Three-body photodisintegration of $^3$He using a longitudinally polarized target and a circularly polarized $\gamma$ beam at 12.8 and 14.7 MeV$^1$ GEORGIOS LASKARIS, Triangle Universities Nuclear Laboratory and Physics Department of Duke University, POLARIZED $^3$HE COLLABORATION AT HIGS/TUNL TEAM — We report on the first measurement of the three-body photodisintegration of longitudinally polarized $^3$He using a circularly polarized $\gamma$-ray beam at incident photon energies 12.8 MeV and 14.7 MeV. The experiment was carried out at the High Intensity $\gamma$-ray Source facility located at the Triangle Universities Nuclear Laboratory. A high-pressure $^3$He target, polarized via spin exchange optical pumping with alkali metals, was employed. The neutrons from the three-body photo-disintegration were detected using ten liquid scintillators positioned in the reaction plane at five different angles between $75^\circ$ and $165^\circ$. Results on the spin-dependent double- and single- differential cross sections, the spin-dependent total cross sections, as well as the asymmetries will be presented and compared with the state-of-the-art three-body calculations for both energies. The first data points below pion production threshold of the three-body photodisintegration part of the GDH sum rule integrand will be also presented. Contributions from three-body photodisintegration at the photon energies of this work to the $^3$He GDH integrand below the pion production threshold will also be presented for the first time.

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