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Strangeness Physics at GlueX

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Content

High-energy electrons and photons are a remarkably clean probe of hadronic matter, providing a microscope for examining atomic nuclei and the strong nuclear force. One of the most striking phenomena of Quantum Chromodynamics (QCD) is the formation of the nucleon out of massless gluons and almost massless quarks. This system of confined quarks and gluons serves as the basic constituent of ordinary baryonic matter and exhibits the characteristic spectra of excited states, which are sensitive to the details of quark confinement. The GlueX experiment in Hall D at Jefferson Lab has accumulated high-statistics samples of photoproduction data off the proton in recent years. The detector system is capable of measuring neutral and charged final-state particles and covers almost the full 4π solid angle. Very good particle identification capabilities allow the study of many final states containing strangeness. The main motivation of the GlueX experiment is to search for and study exotic hybrid mesons, and the mapping of the lowest-mass hybrid-meson nonets. But GlueX is also able to shed more light on the spectrum and properties of strangeness -1 Λ and -2 Ξ (Cascade) baryons. In particular, the photoproduction mechanism for Ξ resonances is not very well understood and expected to proceed via highly excited intermediate singly strange hyperons in reactions such as $\gamma p \rightarrow KY^* (\Lambda^*, \Sigma^*) \rightarrow KK\Xi^*$. Copious data have been collected on the excited strangeness -1 baryons, $\Lambda(1405)$ and $\Lambda(1520)$, along with other data for a comprehensive hyperon program, which also includes the study of the photoproduced anti-$\Lambda\Lambda$ system. In this talk, I will give an update on recent results from the GlueX experiment at Jefferson Laboratory. Moreover, future prospects for strangeness measurements at GlueX will be discussed.

Field of Research: Multi-strange systems / Strangeness in hadron structure / Future experiments and facilities
Experiment / Theory: Experiment
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