

Hall A Compton Commissioning

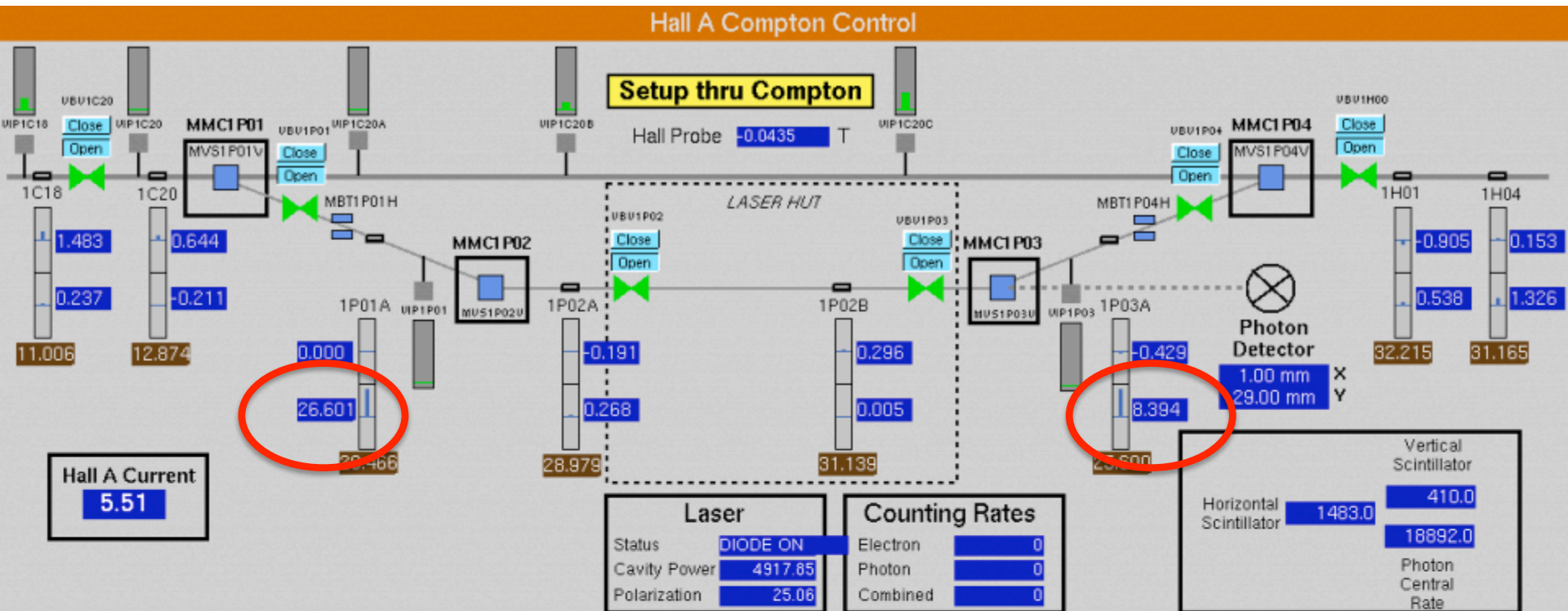
- Accomplishments (so far)
 - Beam through chicane – backgrounds minimized
 - Collisions observed using photon detector
 - CMU DAQ verified to be functional
 - Compton spectrum, raw asymmetry observed
 - Small photon detector position scan (± 5 mm) shows alignment “ok”
- Issues
 - BPMS between dipoles 1-2, and 3-4
 - Horizontal aperture on laser table seems a little small \rightarrow 5 mm instead of 10 mm
 - Laser locking could be more stable \rightarrow sensitive to seed laser temperature?

