

Fall 2015 and Spring 2016 Runs

A. Deur

Fall 2015 run

- Operation mostly for accelerator commissioning.

Accelerator goals:

- Deliver a high current beam of energy ≥ 12 GeV
- Commission 750 MHz RF separator / support multi-hall operation

Fall 2015 run

- Operation mostly for accelerator commissioning.

Accelerator goals:

- Deliver a high current beam of energy ≥ 12 GeV
- Commission 750 MHz RF separator / support multi-hall operation

Accelerator responsibilities for Hall D:

- Commission beam position Fast Feedback
- Commission nA BPMs
- Hall D beam line transport studies

Fall 2015 run

- Operation mostly for accelerator commissioning.

Accelerator goals:

- Deliver a high current beam of energy ≥ 12 GeV
- Commission 750 MHz RF separator / support multi-hall operation

Accelerator responsibilities for Hall D:

- Commission beam position Fast Feedback
- Commission nA BPMs
- Hall D beam line transport studies

- Hall D solenoid was off due to modifications.

⇒ no Drift Chambers on ⇒ no physics/polarized beam run.

Hall D main goals:

- DAQ performance tests
- Continue trigger commissioning

Fall 2015 run

- Operation mostly for accelerator commissioning.

Accelerator goals:

- Deliver a high current beam ✓ of energy ≥ 12 GeV ✓
- Commission 750 MHz RF separator / support multi-hall operation ✓

Accelerator responsibilities for Hall D:

- Commission beam position Fast Feedback ✓
- Commission nA BPMs ~X
- Hall D beam line transport studies X

- Hall D solenoid was off due to modifications.

⇒ no Drift Chambers on ⇒ no physics/polarized beam run.

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)
 - ~5 nA-3μA.
- Al. Radiators. (Diamond radiators available, SI45-S90 (90μm), J1A50 (50μm), J2A100 (100μm) but not used)
- Solid plastic target, 1cm CH₂ (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)

Runplan Schedule, Fall 2015 V.1

	Sat. 12/12	Sun. 13	Mon. 14	Tues. 15	Wed. 16	Thurs. 17	Fri. 18	Sat. 19	Sun. 20	Mon. 21
OWL	TUNE	TUNE Establish photon beam Rad. levels study: 1h Calibrate A.C. Hodosc. V-scan: 1h	Tagger detector commissioning	PS trigger run	FDC align. trig. run	FCAL/BCAL trigger run	pi0 calibration run	FCAL MIPs calib. trigger run	TAGM/TAGH trigger run (0-4:30am) 5-8am Level 3 trigger.	TAGM/TAGH trigger run or special sub-det trigger run (0-4:30am) 3-6am Level 3 trigger. 6am. Beam down
DAY	TUNE	FFB/ΔA/FOPT	FFB/ΔA/FOPT	FFB/ΔA/FOPT	FFB/ΔA/FOPT	FFB/ΔA/FOPT	FFB/ΔA/FOPT	FFB/ΔA/FOPT	FFB/ΔA/FOPT	
SWING	TUNE	16:00 DAQ test 1h 17:00 Trigger test 2h Tagger detector commissioning	16:00 DAQ test 1h 17:00 Trigger setup 2h (PS trigger) PS trigger run	16:00 DAQ test 1h 17:00 Trigger setup 2h (trigger for FDC alignment) FDC align. trig. run	16:00 DAQ test 1h 17:00 Trigger setup 2h (FCAL/BCAL trigger) FCAL/BCAL trigger run	16:00 DAQ test 1h 17:00 Trigger test at high current. pi0 calibration run	16:00 DAQ test 1h 17:00 Trigger setup 2h (FCal MIPS calib. trigger) FCAL MIPs calib. trigger run	16:00 DAQ test 1h 17:00 Trigger setup 2h (TAGM/TAGH trigger) TAGM/TAGH trigger run	16:00 DAQ test 1h 17:00 Trigger setup 2h (TAGM/TAGH trigger, or special trigger request from sub-detectors) TAGM/TAGH trigger run or special sub-det	

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

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



Beam came here

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 be reached. Accelerator would switch to Hall operation at lower energy. Depending on when accelerator decides that 12 GeV cannot be reached for Fall, we may get beam availability before Thanksgiving.



