The Polarized Internal Target at ANKE

R. Engels, K. Grigoryev[a], P. Jansen[b], F. Klehr[b], H. Kleines[c], M. Mikirtychyants[a], F. Rathmann, J. Sarkadi, H. Seyfarth, and A. Vasilyev[a]

During spring of 2005 all components of the polarized internal target (PIT) have been transferred from the laboratory in the IKP office building to the COSY hall, but outside of the accelerator area (LKW-Schleuse). There, the polarized atomic beam source (ABS) using its central flange has been fixed to the new supporting bridge, which allows one to move the system of bridge and ABS as one unit by crane. It can be positioned either between the ANKE spectrometer dipole magnets D1 and D2, or on a special support in the LKW-Schleuse for tests or polarization studies in the framework of an ISTC project [1]. Test measurements, performed after reassembling of the ABS, have shown that the earlier values of ABS-beam intensity and polarization are reproduced. All the supply units and the components of the control and interlock system [2] are mounted on a crane-transportable platform. Thus, fast transfer of the whole setup to and from the ANKE-target position becomes possible, requiring only a few crane movements.

During the summer shutdown of 2005, the bridge with the ABS was moved (Fig. 1) to the ANKE-target position (photograph in Fig. 2). In order to test the movement of the complete setup with the lateral shift of the central dipole magnet D2, also the Lamb-shift polarimeter (LSP) was mounted at the ANKE-target chamber as shown in Fig. 2. The supply platform is positioned nearby outside the accelerator tunnel on an elevated support to keep the lengths of cables and supply-lines as short as possible.

Fig. 1: ABS and supporting bridge with suspension frame in flight to the ANKE target place. The main designer (F.K.) stands below in the opened COSY tunnel, trusting his constructions.

Measurements of the magnetic stray field, mainly caused by the 20 cm gap width of the magnet D2, have shown values near or above the critical values of ABS components, like turbo pumps, displacer-driving motors of the cryogenic pumps, and vacuum gauges. With sufficient soft-iron shielding, the ABS now delivers the laboratory $\vec{\mathrm{H}}$ beam intensity of $\sim 7 \cdot 10^{16}$ atoms/s (two hyperfine states) at the highest D2-gap field of 1.6 T. Another sensitive component of the ABS is the medium field transition unit (MFT), which is used to depopulate one of the two hyperfine states of the $\vec{\mathrm{H}}$ beam. Its soft-iron shielding (designed using the computer code MAFIA [3]) avoids any measurable influence of the magnetic stray fields up to the highest value.

In late 2005, first tests and commissioning measurements with the PIT at ANKE have been performed with promising results [4].

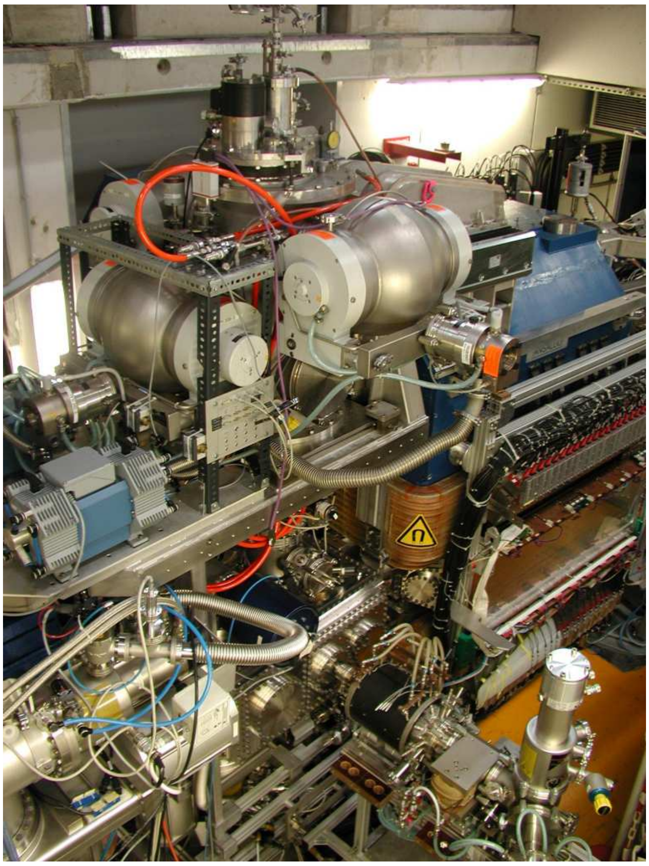

Fig. 2: ABS (vertical, carried by the support bridge) and components of the Lamb-shift polarimeter (horizontal) at the ANKE-target chamber. The COSY beam circulates from left to right through the setup, the spectrometer magnet D2 is at the right-hand side.

References:

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[a] St. Petersburg Nuclear Physics Institute, Gatchina, Russia.
[b] Zentralabteilung Technologie, FZ Jülich.
[c] Zentralinstitut für Elektronik, FZ Jülich.