Abstract Submitted
for the DNP06 Meeting of
The American Physical Society

Nucleon Polarisabilities from Deuteron Compton Scattering, and Its Lessons for Chiral Power Counting HARALD W. GRIESSHAMMER, The George Washington University — Chiral Effective Field Theory with explicit $\Delta(1232)$ degree of freedom is for photon energies up to 300 MeV the tool to accurately determine the polarisabilities of the proton and neutron from Compton scattering experiments in a model-independent and systematic way. It proves in particular indispensable to understand deuteron Compton scattering at 95 MeV as measured at SAL. Simple consistency arguments derived from nuclear phenomenology lead for the deuteron case to the correct Thomson limit, demonstrating gauge-invariance and shedding new light on Weinbergs proposed power-counting of nuclear forces. In our global analysis of all elastic proton and deuteron Compton scattering up to 150 MeV, we find for the static scalar dipole polarisabilities $\bar{\alpha}^p = (11.0 \pm 1.4_{\rm stat} \pm 0.4_{\rm sys}) \times 10^{-4}$ fm^3, $\bar{\beta}^p = (2.8 \mp 1.4_{\rm stat} \pm 0.4_{\rm syst}) \times 10^{-4}$ fm^3 for the proton and $\bar{\alpha}^n = (11.6 \pm 1.5_{\rm stat} \pm 0.6_{\rm syst}) \times 10^{-4}$ fm^3 $\bar{\beta}^n = (3.6 \mp 1.5_{\rm stat} \pm 0.6_{\rm syst}) \times 10^{-4}$ fm^3 for the neutron. Therefore, proton and neutron polarisabilities are identical within the accuracy of available data. New experiments e.g. at MAXlab (Lund) will improve the statistical error-bar.
[1] R. P. Hildebrandt, H. W. Grießhammer and T. R. Hemmert, submitted to Phys. Rev. C [nucl-th/0512063]. [2] H. W. Grießhammer: *Power-Counting in Chiral EFT from a Minimum of Phenomenology*, in preparation.

Harald W. Griesshammer
The George Washington University

Date submitted: 29 Jun 2006 Electronic form version 1.4