Pam Am
smile



Results for Fall 15 run

- Hall D got 30.2 hours of beam time.

-

-

-

-

-

-

-

-

Results for Fall 15 run

- Hall D got 30.2 hours of beam time.
- 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 \Rightarrow We did not want to spend time improving the beam tune.

•

•

•

•

•

•

•

Results for Fall 15 run

- Hall D got 30.2 hours of beam time.
- 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 \Rightarrow 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. \Rightarrow Must continue work during Spring 16 run.

-
-
-
-
-
-

Results for Fall 15 run

- Hall D got **30.2 hours of beam time**.
- **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 \Rightarrow 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. \Rightarrow Must continue work during Spring 16 run.**
- **nA BPM Commissioning stopped almost right away** due to firmware/software problems. Priority was given to FFB. \Rightarrow Must continue work during Spring 16 run.

•

•

•

•

•

Results for Fall 15 run

- Hall D got **30.2 hours of beam time**.
- **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 \Rightarrow 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. \Rightarrow Must continue work during Spring 16 run.**
- **nA BPM Commissioning stopped almost right away** due to firmware/software problems. Priority was given to FFB. \Rightarrow Must continue work during Spring 16 run.
- **DAQ tests were a success**: Sergey managed to run it at high rates: **~ 40 kHz, $\sim 90\%$ Livetime**. We are in good shape for the spring run.

-
-
-
-

Results for Fall 15 run

- Hall D got 30.2 hours of beam time.
- 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 \Rightarrow 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. \Rightarrow Must continue work during Spring 16 run.
- nA BPM Commissioning stopped almost right away due to firmware/software problems. Priority was given to FFB. \Rightarrow Must continue work during Spring 16 run.
- DAQ tests were a success: Sergey managed to run it at high rates: ~ 40 kHz, $\sim 90\%$ 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.

-
-
-

Results for Fall 15 run

- Hall D got 30.2 hours of beam time.
- 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 \Rightarrow 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. \Rightarrow Must continue work during Spring 16 run.
- nA BPM Commissioning stopped almost right away due to firmware/software problems. Priority was given to FFB. \Rightarrow Must continue work during Spring 16 run.
- DAQ tests were a success: Sergey managed to run it at high rates: ~ 40 kHz, $\sim 90\%$ 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.
-
-

Results for Fall 15 run

- Hall D got 30.2 hours of beam time.
- 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 \Rightarrow 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. \Rightarrow Must continue work during Spring 16 run.
- nA BPM Commissioning stopped almost right away due to firmware/software problems. Priority was given to FFB. \Rightarrow Must continue work during Spring 16 run.
- DAQ tests were a success: Sergey managed to run it at high rates: ~ 40 kHz, $\sim 90\%$ 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, CH₂ target). Clear π^0 peak seen.
-

Results for Fall 15 run

- Hall D got 30.2 hours of beam time.
- 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 \Rightarrow 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. \Rightarrow Must continue work during Spring 16 run.
- nA BPM Commissioning stopped almost right away due to firmware/software problems. Priority was given to FFB. \Rightarrow Must continue work during Spring 16 run.
- DAQ tests were a success: Sergey managed to run it at high rates: ~ 40 kHz, $\sim 90\%$ 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, CH₂ 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.

