

The Polarized Internal Target at ANKE: First Results

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A polarized internal storage cell target is currently being developed for the ANKE spectrometer at COSY. After first installation in summer 2005, commissioning studies were carried out, including storage cell tests to determine the dimensions of the COSY beam. The cell was made from pure aluminum foil, it had a length of 400 mm, a cross section of $20 \times 20 \text{ mm}^2$, and was covered with a thin film of Teflon (PTFE). In November 2005, tests with such a storage cell at ANKE using polarized Hydrogen atoms from the ABS, and electron-cooled unpolarized protons, stacked at injection and accelerated in COSY to $T=600 \text{ MeV}$ at different deflection angle settings of the ANKE spectrometer magnet were carried out. It was possible to store $1.5 \cdot 10^{10}$ protons on flattop. In March 2006, a first polarization measurements with unpolarized protons at $T=831 \text{ MeV}$ and a polarized hydrogen beam were carried out. At that energy, stochastic cooling of the beam is possible. Storage cell prototypes made from uncoated pure aluminum foil were used and unpolarized H_2 was admitted from a gas feed system to the storage cell. The analysis of the $pp \rightarrow pp\pi^0$ and $pp \rightarrow pn\pi^+$ reactions shows that events from the extended target can be cleanly identified in the ANKE forward detector system. Using unpolarized N_2 admitted to the cell, the background from the cell walls could be determined as well. The expected target thickness with a hydrogen beam injected into the cell in hyperfine state 1 is $2 \cdot 10^{13} \text{ atoms/cm}^2$. Measurements of the target asymmetry of the $p\bar{p} \rightarrow d\pi^+$ with the ABS operating as a hydrogen jet target in hyperfine state 1 or 2 were necessary, due to difficulties with the magnetic shielding of the weak field transition (WFT) from the spectrometer magnet. An average target polarization of $P=0.44 \pm 0.03$ was measured, while we expected about $P=0.51 \div 0.55$. The jet target thickness was $(1.5 \pm 0.1) \cdot 10^{11} \text{ atoms/cm}^2$.

In the future, the Lamb-shift polarimeter will be mounted below the target chamber to allow for tuning of the transition units and monitoring of the ABS beam polarization. The required new deflector for the polarimeter will be available in summer 2006. The configuration of the target cell and its support mechanism will be upgraded to allow for the installation of the Silicon Tracking Telescopes (STT) near the target cell and will be installed at ANKE in December 2006 for final commissioning. A first double polarized experiment will be carried out in January 2007 and address the study of the spin dependence of the pn interaction from the $\vec{d}\vec{p} \rightarrow ppn$ reaction (see contribution by David Chiladze).