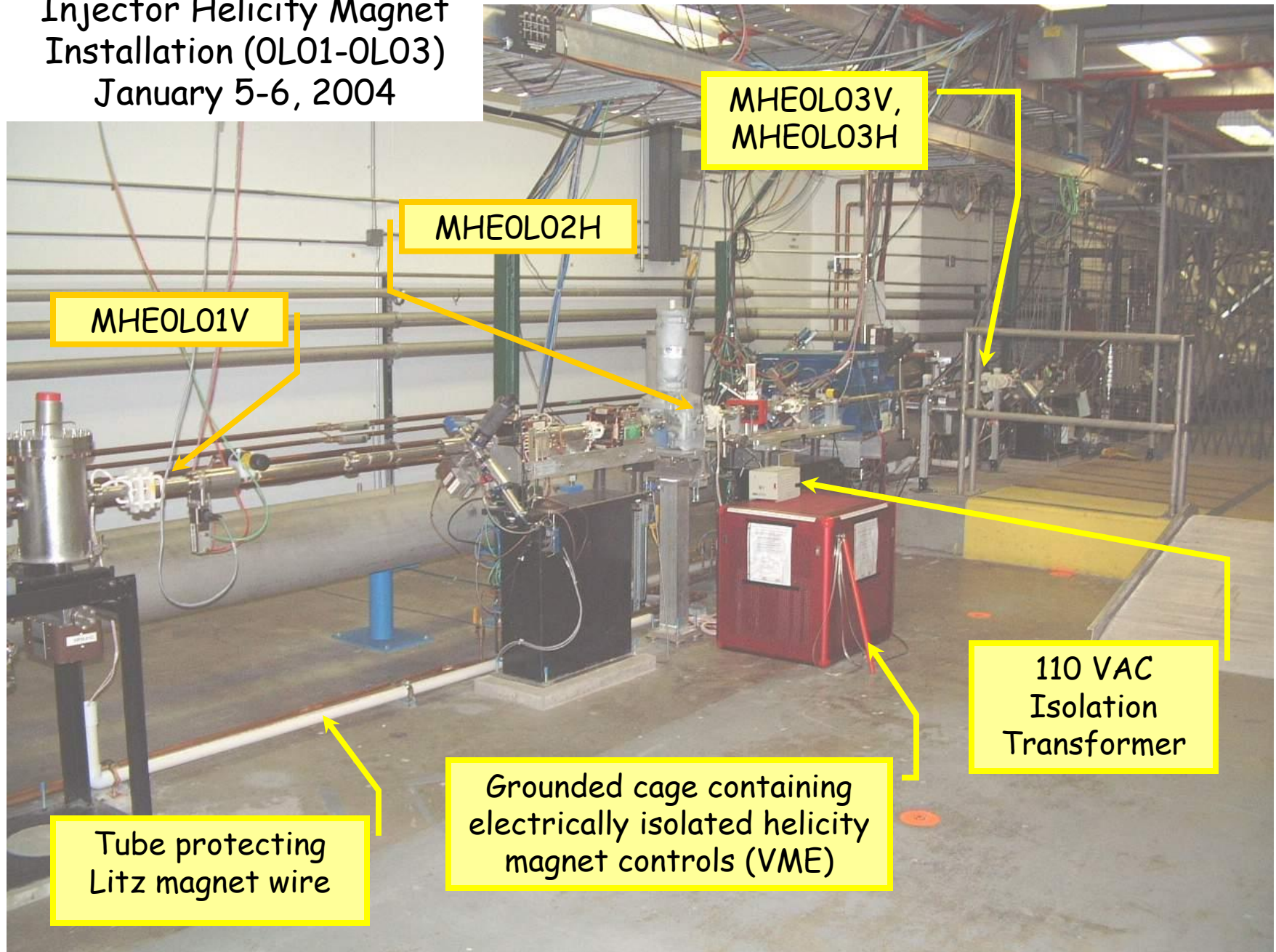


Helicity Magnets Commissioning

February 7, 2007

Hari Areti, Chao, Brad Cumbia, Jeff Dale, Richard Dickson, Joe Grames, Roger Flood, Scott Higgins, Matt Poelker, Riad Suleiman, Scott Windham, ...

