

G⁰ PC Installation and Beam Studies

January 2007

Stephanie Bailey
Riad Suleiman

Pockels Cell Installation

January 2, 2007

- What did we accomplish?
 - Commission the PC translational Stage.
These are the x & y of the PC that minimize the position differences for each IHP state:
IN: $x=0$, $y=90$ mils
OUT: $x=70$, $y=90$ mils
 - Aligned Pockels Cell (PC)
 - Degree of linear polarization = 3.24%
 - Degree of circular polarization = 99.95%
 - Minimized x and y position differences.

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| Steering (LP OUT) | IHWP IN | IHWP OUT | Goal |
|-----------------------|----------------------------------|----------------------------------|---------------------|
| Δx | $-0.0137 \pm 0.0186 \mu\text{m}$ | $-0.0674 \pm 0.0204 \mu\text{m}$ | $< 0.1 \mu\text{m}$ |
| Δy | $-0.0101 \pm 0.0139 \mu\text{m}$ | $0.0625 \pm 0.0150 \mu\text{m}$ | $< 0.1 \mu\text{m}$ |
| Δcharge | $8.476 \pm 2.311 \text{ ppm}$ | $4.133 \pm 2.461 \text{ ppm}$ | |

| Birefringence (LP IN) | IHWP IN | IHWP OUT | Goal |
|-----------------------|---------------------------------|---------------------------------|-------------------|
| Δx | $5.63 \pm 0.0195 \mu\text{m}$ | $-13.22 \pm 0.0198 \mu\text{m}$ | $< 6 \mu\text{m}$ |
| Δy | $-11.09 \pm 0.0116 \mu\text{m}$ | $12.29 \pm 0.0119 \mu\text{m}$ | $< 6 \mu\text{m}$ |
| Δcharge | $-31230 \pm 96 \text{ ppm}$ | $31940 \pm 96 \text{ ppm}$ | |

| Electrical Pickup | PC OFF |
|-----------------------|----------------------------------|
| Δx | $0.0034 \pm 0.0052 \mu\text{m}$ |
| Δy | $-0.0056 \pm 0.0029 \mu\text{m}$ |
| Δcharge | $4.46 \pm 0.63 \text{ ppm}$ |

w/ photocathode
3X larger in injector

w/ photocathode
20X smaller in injector

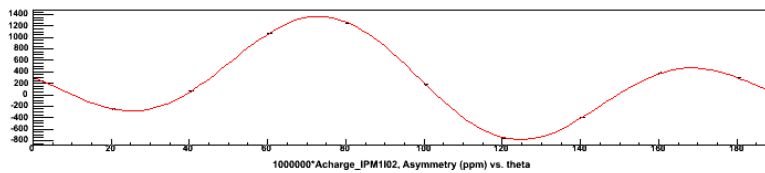
| Injector | Happex |
|-----------------------|---------------------|
| Δx | $< 0.3 \mu\text{m}$ |
| Δy | $< 0.3 \mu\text{m}$ |
| Δcharge | |

Electron Beam Studies

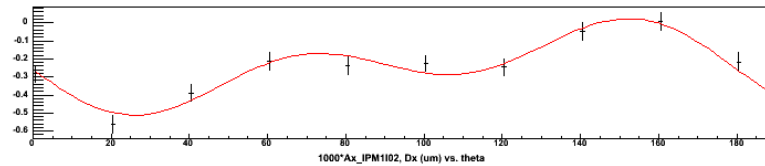
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PITA=0

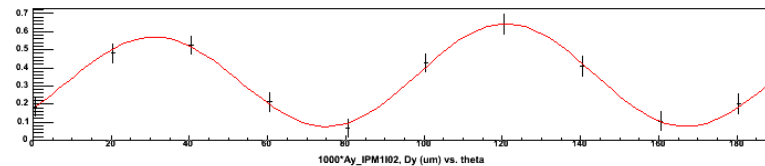
RHWP scan, Run 33105, IHWP IN, IPM1102, PITA = 0



$$Aq = 205.53 + -517.99 \sin(2x + 148.57) + 701.68 \sin(4x + 148.43)$$



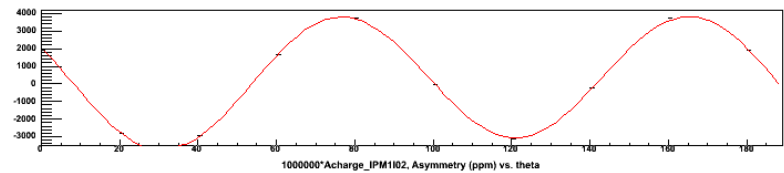
$$Dx = -0.24 + -0.15 \sin(2x + 5.25) + -0.15 \sin(4x + 2.16)$$



