

Injector Status & Commissioning

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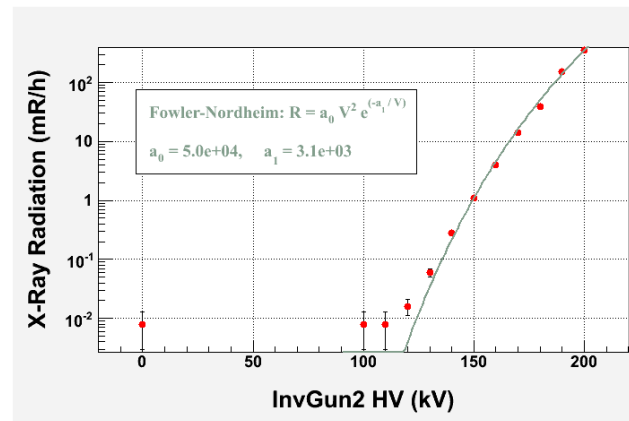
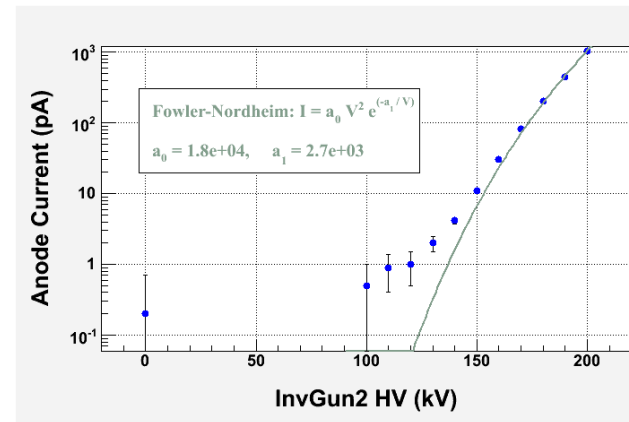
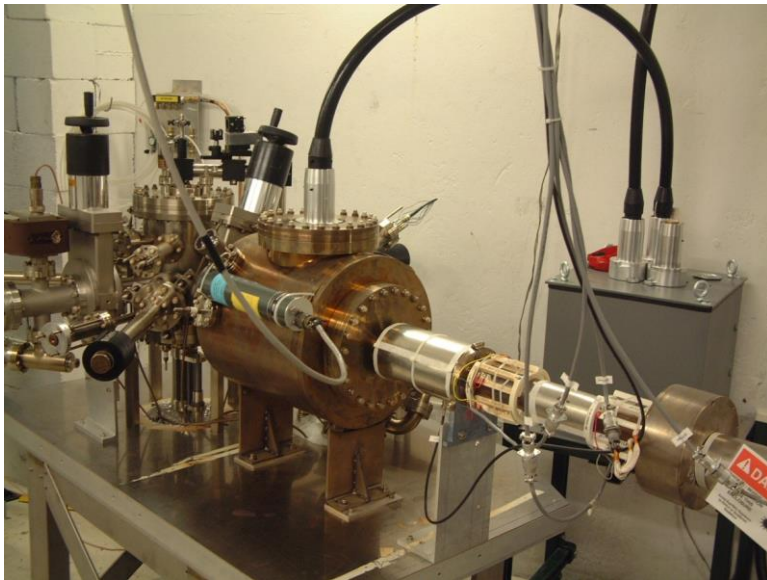
**QWeak Collaboration Meeting
May 24, 2010**