Injector Helicity Magnet Installation (OL01-OL03) January 5-6, 2004



MHEOLO3V,
MHEOLO3H

MHEOLO2H

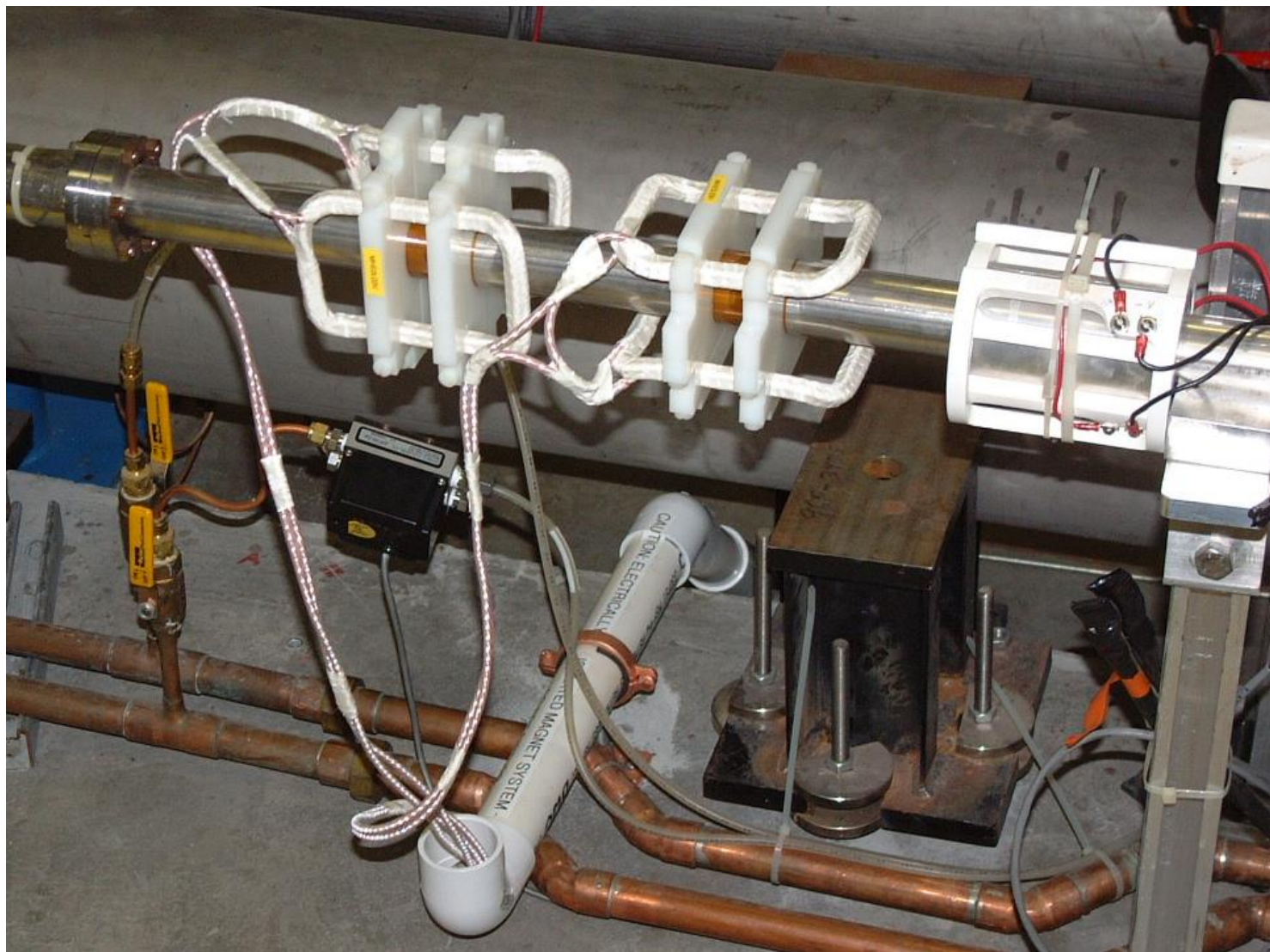
MHEOLO1V

110 VAC
Isolation
Transformer

Grounded cage containing
electrically isolated helicity
magnet controls (VME)

Tube protecting
Litz magnet wire

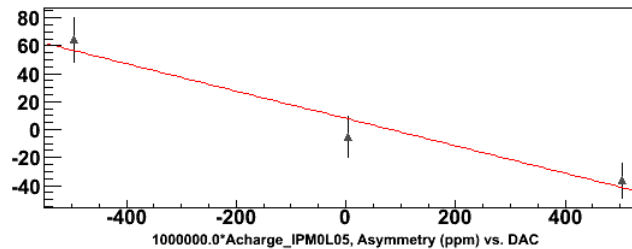
Closer look...



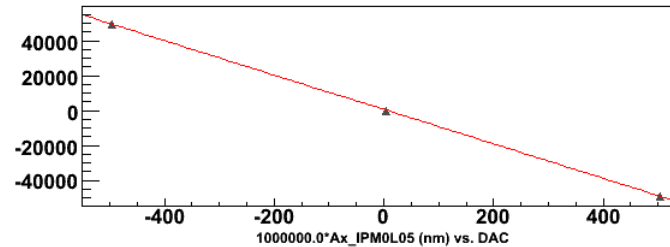
Calibration

- Each magnet can kick both helicity states
- Very small coupling to charge asymmetry (100 times smaller than PZT)
- **The position feedback is not coupled to the charge feedback**
- **Can do position feedback on both position and angle in x & y**

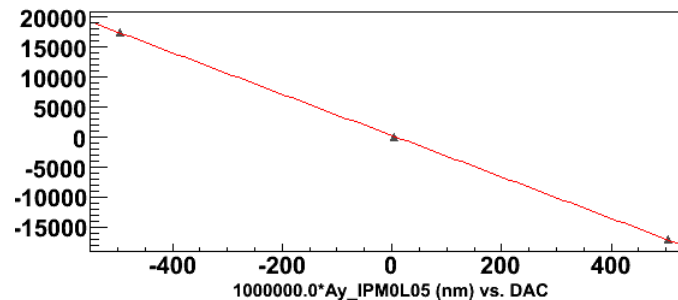
HM Scan, IHWP=IN, magnet=2, Run 33537, IPM0L05



$$A_i = 8.06 + -0.10 * i$$



$$D_x = 699.51 + -98.64 * x$$

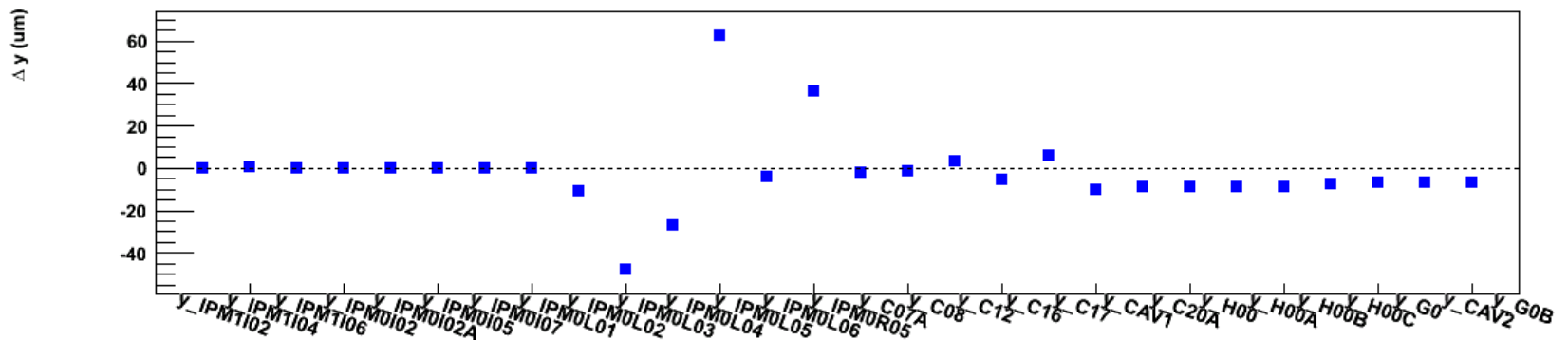
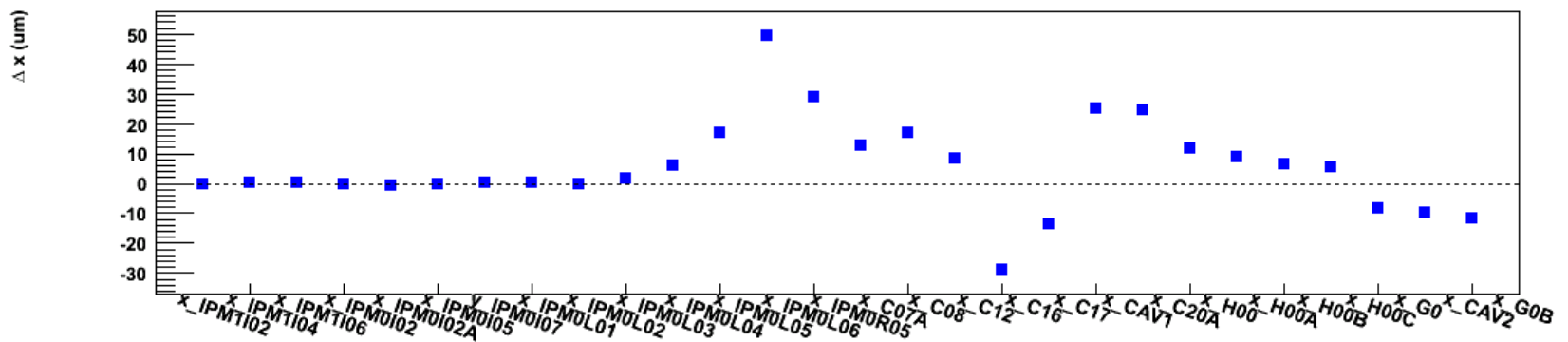


