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Theoretical Studies on $d(\vec{\gamma},\vec{p})n$ at Astrophysical Energies

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The photonuclear reactions using deuterium targets find application in nuclear physics, laser physics and astrophysics. The studies related to deuteron photodisintegration using polarized photons has been the focus of interest since 1998 [1] which influenced many experimental studies that were carried out using 100 percent linearly polarized photons at Duke free electron Laser Laboratory.Theoretical study on deuteron photodisintegration was carried out [2,3]and in these studies the possibility of 3 different $E1_v$ amplitudes leading to the final n-p state in the continuum was discussed.As there is experimental evidence about the splitting of 3 $E1_v-$p wave amplitudes at slightly higher energies, we hope that the same may be true at near threshold energies also. As the spin dependent variables are more sensitive to theoretical inputs and the data obtained on polarization observables are more sensitive to theoretical calculations, there is a considerable interest in studies related to the reaction. On the other hand, photon polarization in n-p fusion was discussed [4], wherein it was suggested for a polarized target-beam test to check for the presence of smaller isoscalar amplitudes. Recently, neutron polarization in $d(\vec{\gamma},\vec{n})p$ was studied at near threshold energies[5].

In this regard, the purpose of the present contribution is to extend this study to discuss proton polarization in $d(\vec{\gamma},\vec{p})n$ reaction using model independent irreducible tensor formalism at near threshold energies of interest to astrophysics.

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Author: M, Kusuma (K S School of Engineering and Management, Bangalore-109, School of Engineering and Technology, Christ University, Bengaluru-560074 India.)

Co-authors: Mr SHASTRI, Venkataramana (School of Engineering and Technology, Christ University, Bengaluru-560074 India.); Dr SHILPASHREE, S.P. (School of Engineering and Technology, Christ University, Bengaluru-560074 India.)

Presenter: M, Kusuma (K S School of Engineering and Management, Bangalore-109, School of Engineering and Technology, Christ University, Bengaluru-560074 India.)

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