

FPGA-Based Upgrade of the Read-Out Electronics for the Low Energy Polarimeter at COSY/Jülich

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The low energy polarimeter (LEP [1]) is a polarimeter in the injector of the Cooler Synchrotron (COSY [2]). COSY is a facility for cooled polarized beams at the Forschungszentrum in Jülich. The beam polarization is measured using scattering off carbon and polyethylene (CH₂) targets. Up to now only elastic scattering off the carbon atoms is used for polarimetry. The outgoing particles are detected using twelve plastic scintillators installed in groups of three to the left, to the right above and below the beam.

LEP is the routine tool for beam set-up, but limited in performance. The current read-out electronics consists of analog NIM modules. It can either be used to measure pulse height spectra at a data rate limited to ~50 kHz or to merely count the pulses within an adjustable range in amplitude, which allows for a faster measurement. Further motivation is the missing capability of P_{zz} determination.

A new system using analog pulse sampling and an FPGA chip for signal processing was installed and tested. The ejectile particles were identified by relative time of flight measurement using a signal from the radio amplifier of the cyclotron used for acceleration as a reference point. The new system is able to measure the time at which a particle arrives to an accuracy in the order of 50 ps.

The presentation includes a review of available systems and the report about first measurements in May 2015.

[1] M. Eggert, Entwicklung eines gepulsten Caesium-Ionenstrahls fuer die Quelle polarisierter Ionen an COSY/Julich, PhD Thesis, 1998

[2] R. Maier, Nucl. Instr. and Meth. A 390 (1997) 1

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