Beam through chicane

Initial setup through Compton went pretty quickly

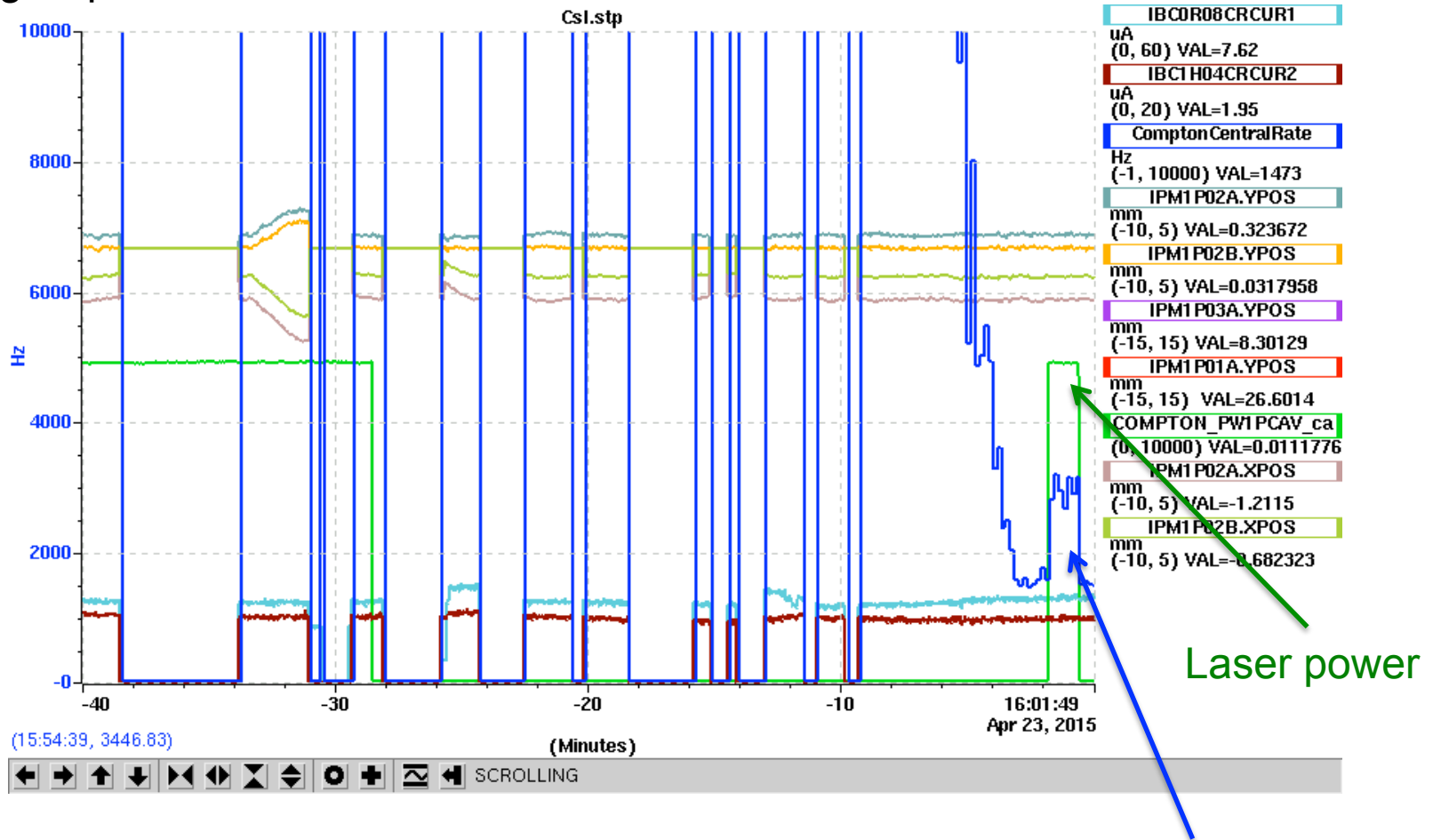
Two issues:

1. New BPM between dipoles 1 and 2 always reads $y=26$ mm with beam present
2. BPM between dipoles 3 and 4 offset (deliberately) by 0.5 inch – this far away from center, position determination likely not reliable



First Collisions

Initially, backgrounds were not terrible, but still too large to see collisions – tuning required