$$D_y = 222.00 + -34.46 * y$$

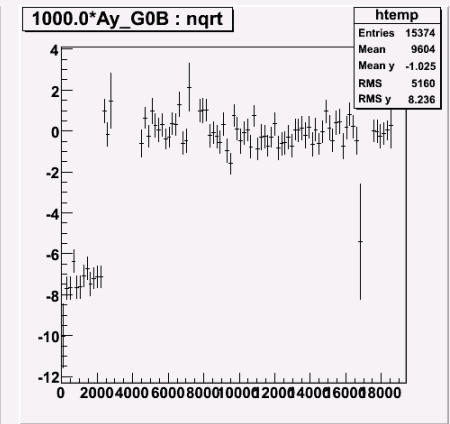
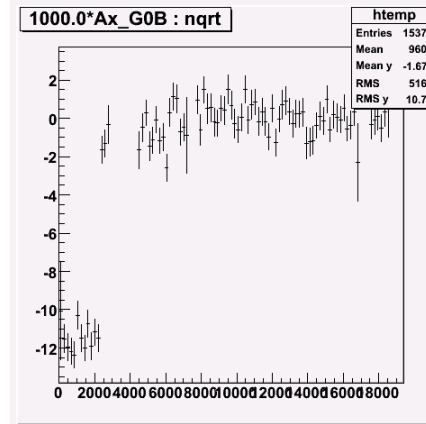
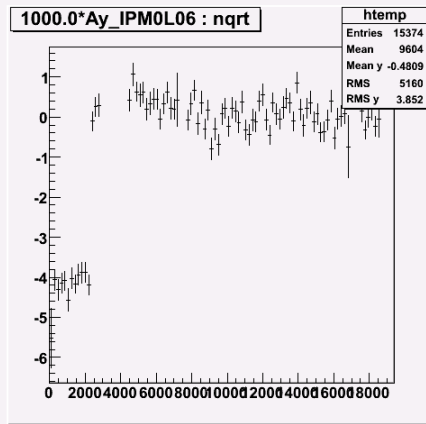
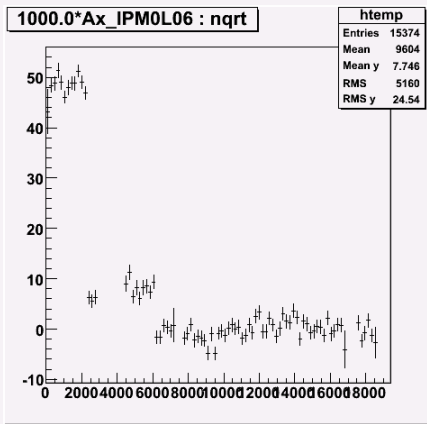
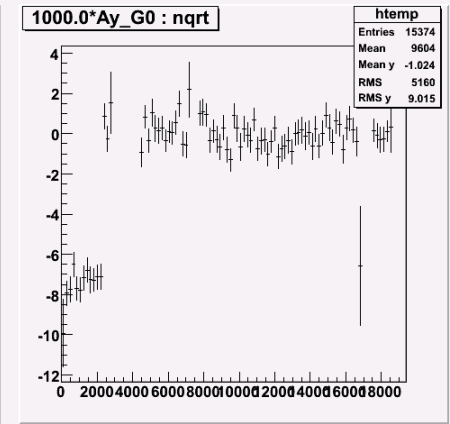
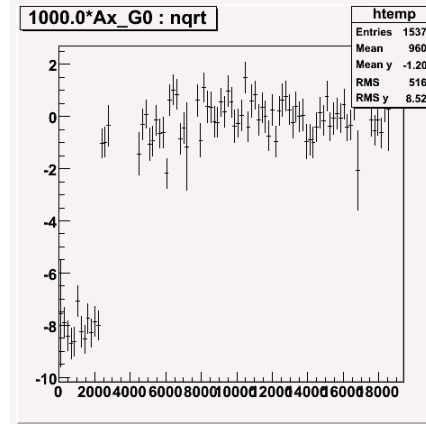
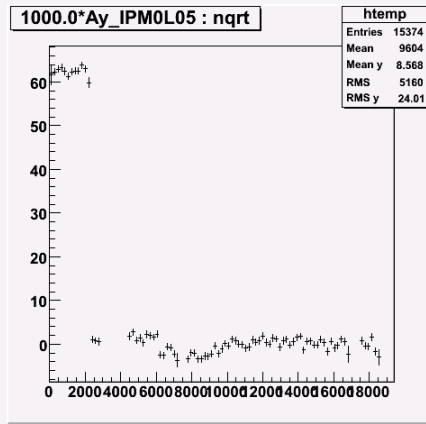
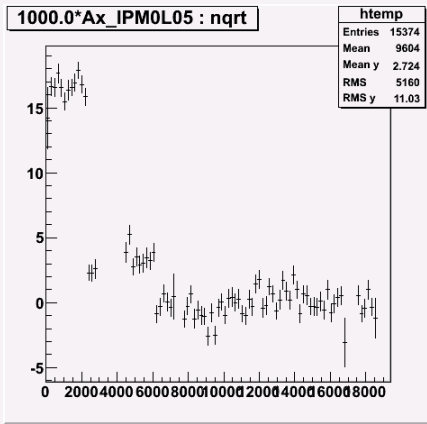
Position Feedback Test I

