Neutron-rich Lambda hypernuclei

Atsushi Sakaguchi[1]

[1]Department of Physics, Osaka University

Considerable number of species of the Lambda hypernuclei have been successfully created with various experimental methods, and the information of the Lambda-N interactions have been extracted from structures of the Lambda hypernuclei with supports of theoretical calculations and interpretations [1]. The attractive nature of the Lambda-N interaction and the independence of a Lambda hyperon in a sense of the Pauli exclusion principle in a hypernucleus promise a rich-spectrum of particle-stable species in the hypernuclear chart, so-called "glue-like effect" of the Lambda hyperon. But, the experimental knowledge of the boundary of stability of the hypernuclei is still not satisfactory.

The main reason of the insufficient knowledge is the lack of efficient production methods of Lambda hypernuclei far from the stability line. Several new methods have been proposed to produce proton- and neutron-rich Lambda hypernuclei [2–4]. In this talk, production methods of the neutron-rich Lambda hypernuclei via the double charge-exchange reactions are discussed. Recently, the searche for the exotic neutron-rich Lambda hypernuclei ${}^{6}_{\Lambda}\mathrm{H}$ has been performed by several groups, but the existence of the ${}^{6}_{\Lambda}\mathrm{H}$ hypernucleus is still controversial [5, 6]. The results and possible interpretations of the experiments are briefly discussed. To pin down the Lambda-N interaction in the neutron-rich Lambda hypernuclei, further experimental information is inevitable. Future plan of experiments at J-PARC 50 GeV PS dedicated for the neutron-rich Lambda hypernuclei is also presented.

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