Polarized 3He Targets at MAMI

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Due to its spin structure polarized 3He is a suitable substitute for a polarized neutron target. Upcoming experiments at MAMI with real and virtual photons include e.g. meson photoproduction and the measurement of the electric form factor of the neutron.

Polarized 3He gas is provided by a polarizer which operates according to the Metastability Exchange Optical Pumping (MEOP) principle. The gas is optically pumped at pressures of about 1 mbar and compressed afterwards in a nonmagnetic piston compressor to the desired target pressure of about 5 bar, where less than 2 % of the initial polarization is lost. As a result, more than 70 % polarization can be obtained at a yield of 2 bar l/h.

After filling at the polarizer the target cells are brought to the experimental area where homogeneous holding fields for all three spacial directions are provided. External magnetic fields are shielded by a mu-metal box. Inside this box an online measurement of the polarization via a nmr method is possible.

This talk will focus on the target setup for electron scattering experiments. Furthermore, preparation methods for the target cells and relaxation measurements for different materials of the entry- and exit-windows will be given.