Spring 16 run

- 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

-

-

-

-

-

-

-

-

-

-

-

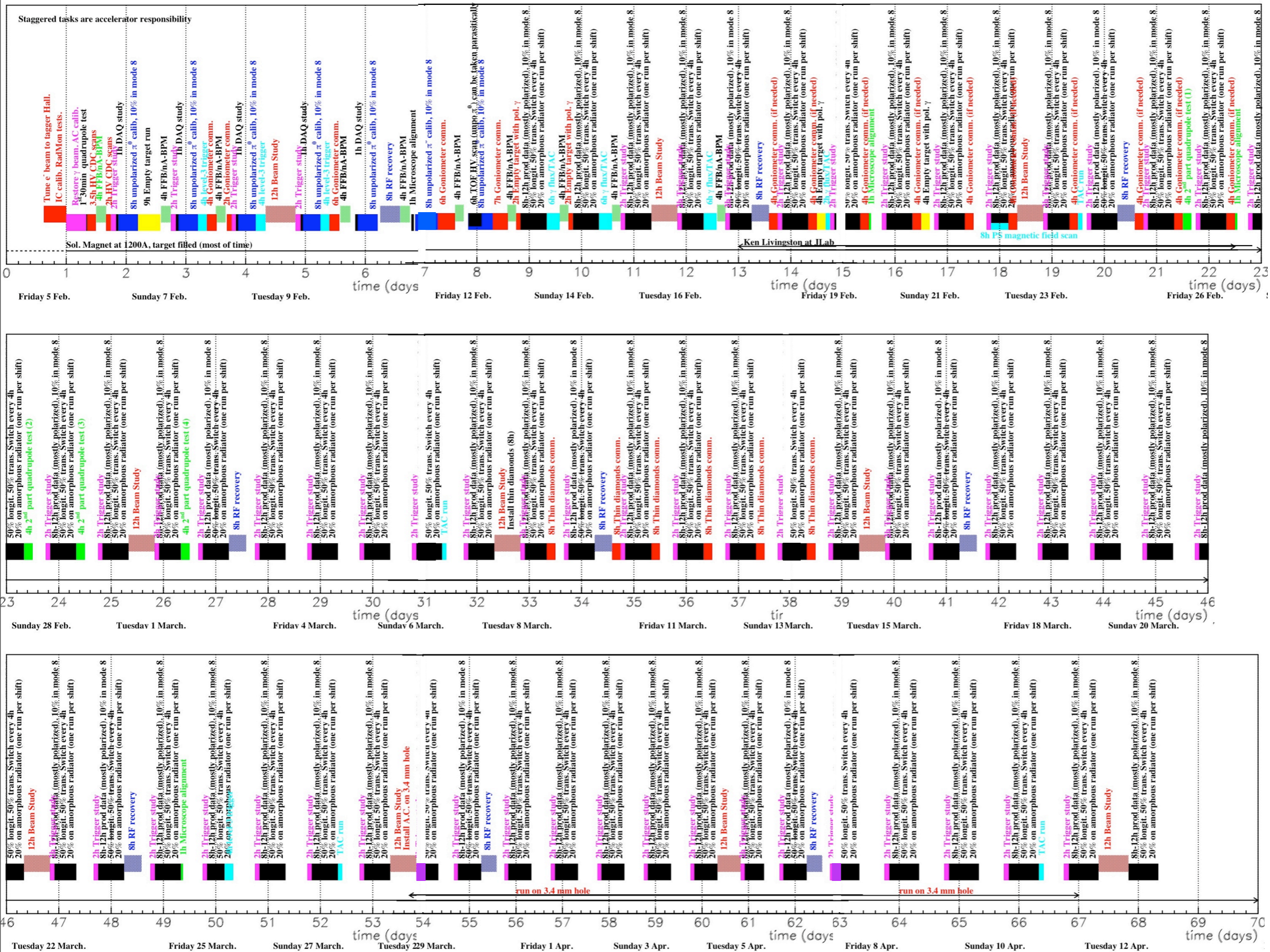
Spring 16 run

- Operation includes physics running. Beam energy same as Fall 16: 12.05 GeV
- Accelerator responsibilities for Hall D:
 - Continue to commission **Fast Feedback**
 - Continue to commission **nA BPMs**
 - Hall D **beam line transport** studies
- Hall D configuration:
 - 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.
- -
 -
 -
 -
 -

Spring 16 run

- Operation includes physics running. Beam energy same as Fall 16: 12.05 GeV
- Accelerator responsibilities for Hall D:
 - Continue to commission **Fast Feedback**
 - Continue to commission **nA BPMs**
 - Hall D **beam line transport** studies
- Hall D configuration:
 - 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 π^0 calibration data**.
 - Commission **Total Absorption Counter** for absolute photon flux meas.
 - Commission **Level 3 trigger**
 - Gather enough **polarized physics data** and enough **systematic data** for a publication

