

## 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

**Days Approved:** 3 years

**Estimated Installation Time:** N/A

**Estimated Checkout Time:** N/A

**Spokespersons:** Riad Suleiman and Matt Poelker

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

This LDRD aims to generate magnetized beam in 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 an old CEBAF ARC power supply. 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 only approved for 10 nA!

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

<p><b>Modifications to Base Equipment (or use of base equipment with different conditions)</b></p> <ol style="list-style-type: none"> <li>1. Beam Line modifications: add slits, YAG viewers and three quads</li> <li>2. Electron gun modifications: add solenoid magnet around HV chamber</li> </ol>
<p><b>New Equipment</b></p> <ol style="list-style-type: none"> <li>1. A second HV supply: Spellman (225 kV, 32 mA). New OSP needed before use in third year.</li> <li>2. Gun solenoid magnet</li> <li>3. Solenoid power supply: (450 A, 150 V) that requires 480 VAC input and LCW</li> </ol>
<p><b>Target Requirements:</b> N/A</p>
<p><b>Beam Line Requirements (including description of conditions)</b> Start with GTS base beam line. Then add slits, YAG viewers and three quads</p>
<p><b>Utilities Requirements</b></p> <p><b>Power (MW):</b> 0.1 MW (solenoid magnet power supply)</p> <p><b>Power Supplies (V, I):</b> Solenoid magnet power supply (150 V, 450 A)</p> <p><b>Cryogenics (T, g/s):</b> N/A</p> <p><b>LCW (gpm):</b> 5 gpm (solenoid magnet power supply) + 8 gpm (solenoid magnet) + 2.5 gpm (beam dump)</p> <p><b>Cabling (#, ft):</b> N/A</p> <p><b>Other</b></p>
<p><b>Additional Requirements</b></p> <p><b>Hazardous Materials:</b> N/A</p> <p><b>Flammable gases:</b> N/A</p> <p><b>Pressure Vessels:</b> N/A</p> <p><b>Platforms or Scaffolding:</b> N/A</p> <p><b>Other</b></p>