

CLAS12 Møller Operations Manual - v0.0

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I. Introduction

The CLAS12 Møller system measures the polarization of the electron beam delivered to Hall B, and this document details its operating procedures. The user interface for shift workers is shown in Fig. 1 and provides direct access to all controls and feedback that the normal operator should need, described in Section II. Expert operations are described in Section III.

The screenshot shows the 'Moller Run' interface with a dark blue background. At the top, there's a 'Menu' button and a timestamp '08/24/2018 18:06:02'. The 'Status' section shows 'Not Configured'. The 'Status Message' section displays 'Non-Moller Configuration Restored.' and 'Run # 1002'. The 'Configuration' section includes buttons for 'Enter', 'Exit', and 'Reconfigure', along with input fields for 'Quad Current' (500), 'Helm Current' (2.0), 'Helm Polarity' (Positive), 'Target Choice' (Right), 'SLM Voltage' (950), and 'Acq Time (s)' (120). The 'Data Acquisition' section has 'Start Run' and 'End Run' buttons, 'DAQ Status' (disabled), and displays 'Polarization (%)' as 0.00000 +/- 0.00000, with a filename 'moeller_08-23-18_19:38:46.txt'. The 'Monitoring' section shows 'Magnet Currents (A)' with values for Up Quad (9.8), Down Quad (9.8), Helmholtz (-0.00), and Tagger (0.4), each with a green indicator light. It also shows 'Charge Asymmetry' (-0.0277 +/- 0.0091), 'Acc/Coinc Ratio' (0.0000), 'SLM Voltage' (1000.0 V), 'Current' (248.2 uA), 'Half Wave Plate' (OUT), and 'Target Motor' (Empty 3.380). The 'Logbook Entry' section has a 'Submit' button and input fields for 'Entry Makers' (bob) and 'Comments' (None).

FIG. 1: The user interface for shift workers for operating a Møller run is divided into status, configuration, data acquisition, monitoring, and logbook sections. In this screenshot, the Moller system is not configured, i.e. the setup is for non-Møller beam delivery.

II. Standard Procedures

The procedure for the operator can be summarized in the following steps, and more details are shown on the next page.

1. **Configure:** ensure the Configuration section is set as desired
2. **Enter:** click *Enter* in the Configuration section and wait for success status
3. **Start Run:** click *Start Run* in the DAQ section
4. **Monitor:** monitor the critical parameters
5. **End Run:** click *End Run* in the DAQ section
6. **Log Entry:** click *Submit* in the Logbook Entry section
7. **Exit:** click *Exit* in the Configuration section and wait for success status

1. **Configure:** ensure the Configuration section is set as desired

The operator should confirm the desired values in the Configuration section. This includes quadrupole current, Helmholtz current and polarity, target choice, SLM voltage, and acquisition time. If the *Auto* option is selected for the quadrupoles, their current will be chosen based on standard settings for the current beam energy. *Note, it is critical that some of these settings are held fixed while a run is ongoing, and those cannot be changed during a run from this interface. See below regarding reconfiguring.*

2. **Enter:** click *Enter* in the Configuration section and wait for success status

Clicking the *Enter* button will configure the system for a Møller run by initiating a sequence of actions and provide corresponding feedback in the status portion of the screen. This includes turning off some detectors' high voltage, energizing the quadrupoles and Helmholtz magnets, and inserting the Møller target. Success will result in "Moller Configuration Ready" in the status message.

3. **Start:** click *Start Run* in the DAQ section

This will initiate a new Møller run, including zeroing any accumulated data, opening a new data file, incrementing the run number, and starting recording data.

4. **Monitor:** monitor the critical parameters

This is left to the operator. The polarization and its uncertainty, the beam charge asymmetry, and the accidental-coincidence ratio should be in acceptable ranges.

5. **End:** click *End Run* in the DAQ section

6. **Log:** click *Submit* in the Logbook Entry section

This will submit a log entry to HBLOG with a table summarizing the results and an attached data file. *Note, at the point you may wish to navigate to the log entry in a web browser and add any relevant screenshots as comments to the entry.*

7. **Reconfigure (optional)** At this point you can reconfigure, e.g. change the Helmholtz polarity by adjusting the configuration and clicking *Reconfigure*, and then click *Start Run*.

8. **Exit:** click *Exit* in the Configuration section and wait for success status

This will restore the non-Møller configuration by turning of the quadrupoles and Helmholtz and retracting the Møller target. *Note, it will not restore any detector high voltage.*

A. Status Values

Describe the possible values of the status variable in the top left of the screen.

III. Expert Procedures

The instructions for the old, manual procedure.

Appendices

Description of the hardware and software involved in the CLAS12 Møller system.

A. Quadrupoles

B. Helmholtz

C. Synchrotron Light Monitor

D. Target

E. Helicity Signal

F. Multi-Channel Scaler

G. EPICS IOCs