Injector Update

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QWeak Collaboration Meeting
September 17, 2010
CEBAF Inverted Gun (with Stainless Steel Cathode) delivered beam to Hall C at 130 kV on August 13, 2010

Conditioned to 150 kV with no FE in September 2010

Beam is being restored at 130 kV – This is the new Gun HV

Maximum possible Gun Voltage is 140 kV (limited by Safety System and HV Power Supplies)
Injector Two-Wien Flipper (INJTWF) commissioned during PREx

Will be re-calibrated at 130 kV
New detectors to replace old ones:

- Detectors are ready
- Will be installed next week
- Might improve response to Mott electrons
Quad Intensity Attenuator (QIA)

- Installed for all 3 Halls
- New 16-bit DAC (QIA, PC, WF HV)
Helicity Reversal

- 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>Quartet</td>
</tr>
<tr>
<td></td>
<td>240 Hz</td>
<td>Free</td>
<td>Octet</td>
</tr>
<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
- Clock signal is 20 MHz. Is this OK for DAQ and FR?
- More patterns: Toggle, Pair, Quartet, Octet, Hexo-Quad and Octo-Quad
Injector Team

- Coordinator: Suleiman
- Members: Poelker, Grames, Hansknecht, King, Carlini, Paschke, Dalton, Ramsay
- A student
Commissioning Plan

1. Heated & re-activated photocathode: Good QE & polarization 85%

2. Characterized RHWP

3. Studies Pockels Cell (PC) ringing

4. Devise a means to quantify ringing on once a week basis. An access to laser table can be made, but remote measurement preferable.

5. Measure Laser Spot-size asymmetries
6. Rotate photocathode to reduce effect of vacuum window birefringence

7. 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. Use the Solenoids, until someone makes definite measurements to use V-Wien

8. Spin dance to zero transverse polarization using Hall C Polarimeter – requirement: $P_x < 4\%$


10. Commission Charge Feedback with the new QIA

11. Try 32 MHz beam for background studies and Moller Polarimeter in Hall C. Not Ready yet, QWeak must talk to Engineering if it is really needed.
Maintaining Good Beam Quality

- It is important to get to a stable beam delivery of 150 μA for days, without modifying the injector configuration (i.e., flipping spin direction, or going to nA beam, where we don't pay attention to beam loss, which must always be maintained small via steering magnets ...)

- If things drift away from optimum and beam quality degrades, Operators need to learn which steering knobs to adjust to get back to acceptable injector configuration.

  Need Online display in MCC of parity data (Injector and Hall C BPMs & BCMs)