

EXPERIMENT DESCRIPTION AND REQUIREMENTS

THE SUBMITTED INFORMATION IS CONSIDERED FROZEN. MODIFICATIONS TO THE EXPERIMENT SHOULD BE APPROVED BY THE DIVISION MANAGEMENT.

Experimental Hall: LEFR Gun Test Stand (GTS)

Experiment Number:

LDRD 2016-2a

Magnetized Beam

Days Approved: 3 years

Estimated Installation Time: N/A

Estimated Checkout Time: N/A

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Short (Technical) Description of the Experiment (max 100 words)

This LDRD aims to generate magnetized beam in LERF Gun Test Stand (GTS). We will design new solenoid magnet to provide 0.2 T field at photocathode. This magnet will need LCW and will be powered by a new spare CEBAF dogleg power supply. We are preparing a magnet operational safety procedure to be ready once the magnet is installed in September 2016.

For first two years, we will use standard GTS high voltage power supply. In third year, we will use another supply capable of delivering 32 mA. Beam line will be modified to add slits, YAG viewers and three quads. We plan to use base GTS lasers.

GTS is only approved to operate up to 10 nA of beam current. We are currently working with RadCon for approval at the needed currents.

We will use simulation tools to create a physics design for beamline so we can locate magnets and diagnostics at their optimum positions. Simulation of different operating scenarios of bunch charge, magnetization and bunch shape will be benchmarked against measurements.

More information can be found at:

https://wiki.jlab.org/ciswiki/index.php/Magnetized_Beam_LDRD

List Beam Energies and Beam Days: (e.g. 30 Days at 11 GeV, 20 Days at 8 GeV)

Two years at 350 kV

Third year at 200 kV

List Range of Beam Currents: (e.g. 10-60 μ A)

4 mA at 350 kV

32 mA at 200 kV

Base Equipment Used

(including description of conditions)

1. LERF Gun Test Stand (GTS) OSP: FEL-14-34782-OSP (expires on January 27, 2017).
Note: Only approved to operate up to 10 nA of beam current. We are currently working with RadCon for approval at the needed currents.

2. GTS Glassman High Voltage Power Supply (HVPS) OSP: FEL-14-33223-OSP (600 kV, 5 mA HV supply)
3. Laser LOSP: ACC-16-001-LOSP
 - a. Antares Laser: 15 Hz, green, 15 mW
 - b. Verdi Laser: DC, green, 5 W
4. Electron gun and photocathode preparation chamber

**Modifications to Base Equipment
(or use of base equipment with different conditions)**

1. Beam Line modifications: add slits and three quads
2. Electron gun modifications: add solenoid magnet around HV chamber

New Equipment

1. Gun solenoid magnet: We are preparing magnet operational safety procedure.
2. Solenoid power supply: (80 V, 500 A) that requires 480 VAC input and LCW
3. A second HV supply: Spellman (225 kV, 32 mA). New OSP will be needed before use in third year.

Target Requirements: N/A

**Beam Line Requirements
(including description of conditions)**

Start with GTS base beam line. Then add slits and three quads

Utilities Requirements

Power (MW): 0.04 MW (solenoid magnet power supply)

Power Supplies (V, I): Solenoid magnet power supply (80 V, 500 A)

Cryogenics (T, g/s): N/A

LCW (gpm): 5 gpm (solenoid magnet power supply) + 8 gpm (solenoid magnet) + 2.5 gpm (beam dump)

Cabling (#, ft): N/A

Other

Additional Requirements

Hazardous Materials: N/A

Flammable gases: N/A

Pressure Vessels: N/A

Platforms or Scaffolding: N/A

Other