

Redesign of the A4 calorimeter for the measurement at backward angles

Boris Gläser^a, for the A4 Collaboration

Institut für Kernphysik, Johannes Gutenberg-Universität Mainz, J.-J.-Becher-Weg 45, 55099 Mainz, Germany

Received: 1 November 2004 / Published Online: 8 February 2005
© Società Italiana di Fisica / Springer-Verlag 2005

Abstract. Backward angle measurements of the parity violating asymmetry in elastic electron proton scattering are planned with the A4 calorimeter. At present the experiment measures at forward angles. For the measurement at backward angles the support of the PbF₂-detector has to be redesigned. For this purpose it will be positioned on a rotatable platform, so that measurements at forward and backward angles will be possible with little effort. We will highlight the new experimental setup and its special features.

PACS. 07.05.Fb Design of experiments – 13.40.Gp Electromagnetic form factors

1 Introduction

Backward kinematics measurements in parity violating electron proton scattering on hydrogen and deuterium are planned with the A4 calorimeter. For this purpose the support for the PbF₂-calorimeter will be positioned on a rotatable platform, so that measurements at forward and backward angles will be possible.

2 The calorimeter

The A4 Calorimeter is at present mounted on a linear moveable platform. The support is used to adjust the focus of the crystal calorimeter on the target. A special requirement for a possible backward angle setup comes through the fact, that not only the detector but also the cryogenic hydrogen target with its scattering chamber and the luminosity monitors have to be adjusted. A new support for the calorimeter and the scattering chamber is needed.

3 The scattering chamber and the luminosity monitors

Figure 1 shows the solid angle of the crystals of the calorimeter and of the luminosity monitors. An elongation chamber for the main scattering chamber will be installed, so that the luminosity monitors have in forward and backward scattering position the same solid angle with respect to the target centre (Fig. 1).

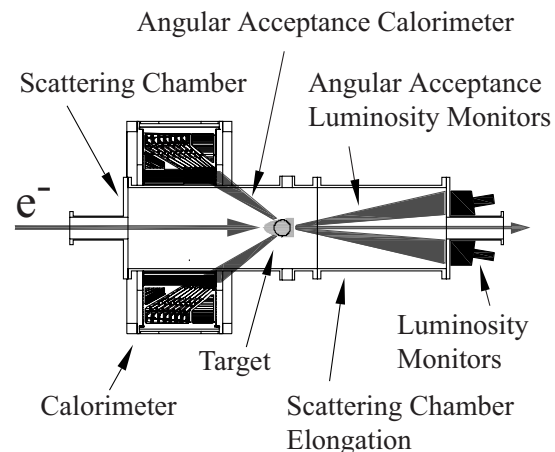


Fig. 1. New Scattering Chamber. The electron beam comes from the left

4 The new experimental setup

We have designed a new, common support structure so that the calorimeter and the scattering chamber are supported on a rotatable platform.

To ensure a vibration free, shock free and easy positioning of the platform, it is supported on three hydraulic oil sliding feet. By its small stroke (1/10 mm) contrary to air cushions (stroke some mm), an easy adjustment without impacts during set off is ensured. Vibrations during rotating, that can damage the fragile crystals, are minimal too.

The support platform, the scattering chamber elongation and the hydraulic oil sliding feet are already delivered and will be installed in December 2004. The new setup will be in operation by end of February 2005.

^a Comprises part of diploma thesis