Run plan

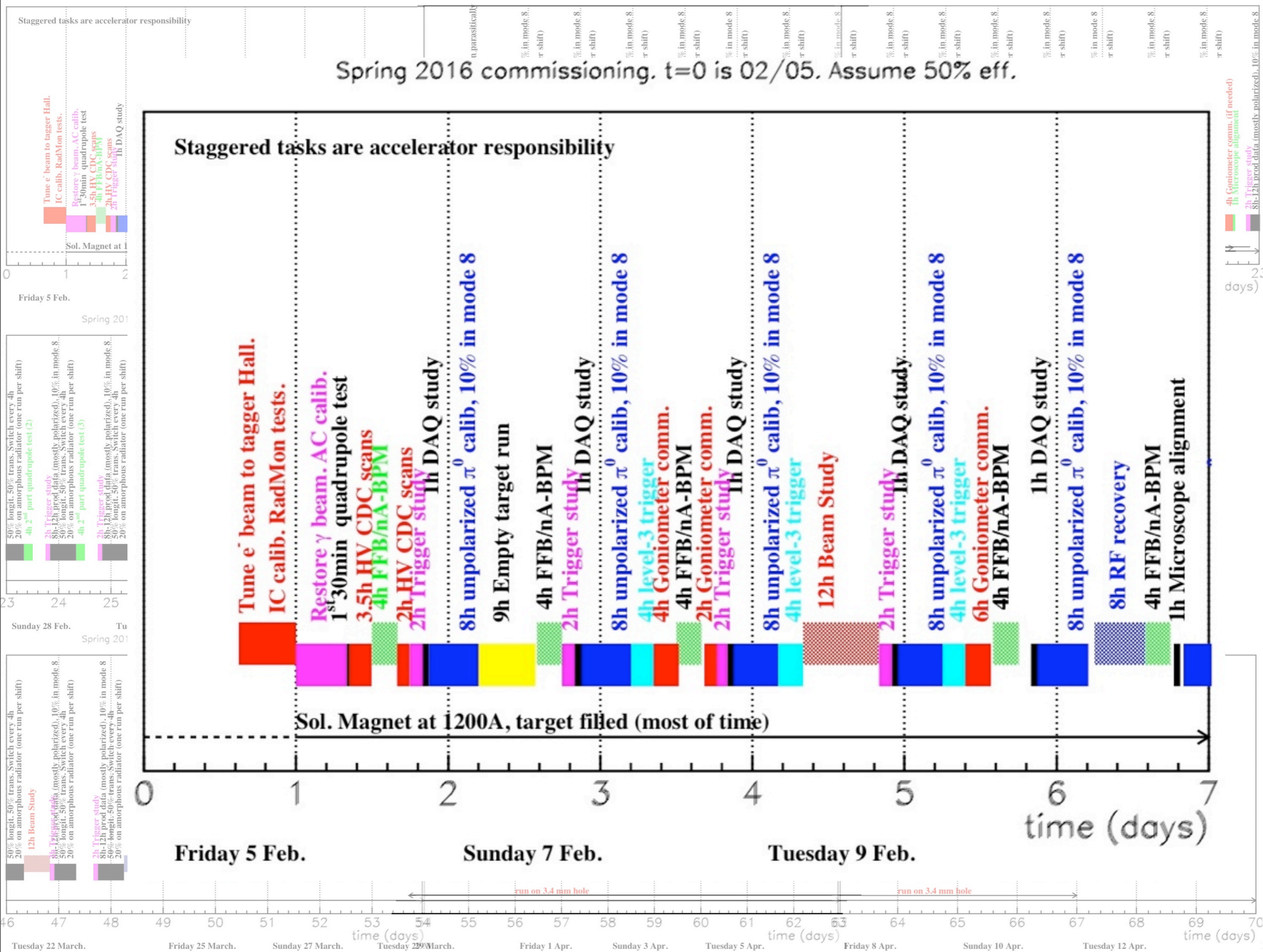


Run plan (week 1)

Spring 2016 commissioning. t=0 is 02/05. Assume 50% eff.

Spring 2016 commissioning. t=0 is 02/05. Assume 50% eff.

