

Magnetized Beam Cathode Solenoid Magnet Operational Safety Procedure (MLDGT01 OSP)

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The cathode solenoid provides a magnetic field of about 1.4 kG at the photocathode with a maximum current of 400 A. With 74 V of applied voltage, the power is about 30 kW. The magnet is bare copper coil (no steel around it) and is made of 8 double pancakes (16 layers) by 20 turns with an ID of 12 inches, OD of 28 inches and a thickness of 6 inches. The magnet weighs about 560 pounds and sits in a cradle (weighs 150 pounds) with mechanical motion to move magnet on rails.

Hazards

The hazards of the solenoid include the following:

1. Electrical hazard
2. Magnetic field
3. Heating Power

Mitigation

Electrical Hazard

The power supply for the solenoid operates with input voltages of 120 VAC and 480 VAC and is interlocked to a current limit of 450 A. Maintenance and servicing of the power supply can only be conducted by "Qualified Electrical Workers". The supply is located at the GTS mezzanine.

During normal operation, connections at the power supply are made inside the cabinet that has interlocked doors. Insulated cables carrying current to the magnet are routed with cable trays with all exposed leads and terminations covered by nonconductive (0.25" thick Lexan) or expanded metal enclosures.

Magnetic Field

When powered up to 400 A, the solenoid can generate up to 3.2 kG field inside the

bore and up to 600 Gauss in the zones that extend somewhat beyond the magnet bore. The 5 Gauss boundary restricting access by personnel with surgical implants and bioelectric devices and the 600 Gauss whole body boundary were found and recorded during the mapping of the solenoid. Strong magnetic field will attract loose ferromagnetic objects, possibly injuring body parts or striking fragile components. Prior to energizing the magnet, a sweep of cordoned area will be performed for any loose magnetic objects. All personnel entering the 600 Gauss area will also be trained to remove ferromagnetic objects from themselves.

To prevent personnel with surgical implants and bioelectric devices from entering the 5 Gauss boundary, lighted warning signs are placed at the doors of the GTS enclosure when the solenoid is energized as well as flashing red beacons and personnel barricades are installed at the actual 5 Gauss contour.

Heating Power

At 400 A, the total power deposited in the magnet is about 30 kW. LCW is used to cool the magnet. The flow is interlocked to the power supply.

Responsible Personnel

The individuals responsible for the operation of the solenoid will be trained and listed here.