- Introduce large position differences:
Magnet 1 at even DAC = 500

Transmission of X and Y Position Differences, Run 33852



- Turn ON position feedback:
Zero position differences at 0L05 and 0L06

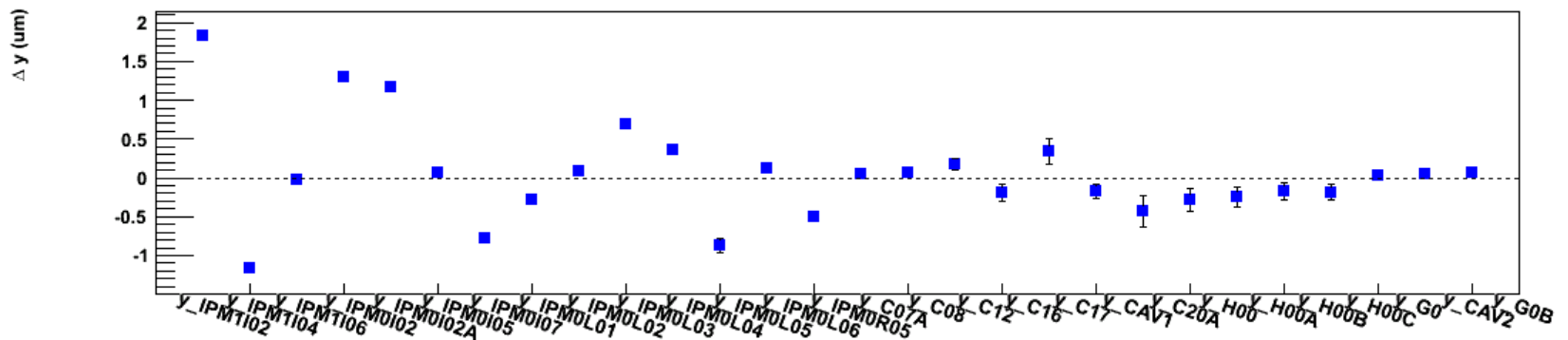
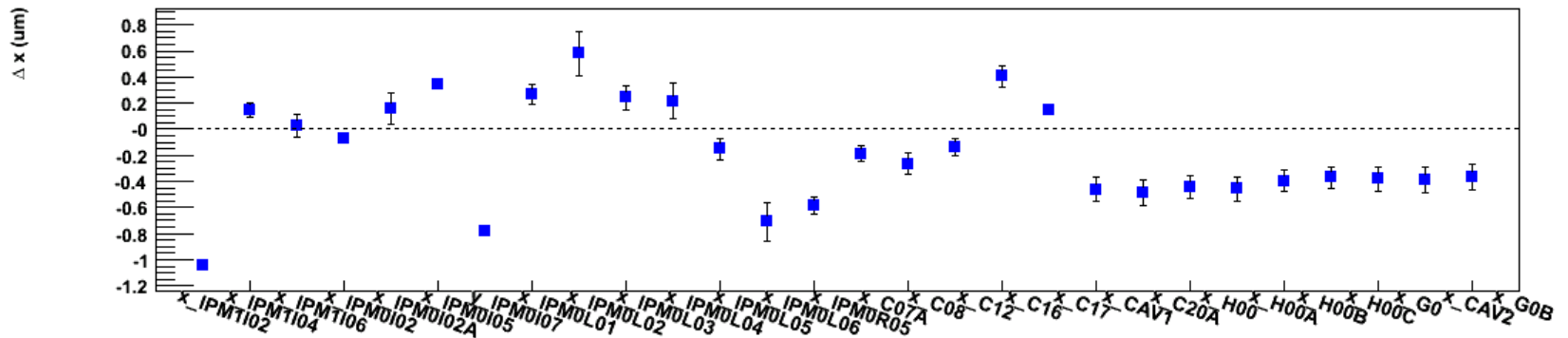


