Spin in Hadronic Reactions at Medium Energy

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Hadron physics is aiming at the investigation of (i) QCD symmetries and symmetry breaking, (ii) hadronic spectroscopy, and (iii) spin physics. Corresponding programs are being pursued at the Cooler Synchrotron (COSY) of the Research Center Jülich, where three major detector systems are employed: ANKE and WASA at the internal COSY beam and TOF at an extracted beamline. While ANKE and TOF are in operation since a couple of years, WASA has recently been transferred from CELSIUS/TSL (Uppsala, Sweden) to COSY and – after refurbishment of detectors and electronics – is currently installed and commissioned.

The spin physics program is based on the availability of polarized proton and deuteron beams (at COSY between 0.3 and 3.7 GeV/c, with intensities up to a few times 10^{10} p/s, and at polarizations of more than 80% for p and up to 70% for d) for single polarization experiments, and in addition a polarized internal target (PIT), which allows for double polarization measurements. In order to achieve sufficiently high luminosities, the polarized gas is fed into a storage cell (length ~40cm), in which the beam-target collisions occur. The target polarization is obtained via selected nuclear reactions and with the help of a Lamb-shift polarimeter (LSP), which is also used for monitoring. For executing the double-polarized neutron-proton experiments – using a long deuterium storage cell target – a detection system for slow so-called *spectator* protons (energy < 10 MeV) is currently being developed, built and commissioned. It comprises three position sensitive silicon detectors to form a silicon tracking telecope (STT) that will also be employed as a polarimeter and for vertex determination during the experiments.

In this talk, the ongoing and future spin-physics program at COSY/ANKE, in particular emphasizing new results, will be presented and discussed. In addition I would like to give an outlook to the *spin filtering* test measurements that we are planning at COSY in order to work out the technical solution for polarizing antiprotons for FAIR at GSI (Darmstadt, Germany) [1].

[1] F. Rathmann et al., Phys. Rev. Lett. 94, 014801 (2005).