

# Beam-spin asymmetry measurement in pion photoproduction on the neutron using CLAS

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## Abstract

Meson photoproduction on the nucleon is one of the cleanest probes of its excitation spectrum. Technological advances in the past years have enabled high resolution experiments using polarised beams and targets, which for the first time have the potential to map the resonance spectrum in a nearly model-independent way, greatly enhancing our capabilities to address long-standing issues such as the missing resonance problem.

To enable determination of the resonance isospin and the reliable extraction of the electromagnetic couplings of the excited states, measurements are required on both isospin partners. The neutron dataset is, however, still pitifully sparse. We present a very high statistics, exclusive measurement of the beam-spin asymmetry ( $\Sigma$ ) in the  $\gamma+n \rightarrow p+\pi^-$  channel, which is a crucial observable required for the unambiguous extraction of the reaction amplitudes for single pseudo-scalar meson-production. The experiment covered the invariant mass range 1.6 – 2.3 GeV and was carried out at Jefferson Laboratory, USA, using the near- $4\pi$  detector CLAS, a linearly polarised photon beam and a liquid deuterium target.