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Measuring Proton Spin Polarizabilities with Polarized Compton Scattering¹ PHILIPPE MARTEL, WILLIAM BARNES, RORY MISKIMEN, ALEXANDER MUSHKARENKOV, University of Massachusetts, MAMI A2 COLLABORATION — An important test of low-energy QCD theories is the extraction of the proton spin polarizabilities (SPs), which describe the response of the proton spin to a polarized photon. The SPs arise as third order terms in the energy expansion of the Compton scattering amplitude, with theoretical values provided by dispersion and effective field theories, and in the future by lattice calculations. Extraction of these values is possible by measuring two beam-target asymmetries of a circularly polarized photon beam on a transversely polarized target, Σ_{2x} , and on a longitudinally polarized target, Σ_{2z} , and a beam asymmetry of a linearly polarized photon beam on an unpolarized target, Σ_3 , at photon energies between π and 2π threshold. The MAMI A2 Bremsstrahlung beam is used in conjunction with either a frozen-spin butanol or an unpolarized hydrogen target, and the Crystal Ball and TAPS detectors which combined provide 97% coverage of 4π . We will report on Σ_{2x} measurements, supplemented by initial Σ_3 measurements, both just below and above 2π threshold.

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