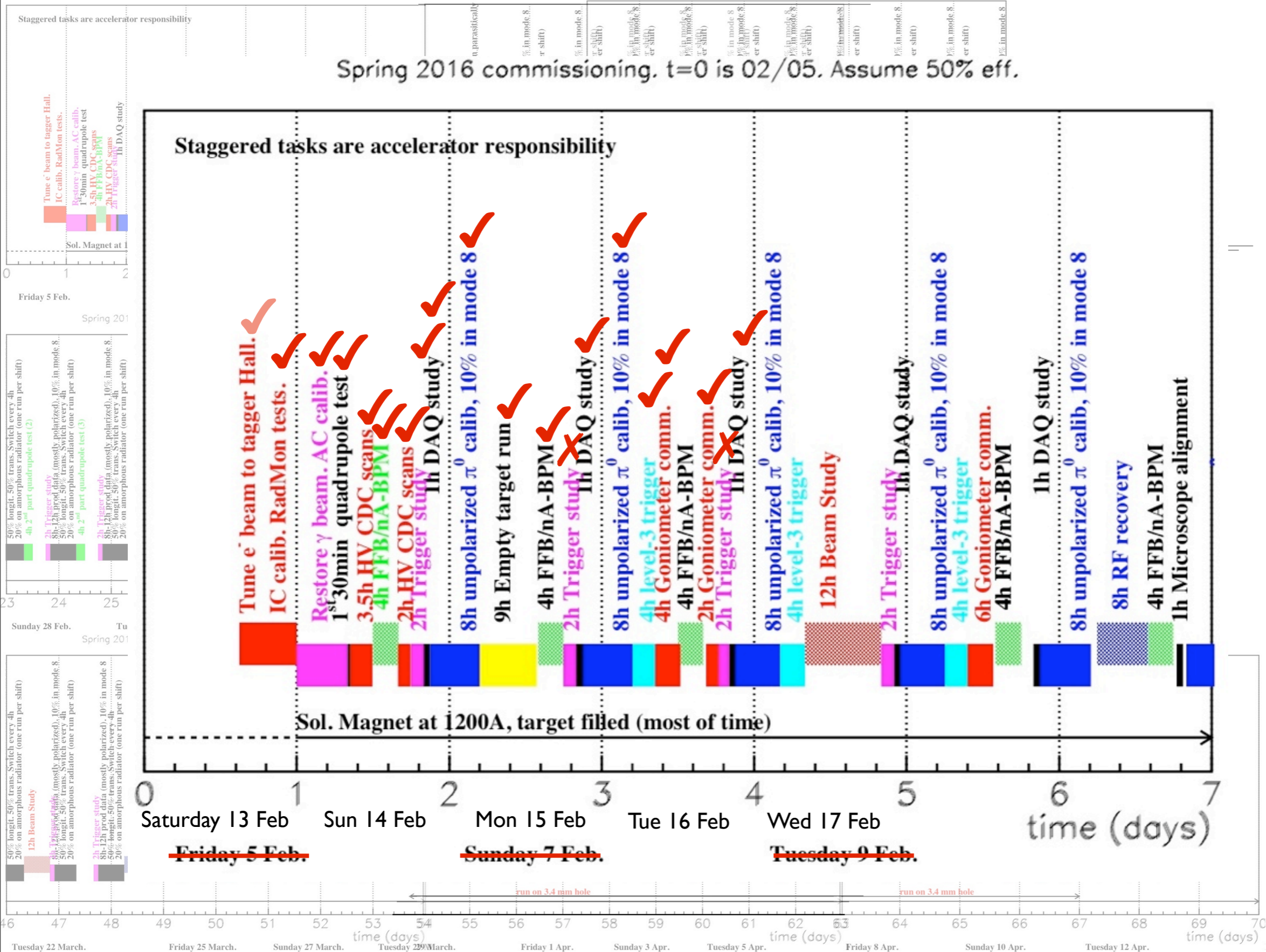
Spring 2016 commissioning. t=0 is 02/05. Assume 50% eff.



Run plan: progress as of Wed. Feb.17th 2016

Spring 2016 commissioning. t=0 is 02/05. Assume 50% eff.

Spring 2016 commissioning. t=0 is 02/05. Assume 50% eff.