<https://logbooks.jlab.org/entry/3334743>

Photon detector rate

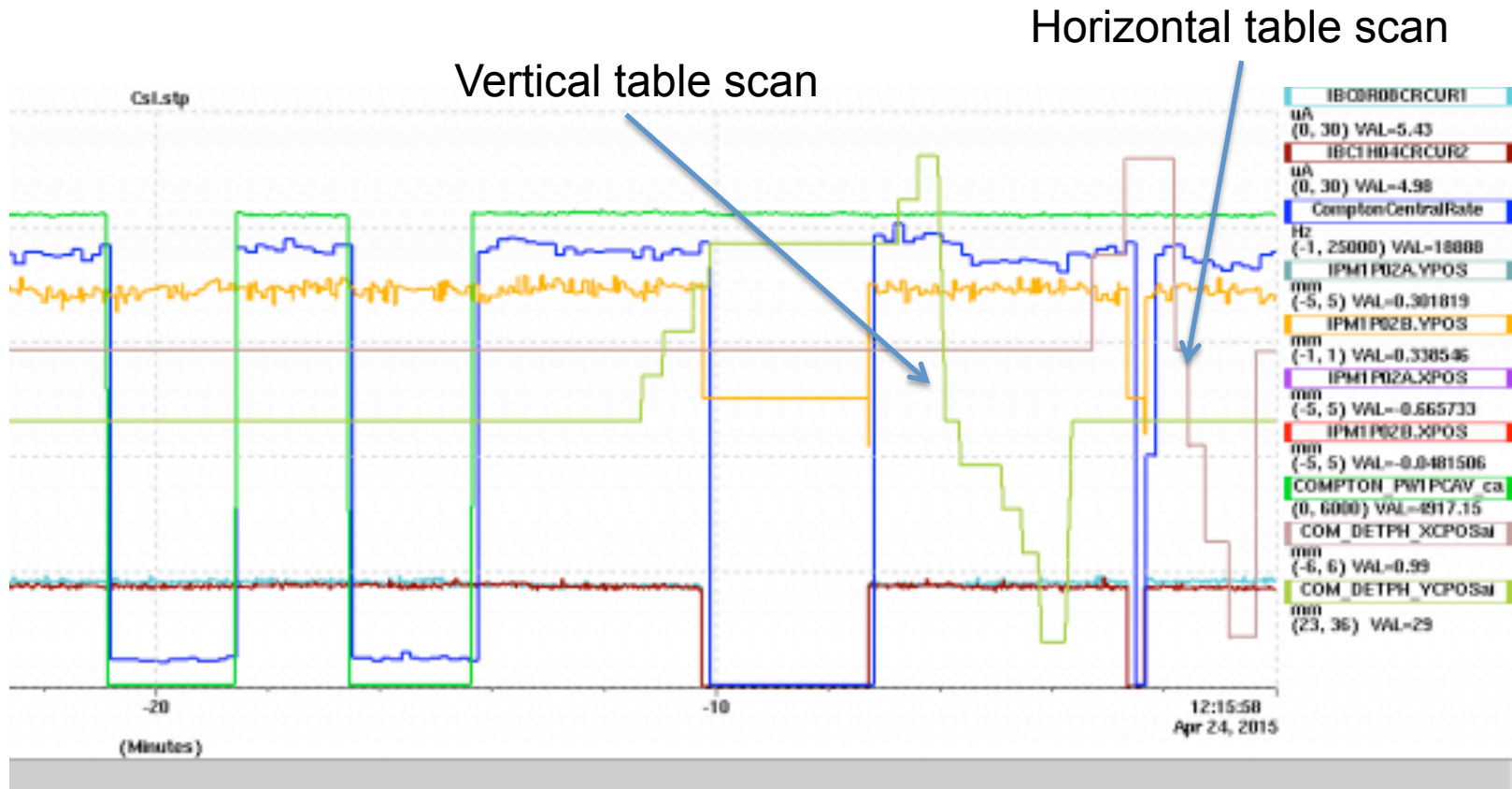
Collisions with Great Signal to Noise

Vertical beam position scan



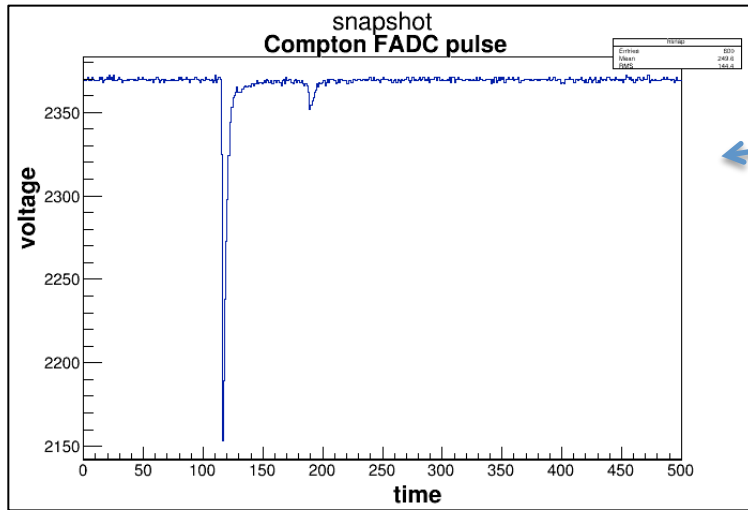
Friday morning – saw great signal to noise. Compton rates close to simple prediction ($4 \text{ kHz}/\mu\text{A}$)

Photon Detector Table Scan



Scanned photon detector position +/- 5 mm in x and y
→ Detector size = 6 cm x 6 cm
→ This such shows we aren't grossly misaligned

Photon Detector Signals



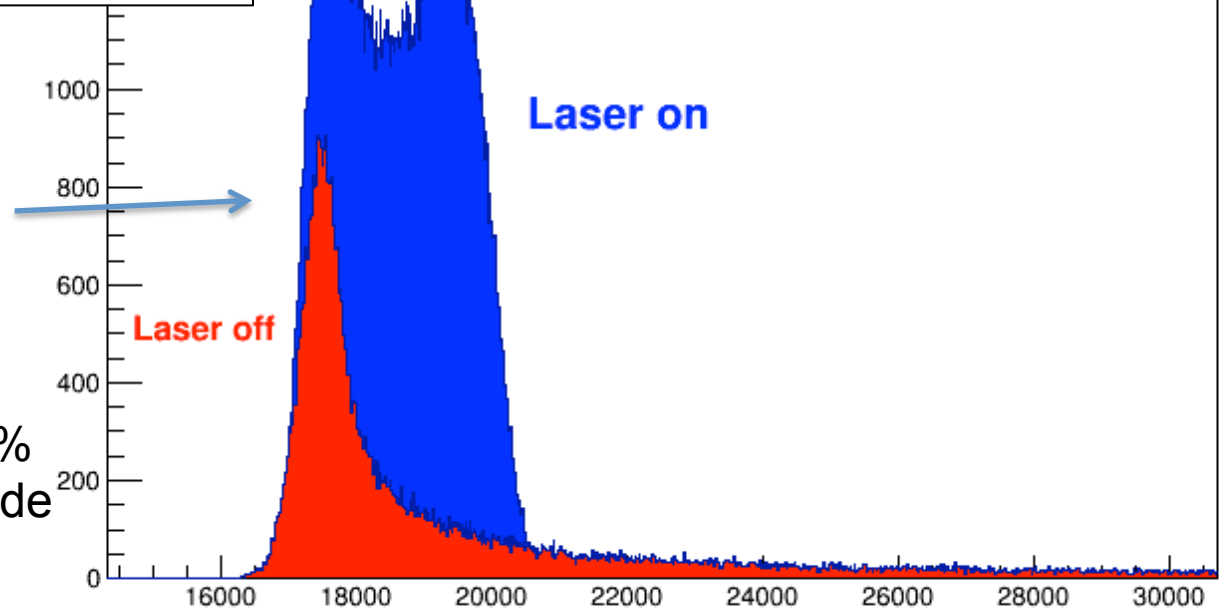
Single snapshot

Sums of Laser On Triggered Pulses: Laser On
Integrated Compton Signals

hTrig_sums_laserOn	
Entries	184807
Mean	1.866e+04
RMS	1091

Integrated spectrum –
has characteristic
Compton shape

Raw asymmetry ~ 3.6%
Right order of magnitude



Towards Polarization Measurements

- Extracting polarization will require some more work
 - Analyzer:
 - Include correction for charge asymmetry
 - Background subtracted asymmetries
 - Analyzing power
 - Simulate detector acceptance/response
 - LED linearity measurements