

Injector Update

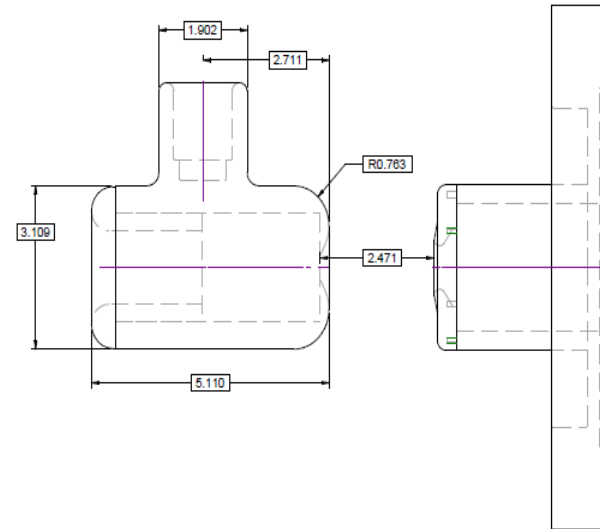
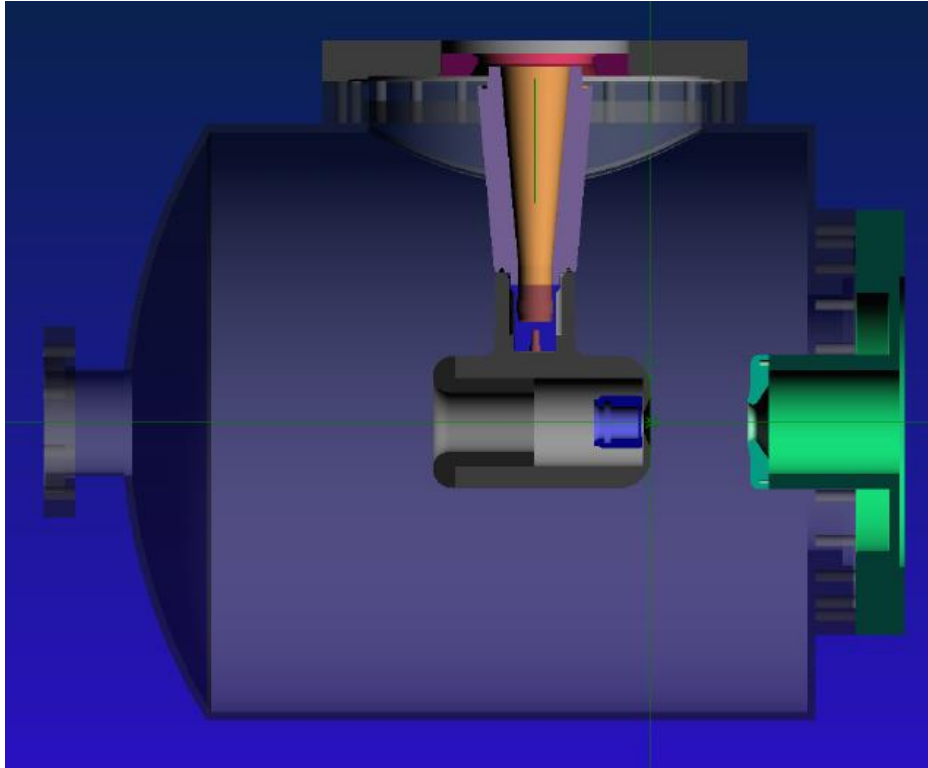
P. Adderley, J. Clark, S. Covert, J. Grames, J. Hansknecht,
R. Mammei, M. Poelker, M. Stutzman, R. Suleiman, K. Surles-Law

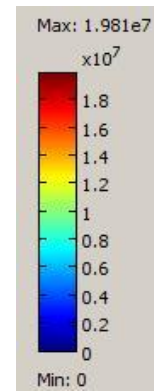
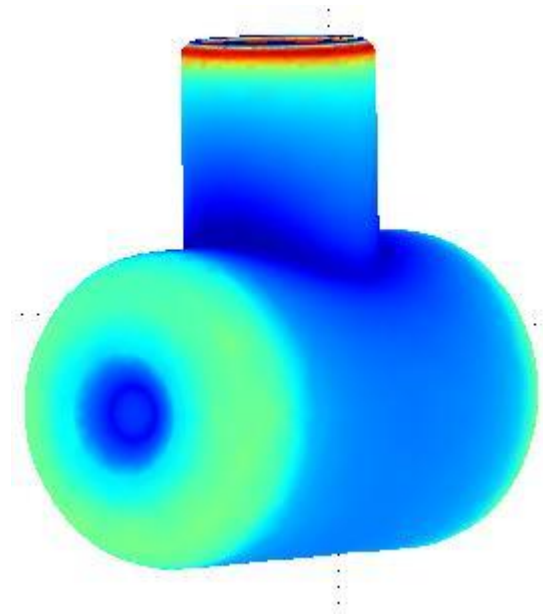
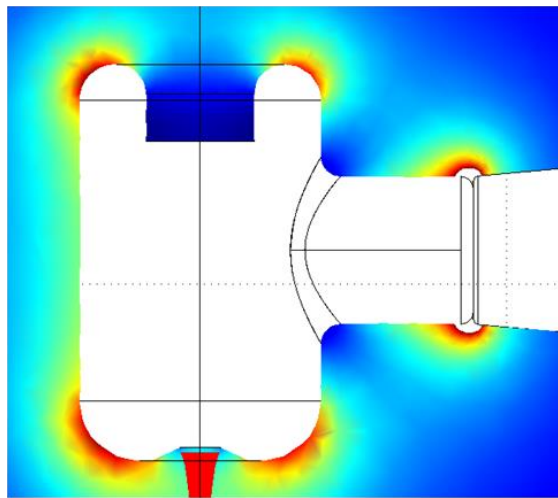


