

# The HERMES Hydrogen and Deuterium Gas Target: 10 Years of Operation

Erhard Steffens (for the HERMES Target Group)

*Physikalisches Institut, Univ. of Erlangen-Nürnberg  
Erwin-Rommel-Str.1, D-91058 Erlangen, Germany  
steffens@physik.uni-erlangen.de*

The HERMES experiment at the HERA 27.5 GeV polarized electron ring (DESY, Hamburg) is running since 1995 for the study of the nucleon spin structure. Single and double polarized measurements of deep-inelastic, semi-inclusive scattering of polarized electrons from a polarized gas target have been performed. After a first year of operation with a polarized  $^3\text{He}$  target<sup>1</sup>, the H/D target<sup>2</sup> has been put into operation in 1996. The various running periods are listed in Table 1.

**TABLE 1. Running Periods for the Different Target Species**

Year	Target Gas	Orientation of Spin
1995	3-He	longitudinal
1996 - 1997	1-H (H)	longitudinal
1998 - 2000	2-H (D)	longitudinal
2001 - 2005	1-H (H)	transverse

The target is based on a Storage Cell with thin walls at a temperature of 100 K, fed by an Atomic Beam Source (ABS). The intense bunched electron beam with peak currents of more than 100 A is surrounded by conducting walls in order to prevent excitation of Wake Fields within the target chamber. RF-depolarization is suppressed by means of a non-resonant B-field of high uniformity. A system of tungsten collimators upstream of the target cell is employed to shield the target cell from synchrotron radiation. A sampling polarimeter serves to measure the polarization of atoms in the cell to 3% in precision.

The operation of the HERMES H/D target during the various running periods will be described. The target has been dismantled in November 2005 and is presently being prepared for a Spin Filtering experiment at the COSY ring (Research Center Jülich) and the AD ring (CERN), in preparation for the PAX experiment proposed for FAIR<sup>3</sup>.

<sup>1</sup> D. DeSchepper et al, Nucl. Instr. Meth. **A419** (1998) 16

<sup>2</sup> A. Airapetian et al, Nucl. Instr. Meth. **A540** (2005) 68

<sup>3</sup> <http://www.fz-juelich.de/ikp/pax/>