

η photo-production on the deuteron at LNS, Tohoku

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Nucleon resonances in the second and third resonance regions have been experimentally studied via η photo-production on the proton at various facilities¹. Recently, a narrow peak at $W \simeq 1.68$ GeV in the quasi-free $\gamma n \rightarrow \eta n$ reaction has been reported by the GRAAL and CB-ELSA collaborations². Since no signal has been observed in the $\gamma p \rightarrow \eta p$ reaction in the same energy region, the corresponding resonance would be attributed to a member of the anti-decuplet penta-quark baryons with hidden strangeness. The U-spin conservation allows the resonance to be produced only on the neutron.

The cross sections on the deuteron at $E_\gamma \leq 1150$ MeV have been measured by using an electromagnetic calorimeter SCISSORS II at Laboratory of Nuclear Science (LNS), Tohoku University. The events of η photo-production are identified in the $\gamma\gamma$ invariant mass distribution. The yields are obtained by subtracting continuum backgrounds originated mainly from multi- π^0 events. The $\gamma d \rightarrow \eta pn$ events are selected in the emitted η momentum distributions. The differential and total cross sections for the $\gamma d \rightarrow \eta pn$ reaction are obtained as a function of the incident γ energy with an acceptance correction. The total cross section on the deuteron shows a bump around $E_\gamma = 1020$ MeV, while no bump is observed in the same energy region in that on the proton.

In this talk, the inclusive total cross section for the $\gamma d \rightarrow \eta pn$ reaction is presented, and the bump around $E_\gamma = 1020$ MeV is discussed.

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