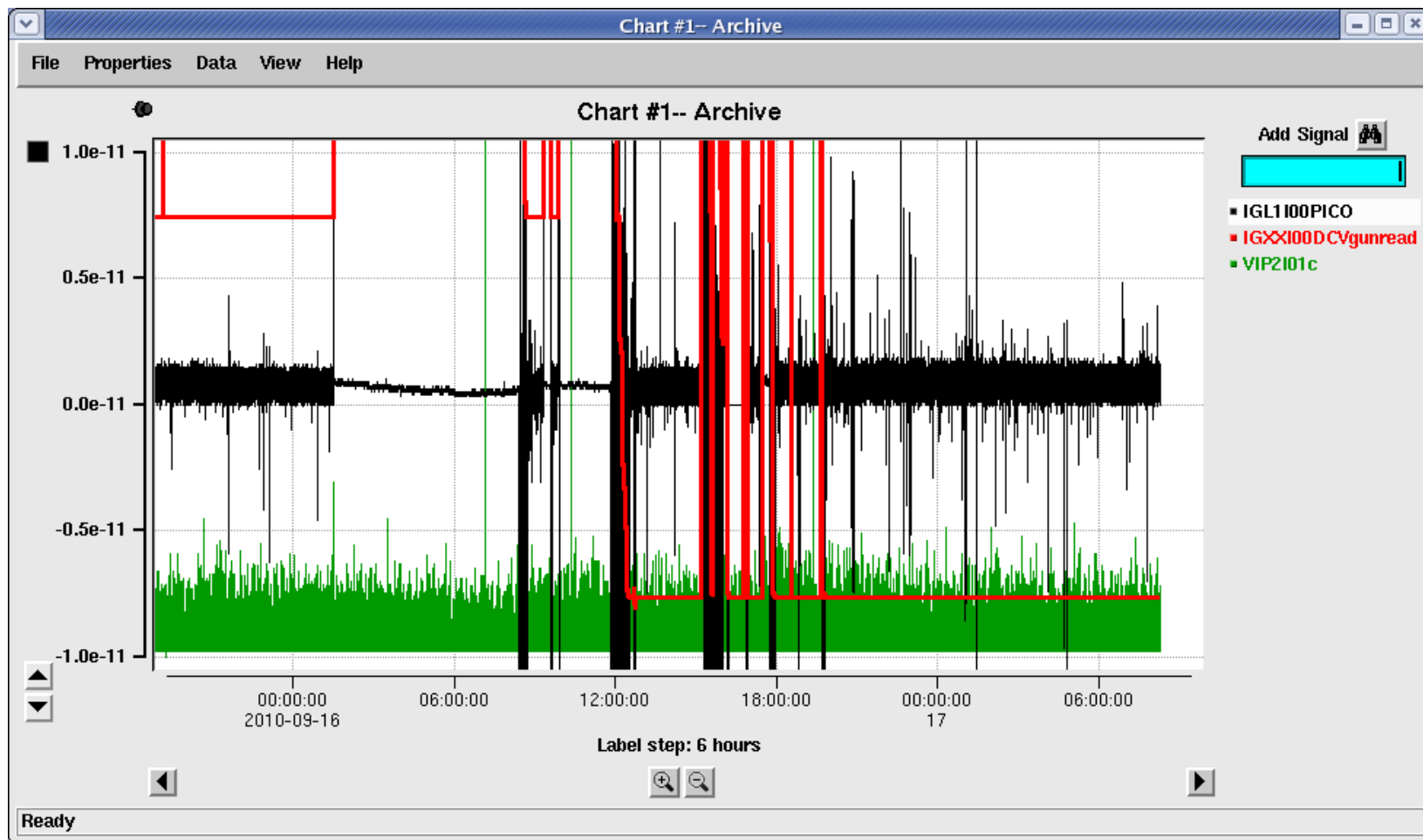
**QWeak Collaboration Meeting
September 17, 2010**