Position Feedback Test II

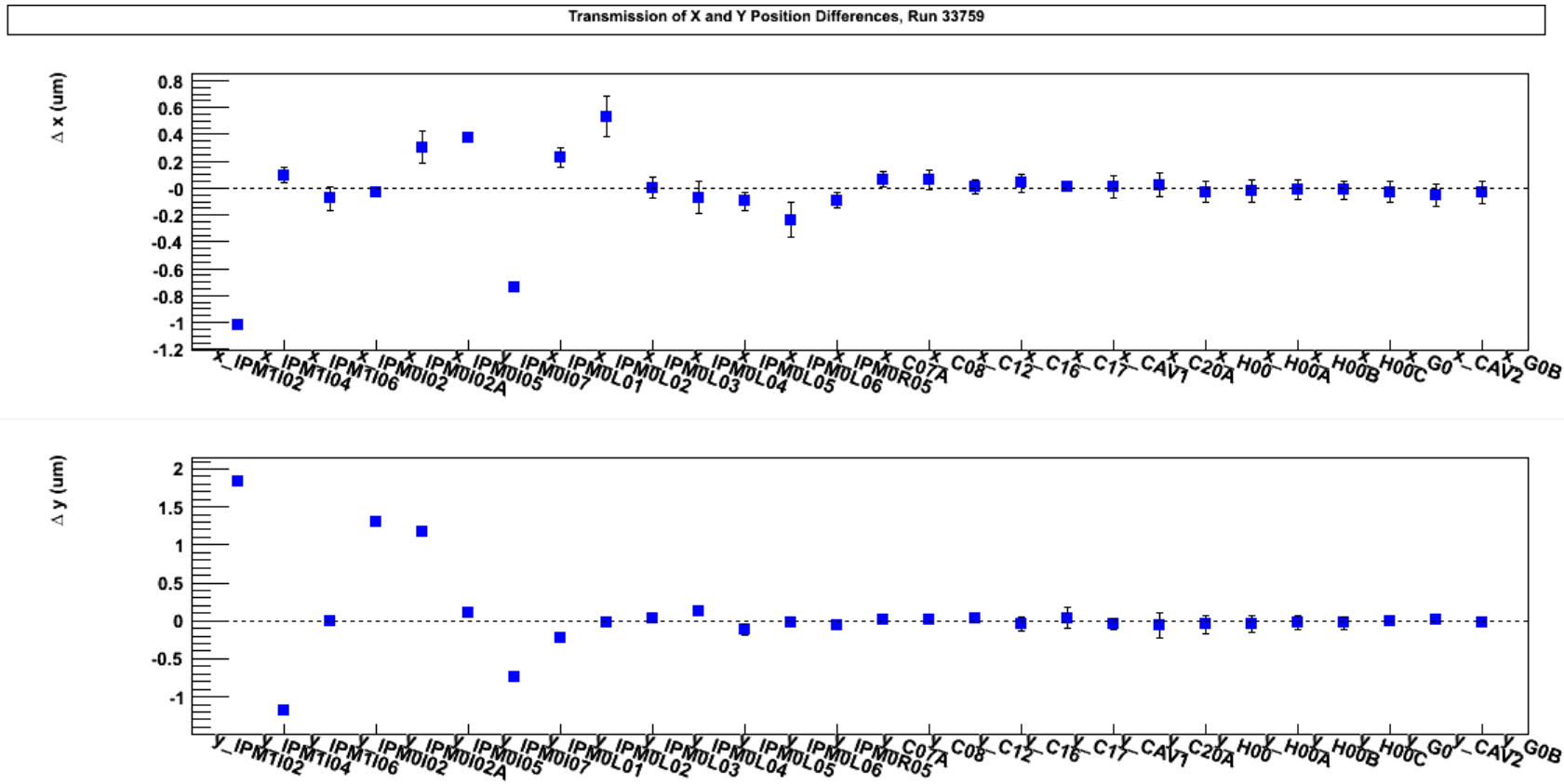
- Introduce large position differences:

Move the Pockels Cell from its optimal position on the laser table

Transmission of X and Y Position Differences, Run 33760



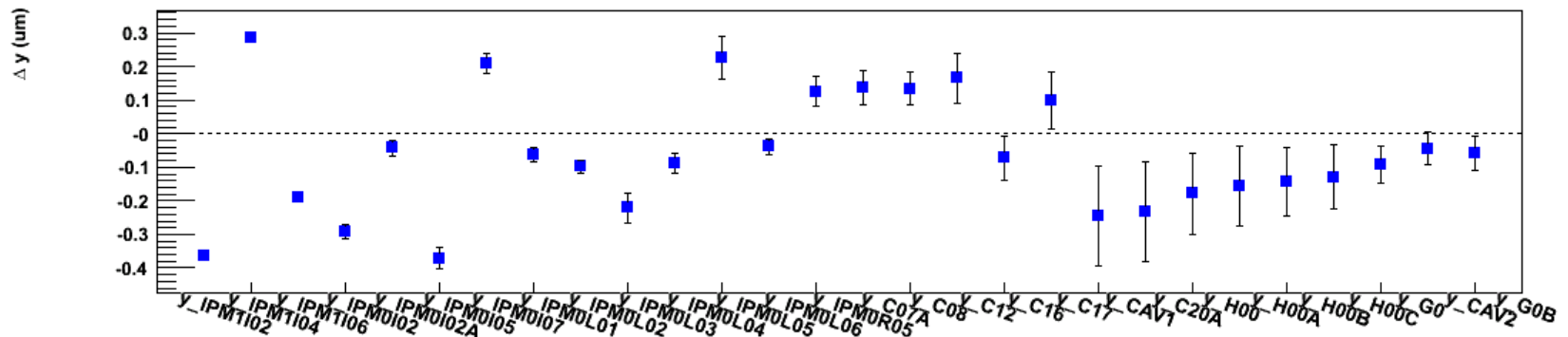
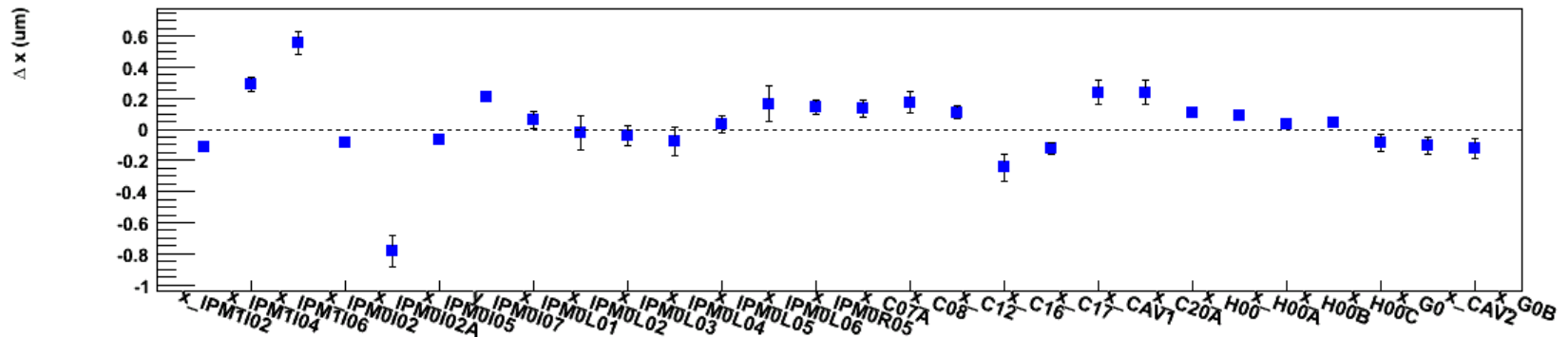
- Turn ON position feedback:
Zero position differences at 0L05 and 0L06



