The Polarized Internal Gas Target (PIT) of ANKE at COSY

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For future few–nucleon interaction studies with polarized beams and targets at ANKE, a polarized internal storage cell gas target is currently being developed. The polarized atomic beam source (PABS) provides beam intensities of $7.4 \cdot 10^{16}$ atoms/s in two hyperfine states of hydrogen [1]. The differential pumping system at ANKE has been installed: two Leybold COOLVAC 1500 cryopumps (each of 2200 l/s H_2 pumping speed) on both D1 and the D2 vacuum chambers, one on the new target chamber. The ion pumps in the D3 region have been replaced by three Leybold COOLVAC 800 cryopumps of higher pumping speed (1000 l/s H_2 each). The full ANKE setup, including the future vertically mounted PABS, positioned above the storage–cell target in front of the central spectrometer magnet D2, is shown in Fig. 1. The large, new target chamber has been installed (see Fig. 2). Its frame structure with a set of standard CF–flanges on the four sides allows for easy mounting of the various components. Furthermore, additional CF–flanges in the front and rear enable, e. g., mounting of vacuum components. The chamber accommodates a newly–developed set of small–aperture horizontal and vertical beam–position monitors (BPM) [2]. Together with an identical set mounted in the section between the two magnets D2 and D3, these monitors will facilitate the determination of the beam position and angle. In the future, the chamber will house the storage cell and a system of target–near detectors. The PABS has to move together with the target chamber, when the central spectrometer dipole magnet is set to a different beam deflection angle. The design of the bridge structure between D1 and D2 to support the PABS and the target chamber is underway. In order to determine the nuclear polarization of the target, a Lamb–Shift polarimeter is currently set up [3]. Tests with prototype storage cells, aiming at the identification of cell dimensions suitable for the ANKE target, are presently prepared. The setup for these tests inside the new target chamber is depicted in Fig. 3.

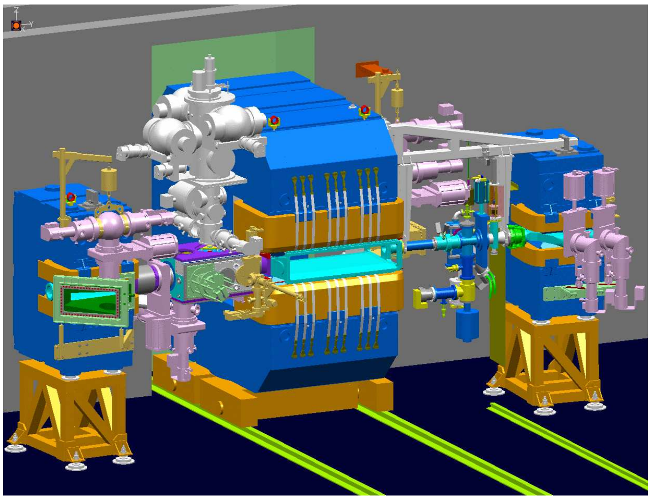

Fig. 1: 3D CAD view of the ANKE setup. The COSY beam enters from the left.

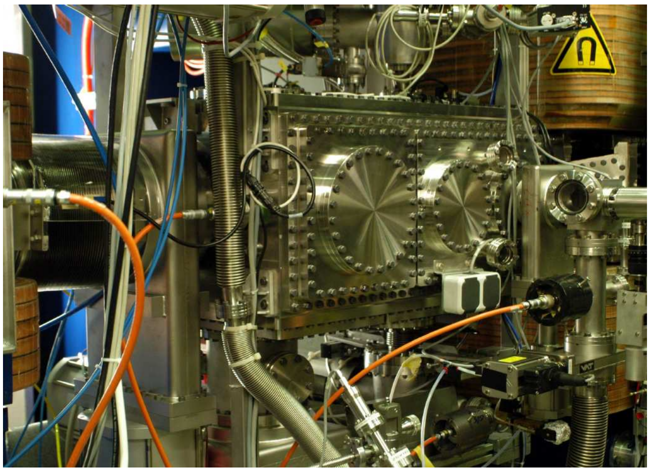

Fig. 2: Side view of the installed new target chamber.

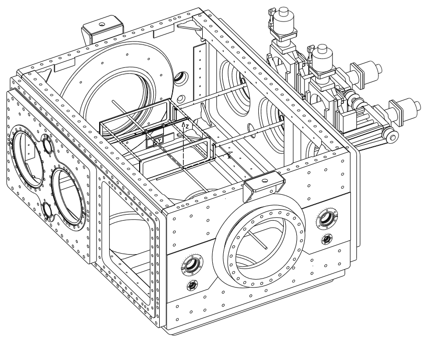

Fig. 3: Target chamber (ℓ = 800 mm, w = 600 mm, h = 400 mm) with two xy manipulators to move a frame carrying the cells. The beam enters from the lower right. The movable BPM system is not shown.

References:

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[2] J. Dietrich *et al.*, contr. to the present report.
[3] R. Engels *et al.*, contr. to the present report.

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