Gun HV at CEBAF

- **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)**







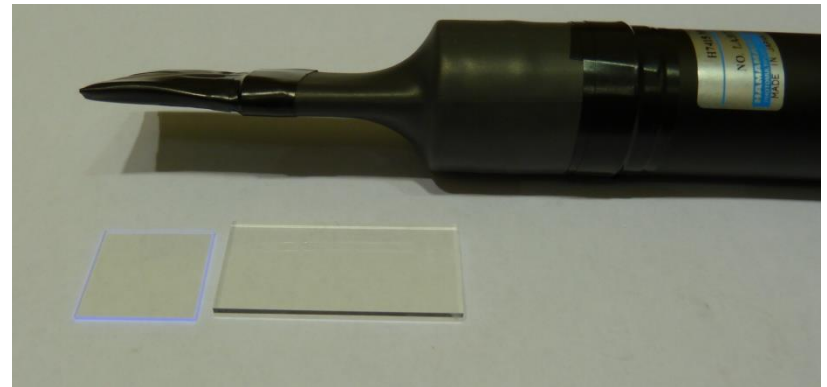
INJTWF Slow Helicity Reversal

- **Injector Two-Wien Flipper (INJTWF) commissioned during PREx**
- **Will be re-calibrated at 130 kV**

5 MeV Mott Polarimeter

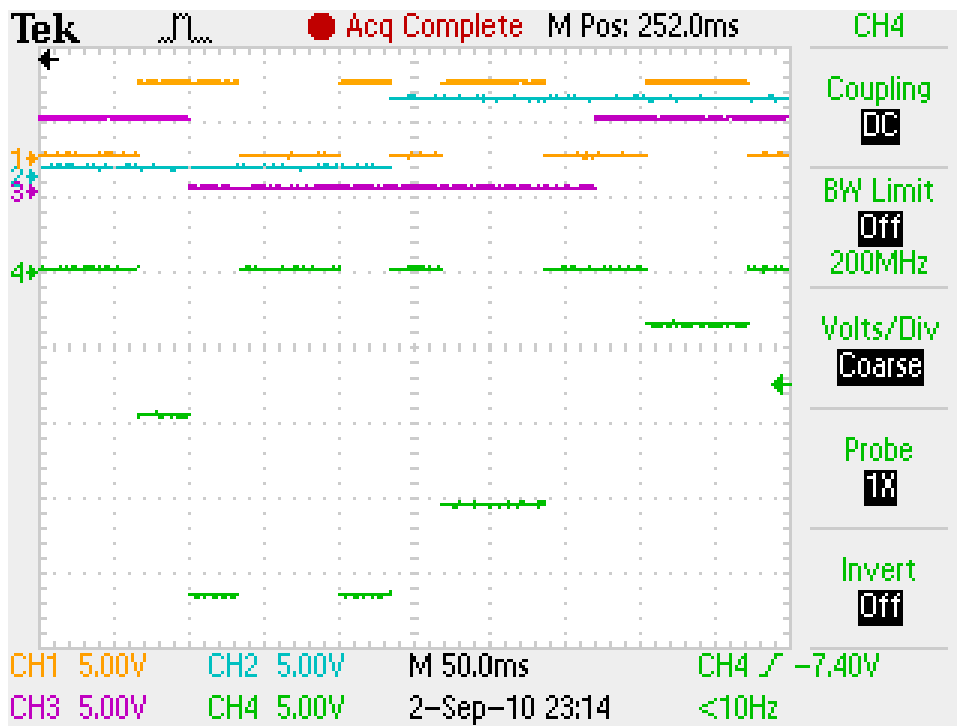
New detectors to replace old ones:

- 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)



Orange	CH 1	Helicity
Blue	CH 2	IA0
Violet	CH 3	IA1
Green	CH 4	Voltage

Helicity Reversal

- Fast Pockels Cell (PC) Reversal:

Experiment	Rate	Clock	Pattern
HAPPE _x III & PVDIS	30 Hz	Free	Quartet
PRE _x	120 Hz 240 Hz	Free Free	Quartet Octet
QWeak (Preliminary)	1 kHz	Free	Quartet

- New Helicity Board commissioned during PRE_x
- 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. Zero vertical polarization using 5 MeV Mott Polarimeter in Injector – requirement: $P_y < 4\%$

8. Spin dance to zero transverse polarization using Hall C Polarimeter – requirement: $P_x < 4\%$
9. Optimize Helicity Board settings: T_Settle, T_Stable, and Pattern. Need hydrogen target and Lumi
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)