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Elucidating Strangeness With Electromagnetic Probes

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Isgur and Capstick [1] predict a total of 44 cascade states below 2.5 GeV. Currently, there are only six Ξ states that have at least three-star ratings in the PDG [2], with the production mechanism of these states still remaining mostly elusive. The goal of the "Very Strange"[3] project is to study the quasi-real photoproduction of cascades to search for missing and new states. The new data from Jefferson Lab would make it possible to measure for the first time the beam polarisation transfer and induced polarisation of the Ξ- baryon as a kinematical variable function. Additionally, cascade studies look promising as a tool to differentiate genuine quark states from hadronic molecules, for which the Ξ(1620) resonance is an interesting state to study [4][5] as it is believed to be the doubly strange analogue to the Λ(1405), since we have the ability to measure the line shape in various decay branches with unprecedented precision. The study of cascades looks to be appealing from a theoretical perspective due to the symmetry from two medium-mass s-quarks. Extracting more information about the cascade baryons could also allow us to begin unravelling the composition of the core of neutron stars [6], exploring the hyperon puzzle. This work focuses on the analysis of CLAS12 data collected at Jefferson Lab to study the production mechanisms and decays of excited Ξ- states that are not well established, with the aim of determining branching ratios and extracting the quantum numbers of the new and missing Ξ states.

[1] S. Capstick and N. Isgur, Phys. Rev. D 34, 2809 (1986).
[2] J. Beringer et al. (Particle Data Group), Phys. Rev. D 86, 010001 (2012).
[3] A. Afanasev et al. (Very Strange Collaboration and CLAS collaboration at JLab), "Photoproduction of the Very Strangest Baryons on a Proton Target in CLAS12", (2013).
[4] E.Oset, A.Ramos, C. Bernhold, "On the spin, parity and nature of the Ξ(1620) resonance", (2018).
[5] M. Sumihama et al., "Observation of Ξ0(1620) and Evidence for Ξ0(1690) in Ξc+ ⟶ Ξ − π + π + Decays", (2019).
[6] A. Clevinger et al., "Hybrid equations of state for neutron stars with hyperons and deltas", (2022).

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