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High Precision Measurement of the Neutron Polarizabilities via Compton Scattering on Deuterium at E_γ=65 MeV MARK SIKORA, Duke University, COMPTON@HIGS TEAM — The electric (α_n) and magnetic (β_n) polarizabilities of the neutron are fundamental properties arising from its internal structure which describe the nucleon's response to applied electromagnetic fields. Precise measurements of the polarizabilities provide crucial constraints on models of Quantum Chromodynamics (QCD) in the low energy regime such as Chiral Effective Field Theories as well as emerging ab initio calculations from lattice-QCD. These values also contribute the most uncertainty to theoretical determinations of the proton-neutron mass difference. Historically, the experimental challenges to measuring α_n and β_n have been due to the difficulty in obtaining suitable targets and sufficiently intense beams, leading to significant statistical uncertainties. To address these issues, a program of Compton scattering experiments on the deuteron is underway at the High Intensity Gamma Source (HIγS) at Duke University with the aim of providing the world's most precise measurement of α_n and β_n. We report measurements of the Compton scattering differential cross section obtained at an incident photon energy of 65 MeV and discuss the sensitivity of these data to the polarizabilities.

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