Last Updated: 23 July 2006

Hall A "LEDEX" RunPlan
1st Low-Energy Beam Period (E_o = 362 MeV): July 24 – Aug. 20, 2006
E05-103

THE FOLLOWING SUB-SECTIONS CONTAIN:

- **START-OF-RUN SETUP**
- **PROCEDURES TO BE DONE AT BEGINNING OF BEAM PERIOD**
- **PROCEDURES THAT NEED TO BE DONE PERIODICALLY THROUGHOUT PERIOD.**

1. Prestarting Conditions (to be setup on 24 July 2006, following completion of CSR tests)

Prior to beam start, the LEFT spectrometer (with the FPP!) should be set to the following angle. The spectrometers should remain off. A **survey** of the **both spectrometers** is required after they are set, and before beam comes. The spectrometers should not be moved after the survey until the 1st hydrogen elastic measurement is complete (Kin points #1, #2 and #3).

Spectrometer	Angle (deg)	Polarity
HRS-L	14.00	Positive
HRS-R	28.30	Negative

2. Beam-Wait Conditions

Set spectrometers to momenta prescribed in Table below while waiting for beam, after Hall is put into Beam Permit status. Follow Counting House "Whiteboard" instructions from J. Lerose for cycling quads when setting momentum. *(HRS-R won't be used during this first beam period, so no need to set its momentum right away – it is needed for E05-004.)*

HRS-L		HRS-R		Target
p_h (GeV/c)	θ_h (deg)	p_e (GeV/c)	θ_e (deg)	
0.5577	14.00	0.3538	28.30	NONE

This sets HRS-L at the kinematics for the first needed DAQ: hydrogen elastic kinematics, with the central-angle elastic peak at δ = -2 % *(KIN #1 on kinplot)* - see section on 1st hydrogen elastic points.

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3. Hall A BCM Calibration (wrt BCM OLO2)

- *This is to cross-calibrate our Hall A BCMs to BCM OLO2 so MCC can judge how much current is coming into the Hall (all calibration constants will have changed because of the addition of amplifiers we put in to improve low-current accuracy).*

- *The procedure outlined here is from discussions with Arun Saha: would be best if he could be present for this measurement.*
  - **Note that no other Hall can have beam for the duration of this test. This must be coordinated with Hall C.**
  - **ALSO NOTE: this may have been completed prior to July 25 (between July 19-23).**
  - Ensure no target ("empty") is in, and also no radiator is in place ("radiator out").
  - Make sure MCC has recently calibrated BCM OLO2.
    1. Prescale all triggers away (PS values = 65535), and start DAQ, and start Hall A EPICS data logging.
    2. Have MCC put ~**30 μA** into BCM OLO2 for about 1-2 minutes.
    3. Have MCC then lower current to ~**20 μA** for about 1-2 minutes.
    4. Repeat with progressively lower currents (e.g. ~**15, 10**, **7, 5, 2 μA)** for about 1-2 minutes each time.
    5. Stop DAQ (so, 1 run for whole process); stop Hall A EPICS data logging.

4. Hall A BCM Calibration (wrt Unser)

- *There is some standard Hall A procedure (hopefully!) written up about this process! Process is similar to section 1.3's BCM calibration in that Hall A EPICS data logging should be running, and Hall A DAQ should be running. Current should be ramped in a manner like: 50 μA on for 90-120 seconds, no beam for 90-120 seconds; 30 μA on for 90-120 seconds, no beam for 90-120 seconds; etc.*
- *Have Arun Saha present to assist.*
- **ALSO NOTE: this may have been completed prior to July 25 (between July 19-23).**

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5. Beam Calorimeter Calibration

- *Need to refer here to Calibration procedure developed by Arne, Jonathon, Ron, et al.*
- *This calibration will need to be done frequently (maybe once per day?) for the first week or so of running until Arne et al. are comfortable of the stability of the calibration.*

