Procedure for measuring the beam polarization with the Möller polarimeter
Version 1.0

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1   Prerequisites

- Reasonable quality beam tune.

- Beam current should be set to < 10 nA without exceeding a 5% accidental rate of left-right coincidence.

  - 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 or web page. Regardless of what currents are specified on the White board or this document, the ratio $Left \otimes Right$ accidentals relative 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.

- **Drift Chamber High Voltage OFF**

- **SVT/MVT High Voltage OFF**

- Harps are in the retracted position.

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 a beam way and energize the tagger magnet).

2. Wait for MCC to authorize change the BTA setting to "photon beam" and also limits if necessary

3. Ask MCC to turn orbit locks off and mask BOM and Downstream Halo Counters in FSD (if needed)

4. Once the tagger magnet is energized, request the beam current as specify for the given energy Møller measurements to be delivered, as measured by 2C21 nA BPM or SLM. Do not use 2C24A since that BPM is located downstream of the Möller setup

5. The following steps are all done from the EPICS terminal of one of **clonsl** PCs. The Møller setup GUI is launched via the **Moller** button on the "beam_screens" GUI.
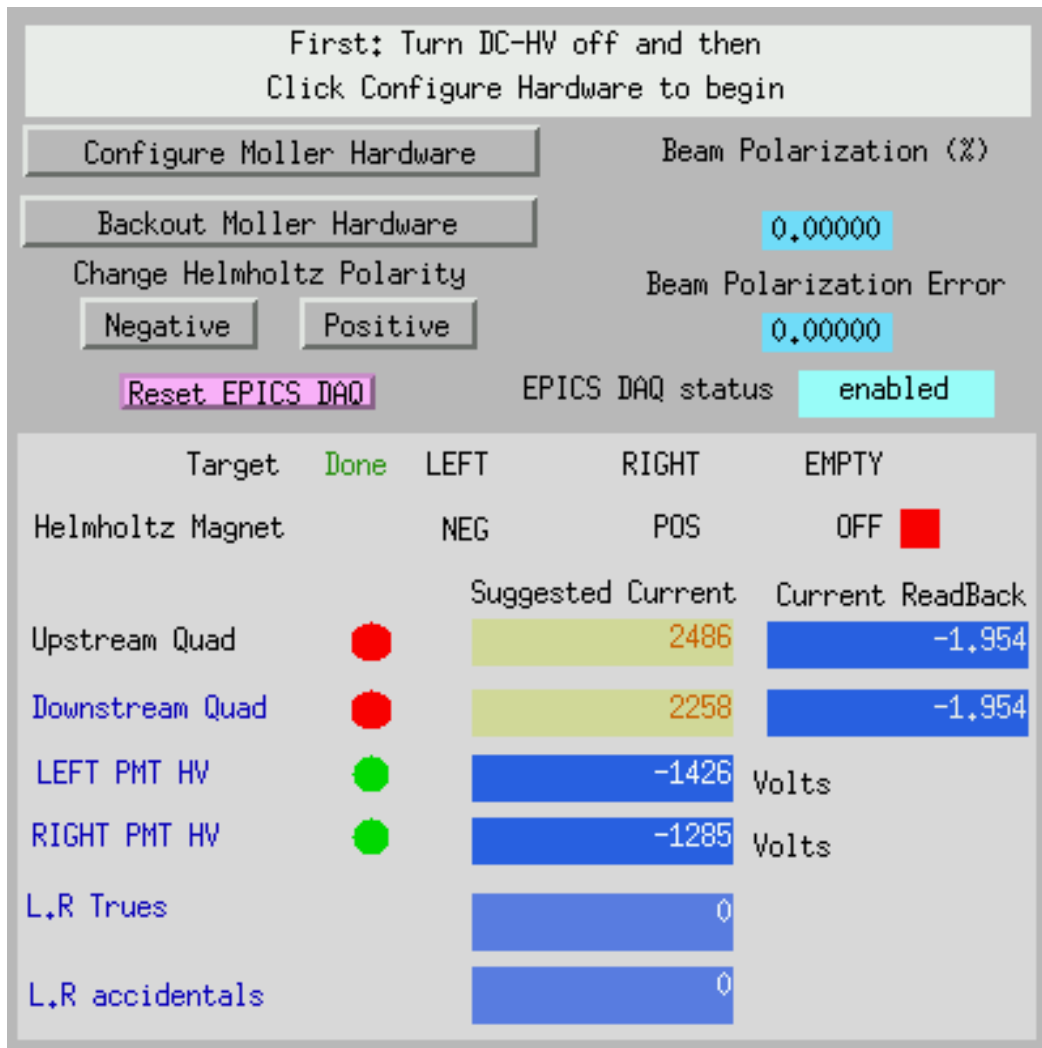
Figure 1: The Möller Epics screen of Möller hardware set up.

(a) Make sure that the integration time for the asymmetry scalers is set to 5 on the "Asymmetry" GUI. If it is not, use the slider to set it to 5 (if the slider wont move, check "IOC ACCESS" on "clas_epics" GUI on clonsl)

(b) Click the *Configure Moller Hardware* button, near the top of the GUI, Figure 1. This will set off 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 $L \odot R\, trues$ 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 expert.

4 Data Taking

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

5 Close out

When you finished 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 beam to Faraday Cup.

Turn on DC HV.

6 Tips

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

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 resetting them using the "clas_epics" program that is probably running on another monitor (maybe even the clas10 monitor). Midway down theGUI you will see a button labeled "tagger & beam HV" under the caption "High Voltage". A window will open and you should select a button on the first line (Group 1) under the column labeled Voltage/Current". This will spawn yet another window with a list of devices. The devices labeled "BM_MOLLER_L" and "BM_MOLLER_R" are the ones of interest to you. Use the "Dis" and "Ena" buttons and the entry field "Input V" to set the PMTs to -1551V for BM_MOLLER_L and -1410 for BM_MOLLER_R. (if this still fails page the Beamline person on call).