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Compton Scattering from Deuterium and the Electromagnetic Polarizabilities of the Neutron GERALD FELDMAN, George Washington University, COMPTON@MAX-LAB COLLABORATION — The electric and magnetic polarizabilities of the neutron are still relatively uncertain, as compared to those values for the proton. To address this problem, a multi-institutional collaboration has conducted a program of elastic Compton scattering experiments on deuterium at the MAX IV Laboratory in Lund, Sweden using tagged photons spanning the energy range E_γ = 65-115 MeV. We assembled at one laboratory, for the first time, three of the world's largest NaI detectors (each with $\Delta E/E \sim 2\%$) and measured elastic Compton scattering cross sections at lab angles of $\theta_\gamma = 60^o$, $120^o$and 150^o. This effectively doubles the world's set of elastic Compton scattering data from deuterium and provides valuable input for chiral effective field theory (χEFT) calculations. The absolute normalization of the current data was rigorously checked via separate measurements of elastic Compton scattering on carbon, which can be compared with precise values in the literature. These new deuterium data overlap previous measurements and extend them by 20 MeV to higher energies. Based on χEFT fits to the expanded world data set, new values for the neutron electric and magnetic polarizabilities have been obtained with greater accuracy than previously achieved, decreasing the statistical error by more than 30%.

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