Injector Status & Commissioning

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QWeak Collaboration Meeting
May 24, 2010
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 µA 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)
• 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)
• 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
Fast Pockels Cell (PC) Reversal:

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Rate</th>
<th>Clock</th>
<th>Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAPPEx III &amp; PVDIS</td>
<td>30 Hz</td>
<td>Free</td>
<td>Quartet</td>
</tr>
<tr>
<td>PREx</td>
<td>120 Hz</td>
<td>Free</td>
<td>Octet</td>
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<tr>
<td></td>
<td>240 Hz</td>
<td>Free</td>
<td></td>
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<tr>
<td>QWeak (Preliminary)</td>
<td>1 kHz</td>
<td>Free</td>
<td>Quartet</td>
</tr>
</tbody>
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New Helicity Board commissioned during PREx

Slow Wien Reversal commissioned during PREx
Coordinator: Suleiman

Members: Poelker, Grames, Hansknecht, King, Carlini, Paschke, Ramsay

A student and a postdoc
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)
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)
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