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New results of nucleon resonances studies in photo and electroproduction of charged pion pairs in CLAS detector

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A broad scientific program of exploration of nucleon exited states(N*) spectrum and structure is carried out in Jefferson Laboratory[1]. Detailed information of N* structure and spectrum opens access to fundamental mechanisms of strong interaction in the domain of large quark-gluon coupling constant resulting in formation of nucleons as bound states of quarks and gluons. The unique combination of electron continuous beam and CLAS[2] detector made it possible to explore for the first time the photo and electroproduction of nucleon resonances in exclusive $\gamma p \to \pi^+\pi^- p$ reactions[2,3].

The processes $\gamma p \to \pi p$ and $\gamma p \to \pi\pi p$ give the largest contribution to the total pion photo and electroproduction cross section. Moreover two-pion channel is more preferrable in studying high lying resonances with masses greater than 1.6 GeV because of the dominant branching ratio. Also this channel gives the opportunity to look for "missing N"states because the constituent quark model calculations show that the decays of these states to single pion channel are suppressed.

At this moment the preliminary CLAS data analysis on two-pion photo and electroproduction is complete. In case of photoproduction because of large statistics it was for the first time possible to obtain one-fold and two-fold differential cross-sections with rather narrow bin width of central mass energy ~25 MeV.

It is worth noting that both photo and electroproduction will be analysed within the framework of one phenomenological model JM[3] to ensure certainty of nucleon resonances extracted parameters.

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