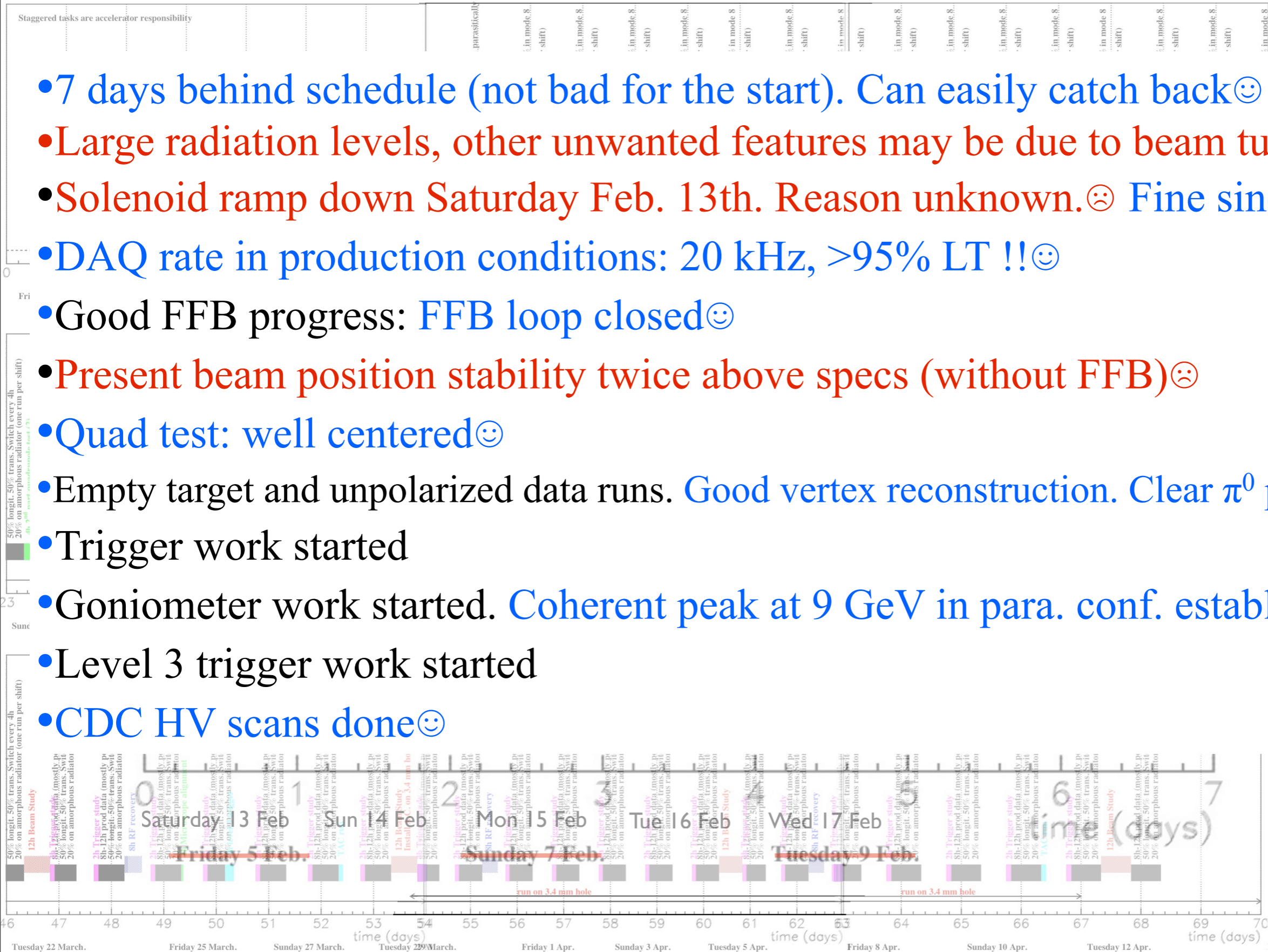


Run plan: progress as of Wed. Feb.17th 2016

Spring 2016 commissioning. t=0 is 02/05. Assume 50% eff.

Spring 2016 commissioning. t=0 is 02/05. Assume 50% eff.

Spring 2016 commissioning. t=0 is 02/05. Assume 50% eff.



- 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 😊
- Present beam position stability twice above specs (without FFB) 😞
- Quad test: well centered 😊
- Empty target and unpolarized data runs. Good vertex reconstruction. Clear π^0 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 😊