

The hypernuclear physics program at Jefferson Lab

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Missing mass spectroscopy of Λ hypernuclei using the $(e,e'K^+)$ reaction has been performed at the Thomas Jefferson National Accelerator Facility (JLab) with several experiments in the past in Hall A and Hall C.

One experiment, expected to run in 2026 in Hall C, will provide the first study of the isospin dependence in medium-mass hyperisotopes by populating Λ -K-40 and Λ -K-48 using an isotopically enriched calcium target [JLab E12-15-008]. In the same campaign, it will be possible to study Λ interactions in nuclear matter using a lead target [JLab E12-20-013]. Further solid-state targets such as aluminum are also considered for this campaign.

The high-resolution spectrometers together with thin target foils and high beam currents guarantee an energy resolution on the sub-MeV level, much better than in hadron beam experiments.

The measurement of precise and accurate energy spectra of different hyperisotopes probes the Λ -N interaction in nuclei including the Λ -N-N three-body force. The latter is assumed to play a key role for the stiffness of the nuclear equation-of-state relevant for the stability of neutron stars.

(On behalf of JLab Hypernuclear Collaboration)

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