

Experiment Safety Assessment Document for E08-027/007

JANUARY 10, 2012

1 Introduction and Scope

Jefferson Lab experiment E08-027 will measure the spin structure function g_2 of the proton. E08-007 will run simultaneously and measure the proton's form factor ratio G_E/G_M . These experiments require equipment which is not part of the set of standard equipment in Hall A. We give a brief overview of each system here, and refer the reader to the detailed OSP of each subsystem to evaluate the hazards and hazard mitigations associated with each system.

2 Non-Standard Equipment

We provide here an overview of all non-standard equipment to be used during E08-027/007. The relevant documentation for each subsystem is listed in Table 1.

Document	System
ENG-11-035-OSP	FZ magnets
PHY-11-036.OSP	Safe Operation of the KHS Power Supply
PHY-11-037.OSP	Safe Operation of the Big Bite Power Supply
PHY-11-038.OSP	Septum Magnet Commissioning and Troubleshooting
PHY-11-046-OSP	Hall A slow raster
PHY-11-047-OSP	Hall A Tungsten calorimeter Operations
PHY-12-xxx-OSP	Hall A Polarized Target (in preparation)
	Hall A Polarized Target Primer

Table 1: E08-027/007 Documentation.

2.1 Polarized Target

Polarized targets have been used in nuclear and high energy scattering experiments for many years. The ability to align the spin of nuclei has been developed for experimental studies of the spin properties of matter. A variety of techniques have been developed, and polarized target technology continues to be an active field of research, with technical improvements occurring which allow for better and different experimental measurements.

This project follows well-established practices that have been utilized in several polarized target experiments (E143, E155 and E155x) at SLAC and at JLab (GEN, RSS, SANE).

The polarized target operation for shift workers is described at The Polarized Target Primer¹. Typically shift workers will have no reason to go anywhere near the physical location of the target. Procedures for target experts are described in the *Polarized Target OSP*.

2.2 Chicane

In order to accommodate the deflection caused by the large holding field of the polarized targets Helmholtz coils magnet, additional magnets have been added to the Hall A beam line. These magnets, together with the target magnet, comprise a vertical chicane.

The magnets are standard accelerator dipoles. The first, designated FZ1, is just after the upside down girder and is the first component in Region 3 of the beamline. The second magnet in Region 3, designated FZ2, precedes the target in the beam line. FZ2 is mounted on a large jack stand that allows for its vertical position to be adjusted. The jack is motor powered and the controls are to be disconnected and removed from the hall when not in use. Adjustments are done at the request of the Run Coordinator by the accelerator survey group, in conjunction with accelerator division mechanical technicians. The adjustments are required for each set of beam energy runs. The beamline terminates with a beryllium window and is not connected to the target chamber.

Typically shift workers will have no reason to interact with the chicane or associated power supplies. Procedures for chicane experts are described in ENG-11-035-OSP *Procedure for maintenance and operation of the Hall A FZ magnets and FZ power supplies*.

2.3 Septa

A room temperature Septa magnet is being used to deflect scattered electrons at 5.7 degrees out to the minimum scattering angle accessible with the spectrometers. Operation of the septa and associated power supplies is discussed in the Septa OSP PHY-11-038.OSP *Septum Magnet Commissioning and Troubleshooting*, PHY-11-036.OSP *Safe Operation of the KHS Power Supply*, and PHY-11-037.OSP *Safe Operation of the Big Bite Power Supply*.

2.4 Slow Raster

The Hall A slow raster magnets are installed in the beamline upstream of the target. The raster system produces a spiral pattern on the target. It must be on when delivering CW to the polarized target. Hall A personnel control the function generator driving the Slow Raster power supply. Full details are provided in PHY-11-046-OSP *Hall A Slow Raster OSP*.

¹<https://hallaweb.jlab.org/wiki/index.php/Solid.Polarized.Target>

2.5 Third Arm Detector

A Third Arm detector will be used in E08-027/007 for independent determination of the product of beam and target polarization via monitoring of the proton elastic asymmetry. The detector consists of two planes of scintillator paddles and is mounted at 70 degrees with respect to the beamline on the downstream left platform. Since this is located on the target lower platform, access to the third arm is regulated by the Platform Access OSP.

2.6 Low Power Local Dump

A low power local dump will be used for several configurations of E08-027/007. The dump is described in PHY-12-XXX-OSP *Hall A Local Dump OSP* (in preparation).

3 Educational Measures

This document contains information needed to operate the hall in a safe manner. The challenge is to disseminate the information contained in this document effectively to all the groups who are potentially effected by the rules of conduct delineated here and in the “Conduct of Operations”. To this end the following steps will be taken.

- All Shift personnel are required to read and sign this document, the COO, as well as the Hall A base equipment ESAD and send verifying email to PDL Jian-Ping Chen (jpchen@jlab.org).
- For ARMs, a special document, “General Guidance for Surveys in Hall A during the g2p experiment” will be prepared and available at the “Information for Arm Monitors” webpage (<http://www.jlab.org/accel/RadCon/ARMS.html>).