

Design of the Mainz Active Polarized Target

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Name: Maik Biroth for the A2-Collaboration

Affiliation: Institut für Kernphysik, Johannes Gutenberg-Universität Mainz, Germany

Title: Design of the Mainz Active Polarized Target

Abstract:

At the Institut für Kernphysik in Mainz, Germany, the A2-Collaboration investigates the spin-polarizabilities of the proton by scattering experiments with spin-polarized energy-tagged photons. Due to the excellent temperature stability of the Mainz Frozen Spin Target a large degree of proton polarization with high relaxation times can be achieved.

To study the spin-polarizabilities below the pion threshold we are building an Active Polarized Target to identify the reactions by detecting recoil-protons inside the Mainz-Dubna dilution cryostat. Pieces of polarizable plastic scintillator are stacked in a head of wavelength-shifting material. The scintillation light is guided through a tube of borosilicate to Silicon Photomultipliers which were operated at cryogenic temperatures inside the cryostat. In a test beam-time it was ensured the design is able to separate recoil-protons with a five times signal enhancement compared to the electro-magnetic background. We will give a report of the latest improvements in the target design and the placement inside the cryostat.

Due to the advanced amplifier development and modifications to a custom type it was possible to operate a Silicon Photomultiplier at liquid helium temperatures at a long distance to the readout electronics. Results from ongoing tests with the latest evolution of this Silicon Photomultiplier from room temperature to liquid nitrogen temperature will be presented.

Proposed parallel session for the contribution: Polarized Solid Targets

Symposium Registration Fee: 280 Euro

Authors: THOMAS, Andreas (University Mainz); DOWNIE, Evie (Physics Department, George Washington University, Washington DC, USA); BIROTH, Maik (Institut für Kernphysik, Mainz, Germany); ACHENBACH, Patrick (Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz, Germany)

Presenter: BIROTH, Maik (Institut für Kernphysik, Mainz, Germany)

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