6. Pedestal Runs

- *Should do a separate "pedrun" just once per day (with no beam on).*

7. Verification ("Commissioning") of Radiator Functioning

- *Shortly after beam in Hall, this needs to be done.*
- *Need to have Ron Gilman run through quick commissioning of Radiator (~30 minutes?):*
  - *Make sure "empty" position is truly empty (even with Raster On 2x2 mm)*
  - *Measure temperature rise on foils with beam to understand what maximum current we will be able to have.*

8. Moller Measurement & FPP Straight-Throughs

- *Need to do this at the **very beginning**, before using Polarized beam for any physics - could be done after BCM (1.3 and 1.4) and Beam Calorimeter (1.5) calibrations, and after Radiator Commissioning (1.7)*

- Setup for Moller measurement (call Eugene).
- Take Moller measurement with liquid Hydrogen target in place – time likely to be 6-8 hours.
- Check FPP HV and LV settings.
- Make sure all FPP carbon doors are OUT.
- Set prescale T3=1. All others infinite (65535). Disregard deadtime.
- Turn on DAQ while Moller measurement is in progress.
- Analyze the data for FPP detectors and VDCs. Other detectors are not crucial.
- Take data with the following spectrometer kinematics (*this is where HRS-L should have been left anyway from "beam wait" prescription)*:

p_h (GeV/c)	θ_h (deg)	Target	Time (hr)
0.5577	14.0	LH_2	3

9. Beam Helicity Sign Verification:

- *See Bob Michael's notes at http://www.jlab.org/~rom/g0helicity.html*
- *Should do this verification following Moller measurement – hopefully either Moller expert or Bob can do this!*

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10. Radiator Thickness Scan

- ***This measurement should be done once the very first Photodisintegration PRODUCTION point is set up, with spectrometers set, and pointing measurements completed.***

    - Small 2msr collimator on HRS-L (will be already bolted in place).
    - **FPP Carbon Doors**: place **either** the **3" doors** (if momentum above ~660 MeV/c), **1.5" doors** (if central momentum between ~560-660 MeV/c) **or NO doors** (less than ~560 MeV/c) → check FPP Figure of Merit Simulation / runplan document.
    - **Note: FPP not necessarily required for this scan – so if FPP chamber 1 is still being flushed on 24-25 July, could do this scan without this chamber functioning.**
    - Check beam position on BPMs; set Raster ON (± 2 mm in X and Y)
    - Set prescales T3=low; other prescales set high (65535) for low deadtime.
    - Pre-run estimates are that Beam Currents between 1-4 μA (assumed 6 msr collimator) for the first run (LD_2 target, 4% R.L. Radiator In) would provide the max DAQ rate of between 2-3 kHz. In each case, the current should be adjusted to give max DAQ rate between 2-3 kHz.
    - Set target/radiator to settings indicated in Table below, and take data for times indicated.
    - GOAL: check linearity of rates with Radiator Thickness; check quality of **background-subtracted** photon-energy spectrum (should be no counts above endpoint).

p_h (GeV/c)	θ_h (deg)	Target	Radiator	DAQ Rate (kHz)	Time (min)
Whatever has been already set for the FIRST PRODUCTION Kin. Point in Kin-Table		LD_2	1 % R.L.	2-3 (max)	20
		LD_2	2 % R.L.	2-3 (max)	20
		LD_2	3 % R.L.	2-3 (max)	20
		LD_2	4 % R.L.	2-3 (max)	20
		LD_2	5 % R.L.	2-3 (max)	20
		LD_2	NONE	2-3 (max)	10
		LH_2	NONE	2-3 (max)	5
		LH_2	1 % R.L.	2-3 (max)	10
		LH_2	2 % R.L.	2-3 (max)	20
		LH_2	3 % R.L.	2-3 (max)	20
		LH_2	4 % R.L.	2-3 (max)	20
		LH_2	5 % R.L.	2-3 (max)	20

    - **Following this scan/evaluation: a choice of which Radiator Thickness is most appropriate will be made; for the rest of this RunPlan, "Radiator=IN" means to use whichever radiator thickness is chosen from this process.**