

## **Polarization Observables in Meson Photoproduction with the Crystal Ball/TAPS at MAMI**

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In order to understand the strong interaction in the non-perturbative region, the excitation spectrum of nucleons is one of the most important tools to use. Recent experiments using the Crystal Ball/TAPS setup at the MAMI accelerator in Mainz, Germany continue to study these properties and the excitation spectrum with meson photoproduction. Electromagnetic excitations of the proton and neutron are essential for understanding their isospin decomposition. The electromagnetic coupling of photons to protons is different than that of neutrons in certain states. Hence, a complete partial wave analysis (PWA) can assist in yielding more information about any reaction, but requires the determination of polarization observables. Polarization observables play a crucial role as they are essential in disentangling the contributing resonant and non-resonant amplitudes, whereas cross-section data alone is not sufficient for separating resonances. Preliminary results of polarization observables ( $E$ ,  $T$ , and  $F$ ) of  $\eta$ , single, and double  $\pi$  production off a polarized neutron (D-butanol) target will be shown with comparison to predictions of recent multipole analyses. These results will allow for significantly developing the world database.