Beam-time request for experiment COSY 20.

(addendum to the beam-request presented to the 19^{th} Meeting of the COSY PAC, November 15/16, 1999).

The polarization measurement program of the experiment COSY 20 aims at the determination of the deuteron internal-momentum dependence (0.29 – 0.51 GeV/c) of five polarization observables $A_y^p, A_y^d, A_{yy}^d, C_{yy}, C_{yyy}$ in the nonmesonic break-up of the deuteron. The planned measurements at ANKE will allow to study the break-up process with two protons emitted under forward angles:

$$p + d \to (pp)_{\text{forw}} + n_{\text{back}},$$

where $(pp)_{\text{forw}}$ is a forward emitted proton pair with a small relative momentum. Therefore, the momentum dependence can be obtained from measurements at different initial energies T_0 in the range 0.5 – 2.6 GeV. The observables of interest can be found, in principle, by measurement of the differential cross sections for 8 different combinations of the proton and the deuteron spin in the initial state. The suggested program foresees measurements during 6 years and consists of the four subsequent steps:

Step 1 (2000-2001): Measurement of the spin-averaged cross sections as a first step necessary for the polarization study and to estimate its physical significance.

Step 2 (2001-2002): Measurement with a transversely polarized proton beam and an unpolarized (cluster) target. Determination of the proton vector analyzing power A_y^p.

Step 3 (2003-2004): Measurement with unpolarized proton beam and polarized (ABS) target. Determination of the deuteron tensor (A_{yy}^d)- and vector (A_y^d)- analyzing power.

Step 4 (2005-2006): Measurement with polarized proton beam and polarized (ABS) target. Determination of the spin-correlation parameters C_{yy} and C_{yyy}.

Following this program the necessary beam-time is summarized in Table 1 (σ denotes the planned accuracy to be obtained from the measuerements). These estimates are based on the simulation calculations described in the proposal for PAC 19. The luminosities used for evaluation of the measurement durations base on the following assumptions on the proton-beam intensity:

— unpolarized beam - 10^{10},

— polarized beam in 2001-2002 - 10^9,

— polarized beam in 2005-2006 - $5 \cdot 10^9$.

All measurements will be performed at a number of different beam energies T_0 e.g. 0.5, 0.7, 1.0, 1.5, 2.0 and 2.6 GeV.

Table 1: Estimated duration of the measurements.

Beam	Target	Observables	L ($cm^{-2} \cdot s^{-1}$)	σ	Time	Year
p	p, d	$d\sigma/dp_1 d\Omega_1 d\Omega_2$	10^{30}	$\leq 10\%$	4 weeks	2000-2001
$\vec{p}$	d	A_y^p	10^{29}	$(3-5)\%$	3 weeks	2001-2002
p	$\vec{d}$	A_y^d, A_{yy}^d,	$2.5 \cdot 10^{29}$	$(3-5)\%$	3 weeks	2003-2004
$\vec{p}$	$\vec{d}$	C_{yy}, C_{yyy},	10^{29}	$(3-5)\%$	10 weeks	2005-2006

Beam-time request for the 2nd half of 2000:

2 weeks in November/December 2000 in a common block with a beam-time for the Exp. COSY-55.
Beam energy: 0.5, 0.7, 1.0, 2.6 GeV.
Intensity: $5 \cdot 10^{10}$ protons in the ring (not less than 10^{10}).
Target: cluster target (H_2, D_2).