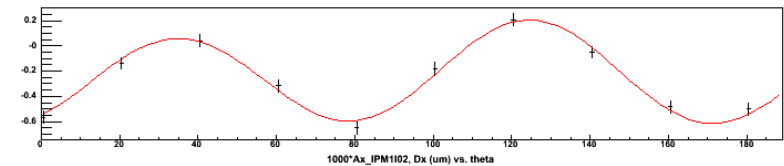
$$Dy = 0.34 + -0.04 \sin(2x + 27.31) + -0.26 \sin(4x + 146.20)$$

PITA=-180

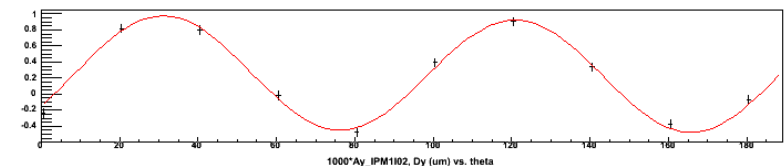
RHWP scan, Run 33106, IHWP IN, IPM1102, PITA = -180



$$Aq = 198.24 + -362.44 \sin(2x + 26.46) + 3604.00 \sin(4x + 146.16)$$



$$Dx = -0.24 + -0.07 \sin(2x + 28.01) + -0.37 \sin(4x + 131.19)$$



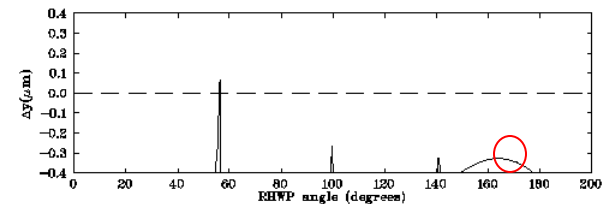
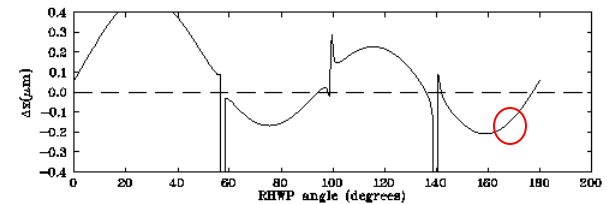
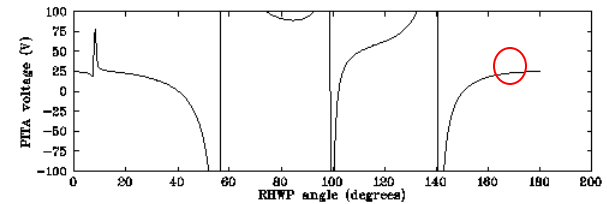
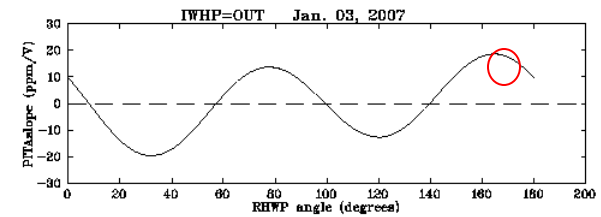
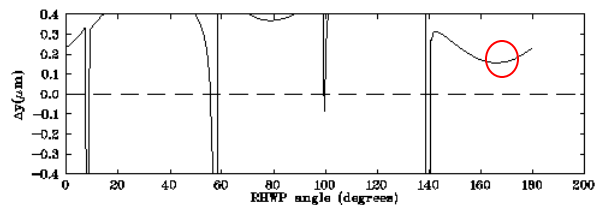
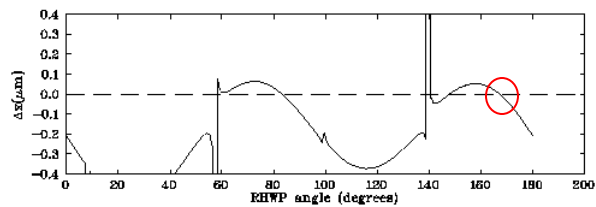
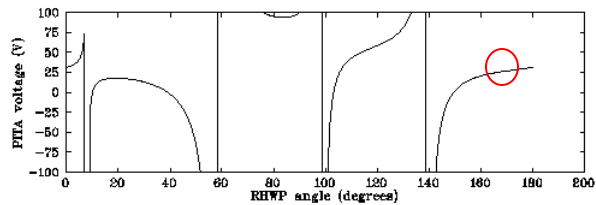
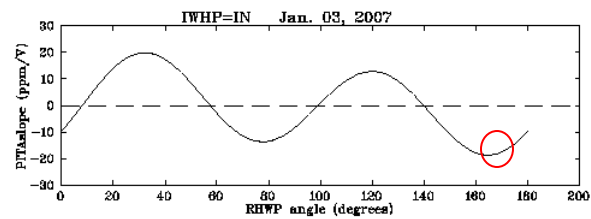
$$Dy = 0.24 + 0.03 \sin(2x + 3.57) + -0.70 \sin(4x + 146.12)$$

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RHWP=170°

RHWP=170°



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IHWP = IN
RHWP = 170°
-17 ppm/V

IHWP = OUT
RHWP = 170°
15 ppm/V

