Generation and Characterization of Magnetized Bunched Electron Beam from DC Photogun for MEIC Cooler

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- MEIC bunched magnetized electron cooler is part of Collider Ring and aims to maintain ion beam emittance and extend luminosity lifetime
- LDRD Scientific Goals:
 - 1. Generate magnetized electron beam and measure its properties
 - 2. Explore impact of cathode magnet on photogun operation
- LDRD Benefits:
 - Simulations and measurements will provide insights on ways to optimize MEIC electron cooler and help design appropriate electron source
 - 2. JLab will have direct experience magnetizing high current electron beam

Milestones and Costs

- 1. Year 1: Design, procure and install cathode magnet, skew quads and slits
- 2. Year 2: Generate magnetized beam, measure mechanical angular momentum and benchmark simulation
- Year 3: Measure photocathode lifetime vs magnetization up to 32 mA, generate flat beam with three skew quads – RTFB Transformer – and measure horizontal and vertical emittances using slit method

Materials and Supplies:

- 1. Cathode magnet
- 2. Three skew quadrupoles
- 3. Components for three diagnostics crosses

Labor:

FT10 EV17	\$265 850
FY18	\$212.025
Total	\$817,086

- 1. Gun magnet design and installation
- 2. Mechanical designer for skew quad magnets and slits
- 3. ASTRA and GPT modeling
- 4. Postdoc

Experimental Overview: GTS