Position Feedback Test III

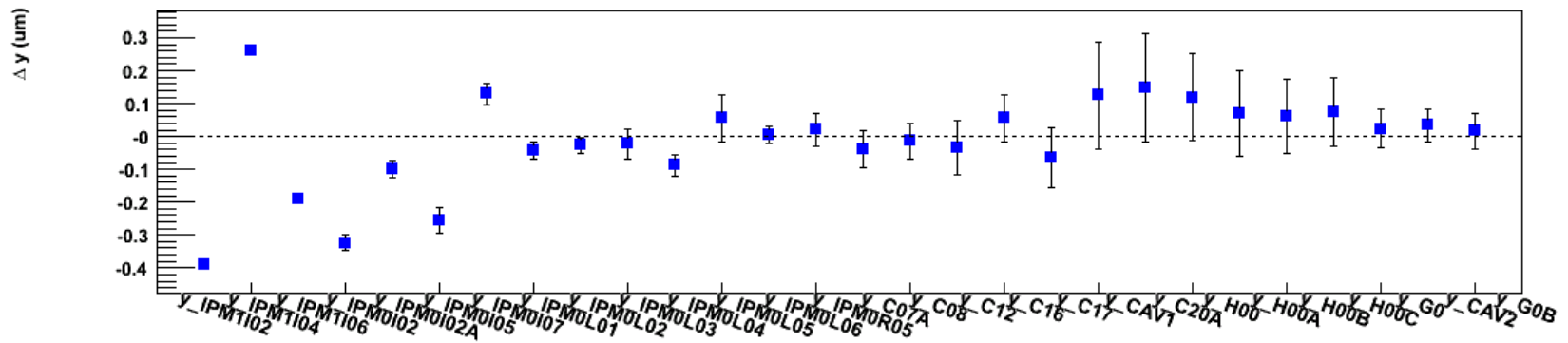
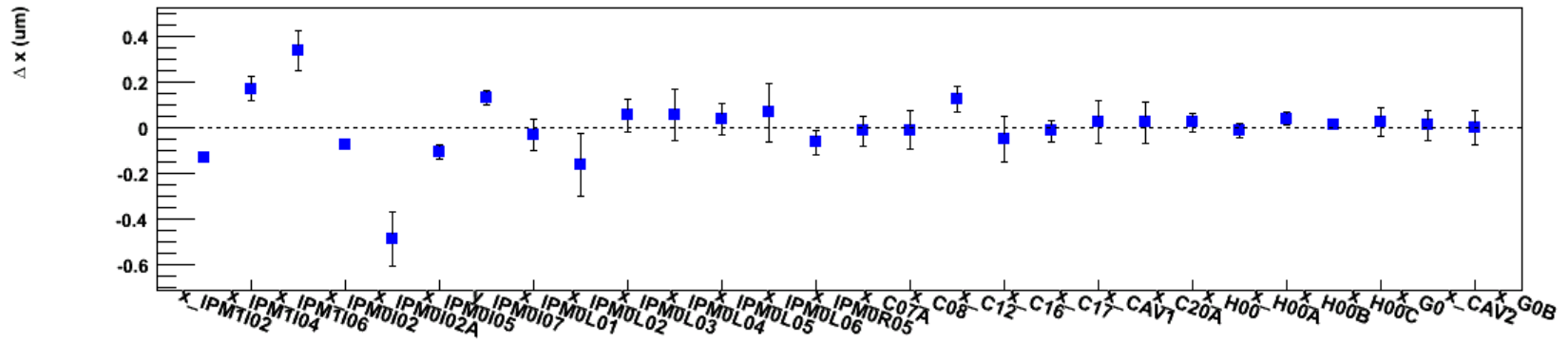
- G0 Production:
with position feedback OFF

Transmission of X and Y Position Differences, Run 33849



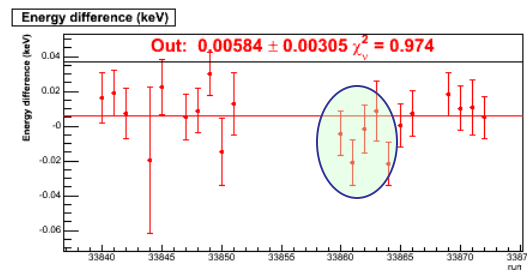
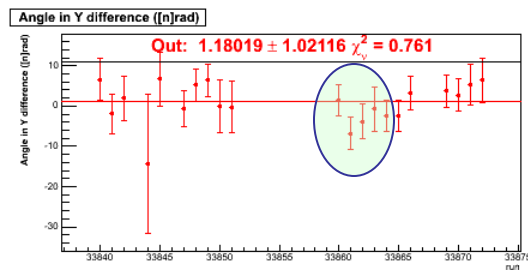
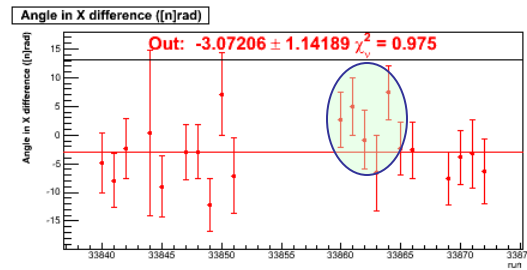
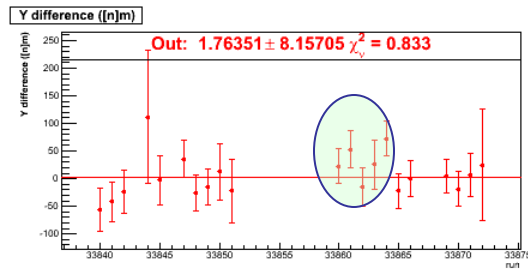
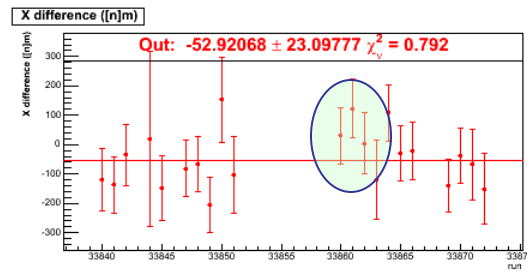
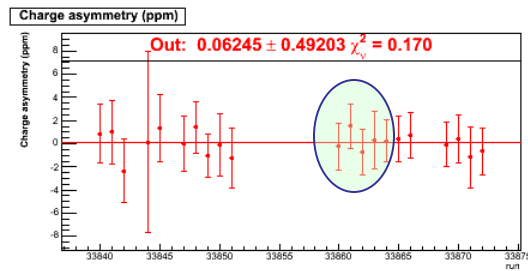
- Turn ON position feedback:
Zero position differences at 0L05 and 0L06

Transmission of X and Y Position Differences, Run 33862



G0 Production

- Position Feedback OFF compared to Position Feedback ON:

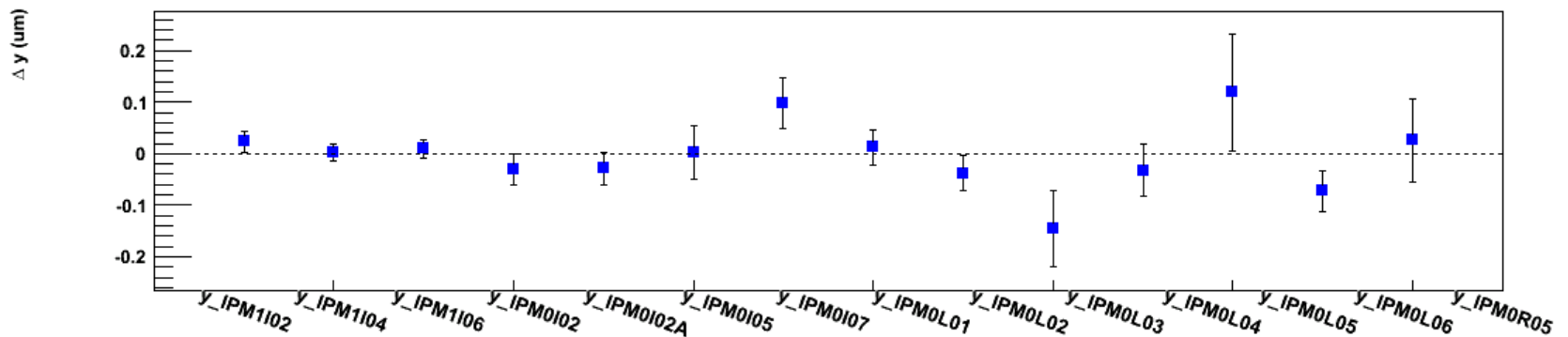
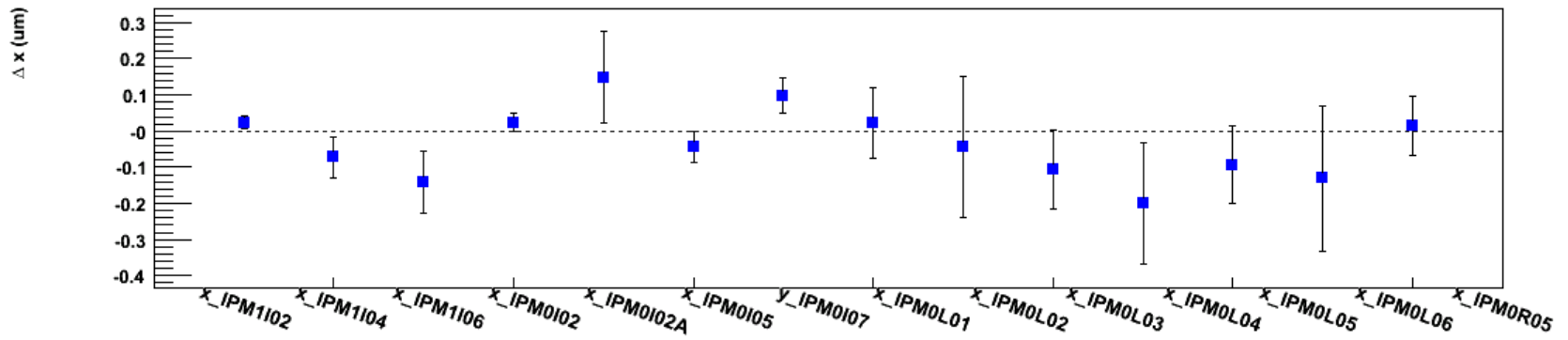


Electrical Pick-up

- One big concern: Will other elements on the beam-line see the helicity signal?

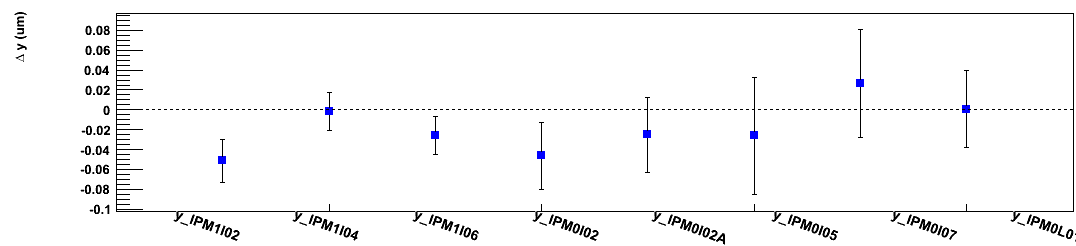
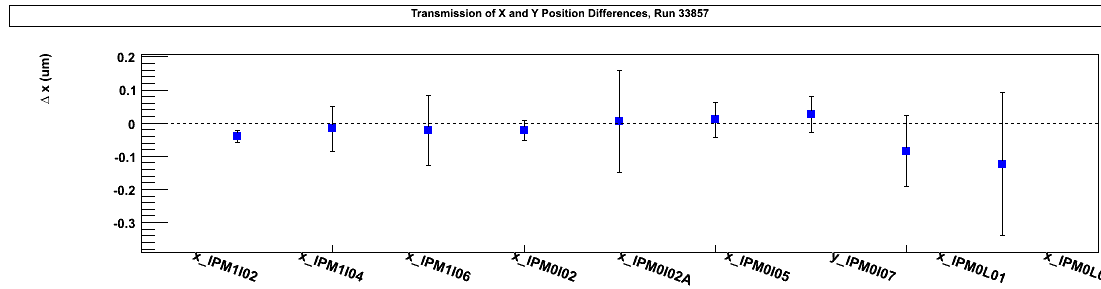
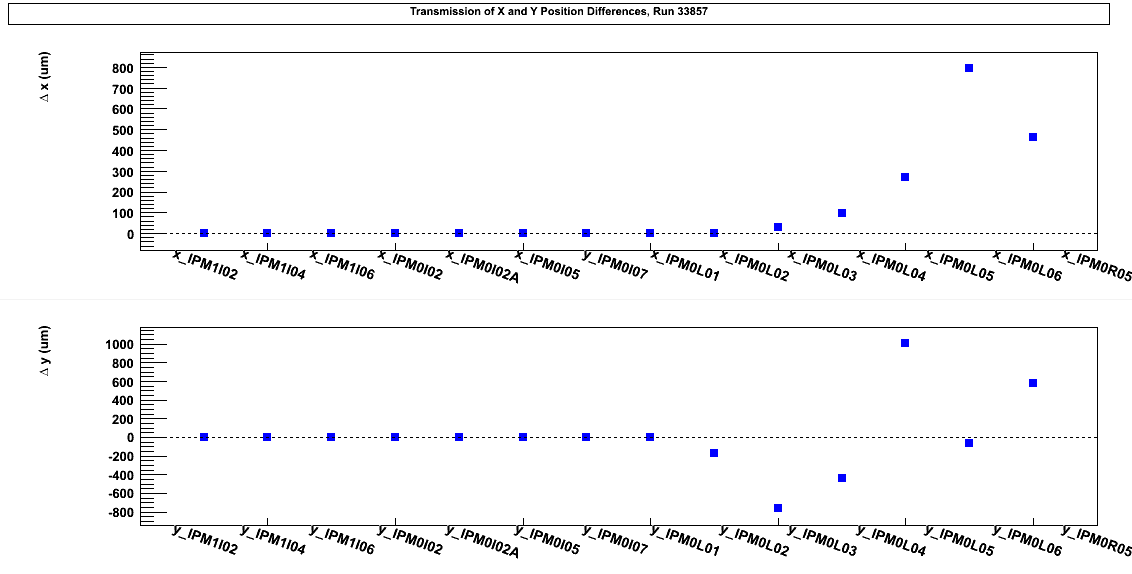
Check this with Pockels Cell OFF and Helicity Magnets OFF.