Inverted Gun at CEBAF

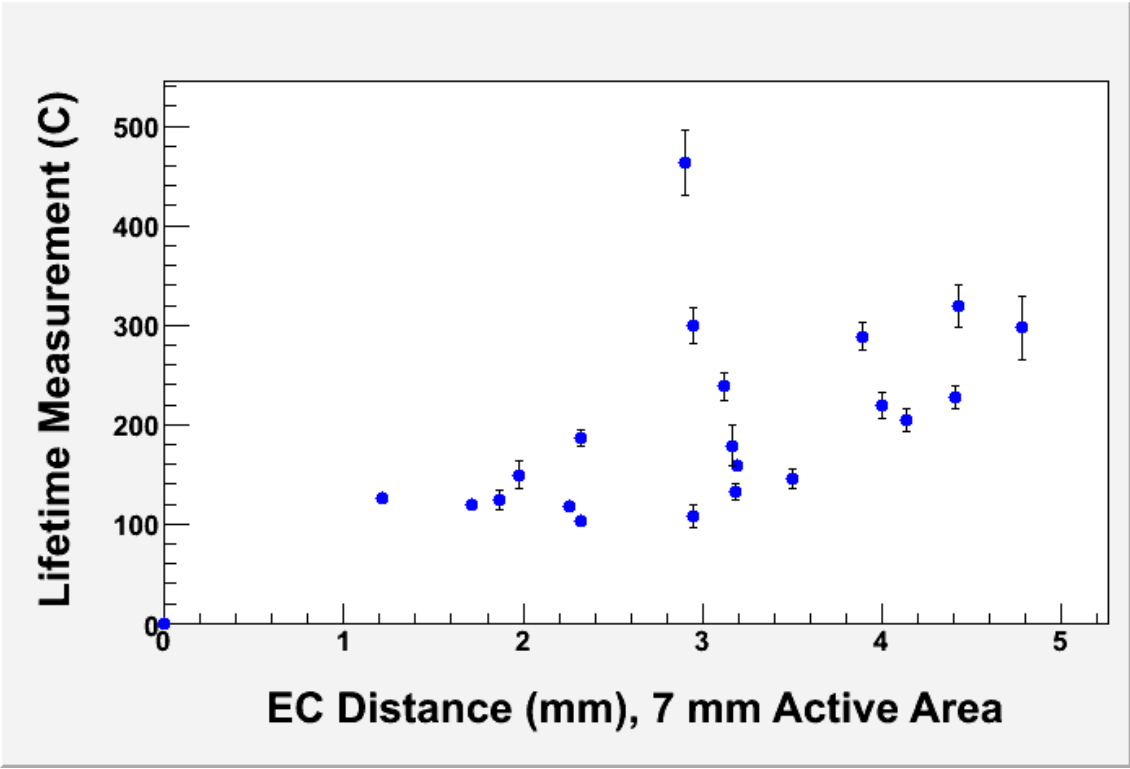
- **First Inverted Gun (with Stainless Steel Cathode) installed at CEBAF, operational since July 2009**
- **Running at 100 kV. Conditioned to 110 kV**
- **Lifetime about 100 C at 50 μ A average current**
 - **2 weeks between spot moves, 2-3 months between heat/activations**
- **Maximum possible Gun Voltage is 150 kV (limited by Safety System and HV Power Supply)**

Inverted Gun at Test Cave

- Second Inverted Gun (with large grain Niobium Cathode) installed at Test Cave in November 2009
- Conditioned to 200 kV



- **Measured lifetime at 100 kV**
(Bulk GaAs, 2 mA, 532 nm, 0.35 mm laser spot)



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- **Test Cave Plan (June – July):**
 - I. **Measure lifetime at 140 kV**
 - II. **Measure lifetime at 200 kV**
 - III. **Re-condition to 225 kV to reduce Field Emission (FE) at 200 kV**
 - IV. **Re-measure lifetime at 200 kV with smaller FE**

Helicity Reversal

- Fast Pockels Cell (PC) Reversal:

Experiment	Rate	Clock	Pattern
HAPPE _x III & PVDIS	30 Hz	Free	Quartet
PRE _x	120 Hz 240 Hz	Free Free	Quartet Octet
QWeak (Preliminary)	1 kHz	Free	Quartet

- New Helicity Board commissioned during PRE_x
- Slow Wien Reversal commissioned during PRE_x

Injector Team

- **Coordinator: Suleiman**
- **Members: Poelker, Grames, Hansknecht, King, Carlini, Paschke, Ramsay**
- **A student and a postdoc**

Commissioning Plan

- 1. Benchmark Hall C beam with PREx Injector setup. Beam quality should be pretty good since C laser lies on top of A laser (8 hours during Beam Studies before June 22)**
- 2. Heat & re-activate photocathode (2 shifts)**
- 3. Install hand-wound A1 corrector to improve steering through A1 and A2**
- 4. Study PC ringing (opto-coupler and HV Switch) and swap PC (if needed), then perform Pockels Cell re-alignment (2 shifts)**

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- 5. Devise a means to quantify ringing on once a week basis. An access to laser table can be made, but remote measurement preferable.**
 - 6. Rotate photocathode to reduce effect of vacuum window birefringence (1 shift)**
 - 7. Wien Filter calibration, part II (2 shifts during beam studies before June 22)**

- 8. Study beam phase-space when using Wien Flip. Quantify the difference between Vertical Wien and Solenoid method with beam to Hall and large position differences (2 shifts)**
- 9. After PREx ends, and before summer shutdown, run 180 μA using 100 kV gun to assess beam quality and for beamline and hydrogen target commissioning**
- 10. Zero vertical polarization using 5 MeV Mott Polarimeter in Injector – requirement: $P_y < 4\%$ (1 shift)**

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- 11. Spin dance to zero transverse polarization using Hall C Polarimeter – requirement: $P_x < 4\%$**
 - 12. Optimize Helicity Board settings: T_Settle, T_Stable, and Pattern. Need hydrogen target and Lumi (3 shifts)**
 - 13. Try 32 MHz beam for background studies and Moller Polarimeter in Hall C**

Deferred To Summer Shutdown (August)

- **4-peak charge asymmetry feedback IA electronics: installation and commissioning**
- **CEBAF Inverted Gun HV Conditioning to 150 kV**
- **Injector setup with 125 kV gun (or higher) and commissioning**
- **Modification to Beamline: New A1 Aperture assembly installation and beamline bake out**