we reproduce the energy and width of ^{5}H within the error bar, the ground state of $^{6}_{\Lambda}$H is obtained as a resonant state.
(3) In our previous work, we predicted the ground state, 1/2+ and the excited states, $3/2^{+}_{1}$ and $5/2^{+}$. The recent observed data at Jlab are in good agreement with our prediction. Here, I will report another new states, $3/2^{+}_{2}$ and $5/2^{+}_{2}$ in $^{7}_{\Lambda}$He which is second 2^{+} state of ^{6}He coupled to 0*s*-orbit of Λ particle. I will report also the structure of these spectra.

References:

Resonant states of the neutron-rich hypernucleus $^{7}_{\Lambda}$He,
E. Hiyama, M. Isaka M. Kamimura, T. Myo, T. Motoba, Phys. Rev. C **91**, 054316 (2015).
Four-body structure of neutron-rich hypernucleus $^{6}_{\Lambda}$H,
E. Hiyama, S. Ohnishi, M. Kamimura, Y. Yamamoto, Nucl. Phys. ***A908***, 29 (2013).

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