Transmission of X and Y Position Differences, Run 33856



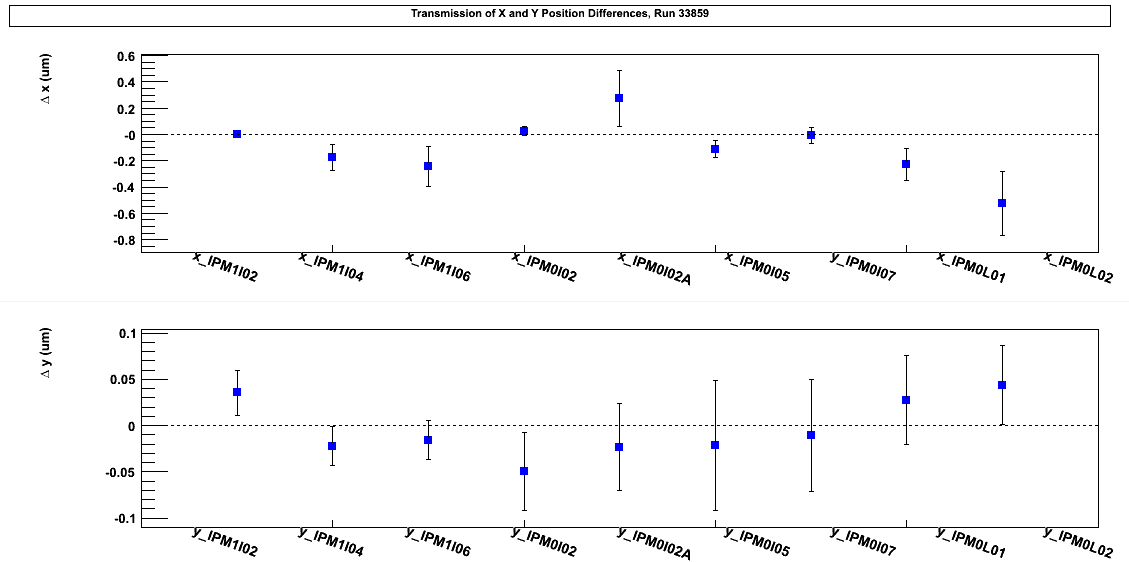
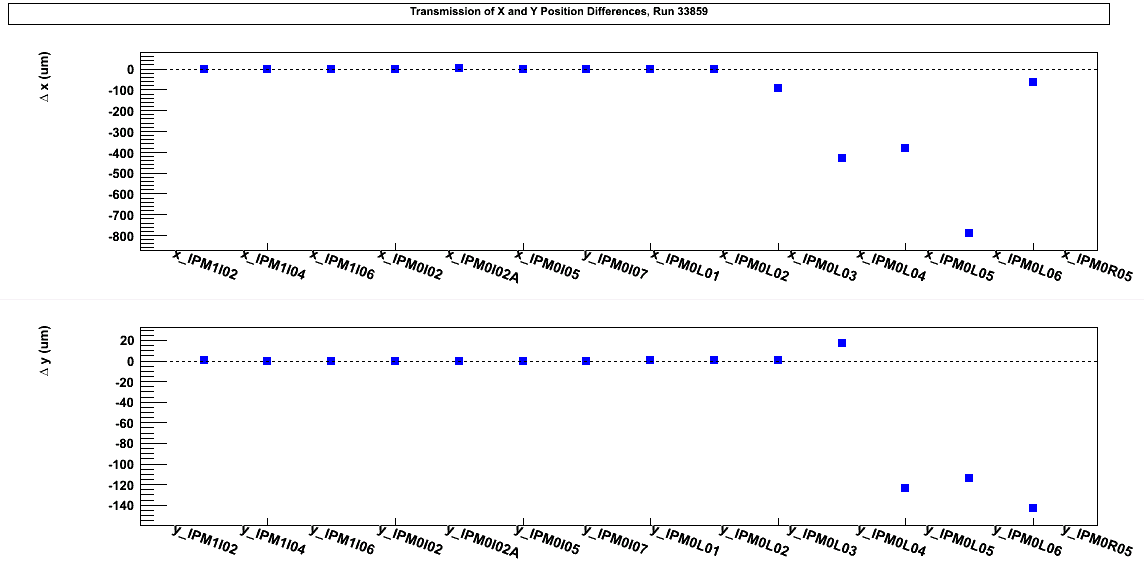
- Turn ON magnet 1:

Power it to 1000 times its operational value. Look for position differences upstream the magnet



- Turn ON magnet 4:

Power it to 1000 times its operational value. Look for position differences upstream the magnet



Summary:

Helicity Magnets can be used to do
position feedback

Some improvements are still needed ...

1. Increase the DAC resolution by at least a factor of 10.
2. Better selection of BPMs to do feedback on.