Recent Topics in Hypernuclear Spectroscopy

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Recently the experimental energy resolution in Λ-hypernuclear spectroscopic study has been remarkably improved due to the γ-ray measurements with the Ge detector. The typical examples of such great achievement are several level energies known in ${}^{7}_{\Lambda}$Li, ${}^{9}_{\Lambda}$Be, and ${}^{13}_{\Lambda}$C with the resolution of less than 10 KeV. In addition, new experiments are being performed actually and also planned to measure γ-rays systematically for other hypernuclei. One of the most interesting features relevant to this experimental progress is a possibility of making a detailed test of the spin-spin and spin-orbit interactions embodied in several theoretical hyperon-nucleon potential models, which leads to a right way of getting better interaction models. Detailed comparison along this line will be discussed by adopting the G-matrix effective interactions derived from the recent Nijmegen meson theoretical potential model which has the soft core and five versions denoted as NSC97a,b,c,d,e,f.

On the other hand, in addition to the major peaks dominantly excited in the (K^-, π^-) and (π^+, K^+) reactions, several side peaks have been disclosed by using the SKS spectrometer at KEK. These 'minor' peaks are very important in a hypernuclear structure point of view, since they might reflect dynamical effects of a hyperon coupled with nuclear core-excited states. Such new feature of hypernuclear structure will be further revealed with the actual participation of the $(e, e'K^+)$ reaction performed and/or planned at JLab which is known to favor unnatural parity states of Λ-hypernuclei. In anticipation of these progress we tried to describe the hypernucleus with sophisticated wave functions in which the inter-shell coupling is taken into account. We will also discuss the reaction spectroscopic results with use of these wave functions.