$G^0$ PC Installation and Beam Studies

September 2006

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Pockels Cell Installation
September 12, 2006

- Beam spot had two satellites at about 45° and 225°
- John and Matt determined the source of the satellites to be the tune cell
- Swapped Hall C and Hall A tune cells
- Satellites disappeared
Pockels Cell Installation
September 12, 2006

• What did we accomplish?
  – Characterized Intensity Asymmetry (IA) Cell: \( \lambda/4, 16^\circ \)
    • Measured dependence of intensity asymmetry on voltage: 22.27 ppm/V
  – Aligned Pockels Cell (PC)
    • Degree of linear polarization = 3.62%
    • Degree of circular polarization = 99.93%
    • Minimized x and y position differences.
# Pockels Cell Installation

**September 12, 2006**

<table>
<thead>
<tr>
<th>Steering (LP OUT)</th>
<th>IHWP IN</th>
<th>IHWP OUT</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δx</td>
<td>0.0023 ± 0.032 µm</td>
<td>-0.064 ± 0.023 µm</td>
<td>&lt; 0.1 µm</td>
</tr>
<tr>
<td>Δy</td>
<td>0.24 ± 0.030 µm</td>
<td>-0.24 ± 0.020 µm</td>
<td>&lt; 0.1 µm</td>
</tr>
<tr>
<td>Δcharge</td>
<td>6.35 ± 3.41 ppm</td>
<td>-8.13 ± 3.72 ppm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Birefringence (LP IN)</th>
<th>IHWP IN</th>
<th>IHWP OUT</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δx</td>
<td>-11.04 ± 0.021 µm</td>
<td>8.22 ± 0.016 µm</td>
<td>&lt; 6 µm</td>
</tr>
<tr>
<td>Δy</td>
<td>1.868 ± 0.013 µm</td>
<td>2.06 ± 0.013 µm</td>
<td>&lt; 6 µm</td>
</tr>
<tr>
<td>Δcharge</td>
<td>-2169 ± 89 ppm</td>
<td>3601 ± 86 ppm</td>
<td></td>
</tr>
</tbody>
</table>

- **Δx** and **Δy** values are given with uncertainties in micrometers (µm).
- **Δx** and **Δy** are below the specified goals of 0.1 µm and 0.3 µm, respectively.
- **Δcharge** values are given with uncertainties in parts per million (ppm).
- **Δcharge** values are within acceptable limits.

**Electrical Pickup**

<table>
<thead>
<tr>
<th>PC OFF</th>
<th>Δx</th>
<th>Δy</th>
<th>Δcharge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.003636 ± 0.004735 µm</td>
<td>-0.001241 ± 0.003138 µm</td>
<td>0.9439 ± 0.9773 ppm</td>
</tr>
</tbody>
</table>

- **Δx** and **Δy** values are given with uncertainties in micrometers (µm).
- **Δcharge** value is given with uncertainty in parts per million (ppm).

**Injector**

<table>
<thead>
<tr>
<th>Happex</th>
<th>Δx</th>
<th>Δy</th>
<th>Δcharge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 0.3 µm</td>
<td>&lt; 0.3 µm</td>
<td></td>
</tr>
</tbody>
</table>

- **Δx** and **Δy** values are below the specified goal of 0.3 µm.
- **Δcharge** is not specified.

**w/ photocathode**

- **3X larger in injector**
- **20X smaller in injector**
Electron Beam Studies
September 14, 2006

PITA=0

RHWP scan, Run 30905, IHWF OUT, IPM1102

\[ A_q = -164.97 + 611.64 \sin(2\theta + 150.86) + 184.62 \sin(4\theta + 60.59) \]

\[ D_x = -0.06 + 0.09 \sin(2\theta + 33.15) + 0.06 \sin(4\theta + 0.41) \]

\[ D_y = 0.09 - 0.35 \sin(2\theta + 153.23) + 0.17 \sin(4\theta + 99.27) \]

PITA=-180

RHWP scan, Run 30906, IHWF OUT, IPM1102

\[ A_q = -162.42 + 251.87 \sin(2\theta + 36.34) - 2796.86 \sin(4\theta + 133.36) \]

\[ D_x = -0.05 + 0.08 \sin(2\theta + 46.07) - 0.01 \sin(4\theta + 87.01) \]

\[ D_y = 0.05 - 0.19 \sin(2\theta + 34.02) + 1.81 \sin(4\theta + 133.77) \]
Electron Beam Studies
September 14, 2006

RHWP=0°
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July 18, 2006

IHWP = OUT
RHWP = 0°
-10 ppm/V

IHWP = IN
RHWP = 0°
-11 ppm/V