

Procedure for measuring the beam polarization with the Möller polarimeter

Version 1.0

S. Stepanyan

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1 Prerequisites

- Reasonable quality beam tune
- Beam is sent to the tagger yoke dump (tagger magnet is energized at proper current)
- **Drift Chamber High Voltage OFF**
- **SVT/MVT High Voltage OFF**
- Harps are in the retracted position.
 - The optimal beam current is a function of beam energy. More specific information may be available on the white board in the counting house or in the run period specific documentation on the run wiki. Regardless of what currents are specified on the White board or in this document, the ratio $Left \otimes Right$ accidentals to the true coincidence rate should be kept below 5%. It may be necessary to adjust the HV on the Left and Right PMT's to achieve a low accidental rate, while maintaining a reasonable true rate.

2 Setup

1. Notify MCC that you are about to do a Möller run and **request to take the beam to the tagger yoke beam dump** (they will need to take the beam way and energize the tagger magnet).
2. Wait for MCC to authorize change the BTA setting to “photon beam” and also beam position/current limits if necessary
3. Ask MCC to turn orbit locks off, and mask BOM and the Halo Counters in FSD
4. Once the tagger magnet is energized, request the beam current as specify for the given energy Möller measurements to be delivered¹, as measured by 2C21 nA BPM and/or SLM. Do not use 2C24A since that BPM is located downstream of the Möller setup

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5. The following steps are all done from the EPICS terminal of one of **clonsl** PCs. The Möller setup GUI is launched via the **Moller** button on the "*clascss*" GUI.
 - (a) Make sure that the integration time for the asymmetry scalers is set to 5 on the "*asym*" GUI under "*Beamline*". If it is not, use the slider to set it to 5 (if the slider wont move, check "IOC ACCESS" on "*clascss*" GUI on clonsl)
 - (b) Click "*Configure Moller Hardware*" button, near the top of the GUI, Figure 1. This will start the following sequence of events:
 - i. SC HV Mainframes will be turned off.
 - ii. EC HV Mainframes will be turned off.
 - iii. Helmholtz Magnet will be energized in the Negative polarity.
 - iv. Möller Target will be positioned to the *LEFT* target position.
 - v. Möller Quadrupole magnets will be energized
 - vi. EPICS DAQ will be started
 - (c) Watch the text at the top of the GUI for informational guidance.

3 Confirming the Möller Hardware Configuration

If the Möller hardware is correctly set up you should observe $L \ominus R$ *true*s rate and the beam polarization should be posted on the EPICS GUI. If no coincidence rate, or no beam polarization on the GUI page the beamline expert.

4 Data Taking

Run is complete when the error on the beam polarization on the GUI is below 1.5% absolute. Typically it takes about 30 min to 40 min to get the required accuracy.

5 Close out

When done with the measurements:

- Do not forget to make a log entry using "Log Entry" button on the GUI!
- Click the *Backout Moller Hardware* button on the EPICS GUI to restore the hardware back to production running.
- Request that MCC take the beam away and **de-gauss the tagger magnet**.
- Once tagger magnet is degaussed, restore the beam to Faraday Cup.
- Turn on DC and CVT HVs.

6 Tips

1. During a Möller run the upstream PMTs labeled "up" and "down" may get activated. The half life is around 20 Minutes. MCC should ignore those PMTs for at least an hour.

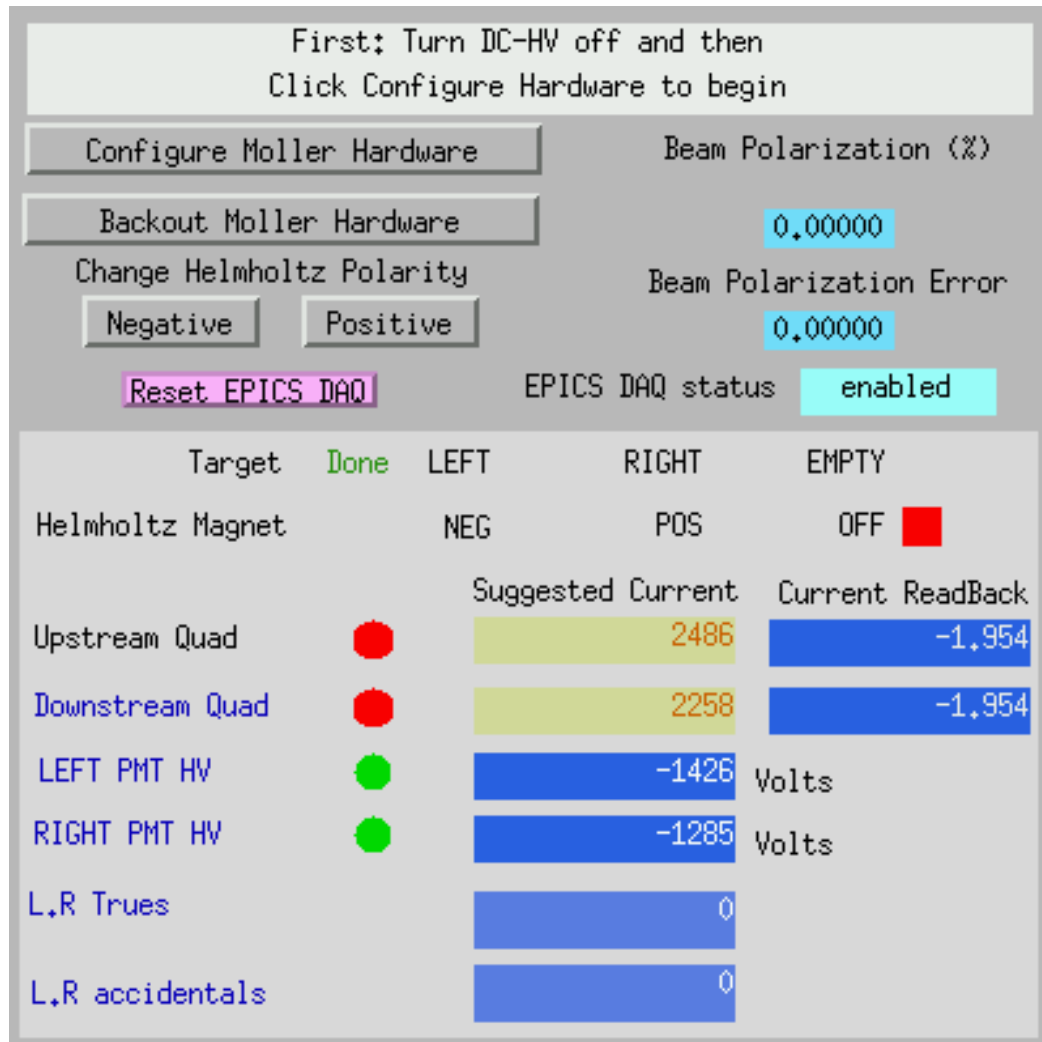


Figure 1: The Möller Epics screen of Möller hardware set up.

2. MOLLER QUADS. At times the moller quads will not turn on. Using the Moller expert screens controls you can try a few things to get them on first try to click the "RESET" and "ON" buttons. Then you could try to click the "OFF" and then "ON" buttons. The readback value of the current should be close to the entered set value.
3. Steering: Based on the beam tune, the moller quads may substantially deflect the beam. A deflection of 5 mm has been observed.
4. If the Moller PMT's do not come ON, try to reset them using the beamline HV GUI.