Measurement of G_{En} in $D(\vec{e},e'\vec{n})p$

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The neutron electric form factor $G_{E,n}$ has been measured at four-momentum transfers of 0.3, 0.6, and $0.8\,\mathrm{GeV/c^2}$ in a $\mathrm{D}(\vec{e},e'\vec{n})p$ experiment, based on the spin transfer in (quasi-)elastic scattering of polarised electrons on unpolarised nucleons.

The experiment was performed at the three-spectrometer facility at MAMI, using a polarised electron beam hitting a liquid deuterium target. The momentum of the scattered electrons was measured in a magnetic spectrometer. Neutrons were detected at forward angles in a neutron polarimeter. Their direction and time of flight were measured in a first wall of scintillators. Since the *n*-*p* scattering reaction in the organic scintillator carries analysing power, a transverse neutron polarisation will lead to an asymmetry that can be analysed by another neutron detection in a second scintillator wall. By precessing the neutron spin in a magnetic field, both transverse and longitudinal polarisation components can be measured.

The first step of data analysis is the reconstruction of the kinematics of each event, which is determined by the momentum of the scattered electron and by the lab-system angle of the neutron. Neutrons can be discriminated against protons and other charged particles by various conditions based on time of flight measurement and on the particles' energy deposition in different layers of the detector. Additional information is provided by the correlation of the (quasi-)elastic $p(\vec{n},pn)$ neutron scattering angle and the energy signal in the first scintillator wall. For the final event sample, the azimuthal angle of the analysing scattering of the neutron and the beam helicity can be combined to an asymmetry double ratio. Data have been taken at different precession angles, permitting a determination of the $G_{E,n}/G_{M,n}$ ratio, independent of the effective analysing power.

Data taking was completed in August 2002 and analysis is in progress. Our aim is a relative error on $G_{E,n}$ of about 10 %.