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Two- and Three-body Photo-disintegration of ^3He with Double Polarizations at 29.0 and 16.5 MeV

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We report on the first measurements of the two- and three-body photodisintegration of longitudinally polarized ^3He using a circularly polarized γ -ray beam at the incident photon energies of 29.0 MeV and 16.5 MeV, respectively. The experiments were carried out at the High Intensity γ -ray Source facility located at the Triangle Universities Nuclear Laboratory. A highpressure ^3He target, polarized via spin exchange optical pumping with alkali metals, was employed. The protons from the two-body photo-disintegration were detected using 72 silicon surface barrier detectors placed at 4 different angles between 45° and 120° while the neutrons from the three-body photo disintegration were detected using 16 liquid scintillators positioned in horizontal reaction plane in the lab frame at 8 angles between 30° and 165° . Results on the spin-dependent double- and single-differential cross sections, the spin dependent total cross sections and the GDH sum rule integrand will be presented for the first time and compared with the state-of-the-art three-body calculations.

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