Fall 2015 and Spring 2016 Runs

A. Deur
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• Operation mostly for accelerator commissioning.
  Accelerator goals:
  • Deliver a high current beam of energy $\geq 12$ GeV
  • Commission 750 MHz RF separator / support multi-hall operation
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  $\Rightarrow$ no Drift Chambers on $\Rightarrow$ no physics/polarized beam run.

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- Continue trigger commissioning
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Accelerator responsibilities for Hall D:
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• Commission nA BPMs ~✗
• Hall D beam line transport studies ✗

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Hall D main goals:
• DAQ performance tests ✔
• Continue trigger commissioning ✔

Summary of the run with link to relevant logbook entries: https://logbooks.jlab.org/entry/3369812
Run conditions

• e\(^{-}\) beam:  • 12.047 GeV (1.090 GeV/linac and 0.123 GeV for the injector and -0.066 GeV of synchrotron radiation losses)
  • \(\sim\) 5 nA-3\(\mu\)A.

• Al. Radiators. (Diamond radiators available, SI45-S90 (90\(\mu\)m), J1A50 (50\(\mu\)m), J2A100 (100\(\mu\)m) but not used)

• Solid plastic target, 1cm CH\(_2\) (HDPE) located on the nose of the ST (no need for cryotarget: no physics data taking planned)

• New neutron monitor in Hall.

Run scheduled for five weeks.
Accelerator had priority to establish 12-GeV Running.
# Run plan (final version)

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**Parasitic tasks, done at a time convenient for the ones in charge:**

*Microscope bias voltage study.  
*TDR.  
*Runs on calorimeters, ST and TOF.
Possible Scenarios

• Miracle scenario: everything is proceeding without any hitch. Then the beam could be ready before Thanksgiving.

• Realistic good scenario: everything is proceeding as expected. Beam comes around Thanksgiving. We have the 10 first days busy with FFB commissioning. The remaining few days of swing and night shifts will be for Hall D commissioning.

• Realistic bad scenario: the 12 GeV goal is reached near mid-December. There will be no beam in the tagger or in Hall D. FFB commissioning is postponed to Spring 16.

• Really bad scenario: the 12 GeV goal cannot reached. Accelerator would switch to Hall operation at lower energy. Depending on when accelerator decides that 12 GeV cannot reached for Fall, we may get beam availability before Thanksgiving.
Results for Fall 15 run

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• Beam quality not as good as Spring 15 (but better than Fall 14). Discussed in afternoon beamline talk. We had only one week of run ⇒ We did not want to spend time improving the beam tune.

• Commissioning of FFB kicked-off (overall, 8h of studies, compared to 40h expected). Start delayed because of acquisition problems. Lower beam quality and unexpected feature in beam transport delayed progress further. Feedback loop closing not achieved. ⇒ Must continue work during Spring 16 run.

• nA BPM Commissioning stopped almost right away due to firmware/software problems. Priority was given to FFB. ⇒ Must continue work during Spring 16 run.

• DAQ tests were a success: Sergey managed to run it at high rates: ~40 kHz, ~90% Livetime. We are in good shape for the spring run.

• Trigger studies made good progresses: FCal+BCal trigger, and FCal+BCal+PS trigger both work well. More work remaining for Spring 16.

• Level 3 trigger commissioning started.

• 5h of data taken (unpolarized photon beam, no DC, no magnetic field, CH$_2$ target). Clear π$_0$ peak seen.

• Radiation level ~5 times higher than for Spring 15. New neutron detector in Hall showed that neutron levels at the DIRC location are small: often below detector sensitivity, up to 0.2 mRem/h above detector baseline with largest photon flux: ~100 nA, 10^{-4} radiator. Confirm earlier OSL data.
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Operation includes physics running. Beam energy same as Fall 15: 12.05 GeV

Accelerator responsibilities for Hall D:

• Continue to commission Fast Feedback
• Continue to commission nA BPMs
• Hall D beam line transport studies

• Solenoid at 1200A
• Use diamond radiators asap (thick test ones first, thinner ones in March)
• Most of work to be done on 5mm collimator hole. May test the 3.4mm hole at end of run.
• LH2 target.

Hall D main goals:

• Continue trigger commissioning
• Establish polarized beam, including on thin diamonds. Before this, gather $\pi^0$ calibration data.
• Commission Total Absorption Counter for absolute photon flux meas.
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Run plan

[Diagram of a run plan spanning multiple days with various tasks and time slots indicated.]
Run plan (week 1)

Staggered tasks are accelerator responsibility

Sol. Magnet at 1200A, target filled (most of time)

Friday 5 Feb.

Sunday 7 Feb.

Tuesday 9 Feb.

Time (days)
Run plan: progress as of Wed. Feb. 17th 2016
Run plan: progress as of Wed. Feb.17th 2016

- 7 days behind schedule (not bad for the start). Can easily catch back😊
- Large radiation levels, other unwanted features may be due to beam tune
- Solenoid ramp down Saturday Feb. 13th. Reason unknown.☹️ Fine since then😊
- DAQ rate in production conditions: 20 kHz, >95% LT !!😊
- Good FFB progress: FFB loop closed😊
- nA BPM commissioning almost finished😊
- Present beam position stability twice above specs (without FFB)☹️
- Quad test: well centered😊
- Empty target and unpolarized data runs. Good vertex reconstruction. Clear π⁰ peak seen😊
- Trigger work started
- Goniometer work started. Coherent peak at 9 GeV in para. conf. established😊
- Level 3 trigger work started
- CDC HV scans done😊

Wednesday, February 17, 2016