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Photoproduction of Structure in the $d\pi$ System Near the $N\Delta$ mass: Sign of a Quasi-Bound State?¹

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Results from nucleon-nucleon and pion-deuteron scattering analysis show attractive resonance-like behavior in certain partial waves. But evidence for clear-cut baryon-baryon (quasi-) bound states other than the deuteron remains lacking, despite theoretical expectations that they can exist. In recent years some measurements using pd scattering have interpreted a broad bump in the $d\pi\pi$ invariant mass distribution in terms of a $\Delta\Delta$ dibaryonic resonance. If such a quasi-bound state exists, then one supposes that an $N\Delta$ quasi-bound state exists also, as supported by recent Fadeev-model calculations of the πNN system. Here we discuss ongoing work looking at the $\gamma d \rightarrow d\pi^+\pi^-$ reaction using the CLAS detector at Jefferson Lab. A Dalitz-plot analysis shows structure in the invariant mass distributions in $(d\pi)^{++}$ and $(d\pi)^0$ systems. Both are near the center of the $N\Delta$ mass distribution. Possible interpretations of this observation will be discussed.

¹(for the CLAS Collaboration)