Fall 2016 run summary
and
Spring 2017 run plan

A. Deur
Jefferson Lab

Fall 16 run

- Operation was for physics running. Energy: 11.64 GeV (Lower than Fall15/Spring16: 12.05 GeV)
- Accelerator development (beam studies 8h/week): goals related Hall D:
  - Re-commission RF separator.
  - Test multi-hall operations.
  - Other small tests: Act. Col. fast calibration, fix energy determination code, ...

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  - Solenoid at 1200A. (Initial plan: 1350A but ramp-up problems forced us to use a safer value)
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- **Gather GlueX low luminosity polarized data with its necessary systematic data.**
- Check high rate trigger/DAQ/L3 performances and gather data to assess performance during GlueX high luminosity run.
- ToF/CDC HV scans.
- (Commission ComCal for PrimEx)

Schedule

Original timeline (11 weeks):

- Oct. 1st-8th: Electron beam restoration.
- Oct. 8th-Nov. 22nd: Hall D Fall run, part 1.
- Nov. 23rd-27th: Thanksgiving break.
- Nov. 28th-Dec. 18th: Hall D Fall run, part 2 (includes 2 day of beam restoration).
- Dec. 19th-21st: TBD.

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Actual timeline (6 days):

- Dec. 15th (11am) - 21st (4am)

Delays due to:

•Failure of power supply in CEBAF's arc 7: precluded 5- and 5.5-pass running: 2 months delay.

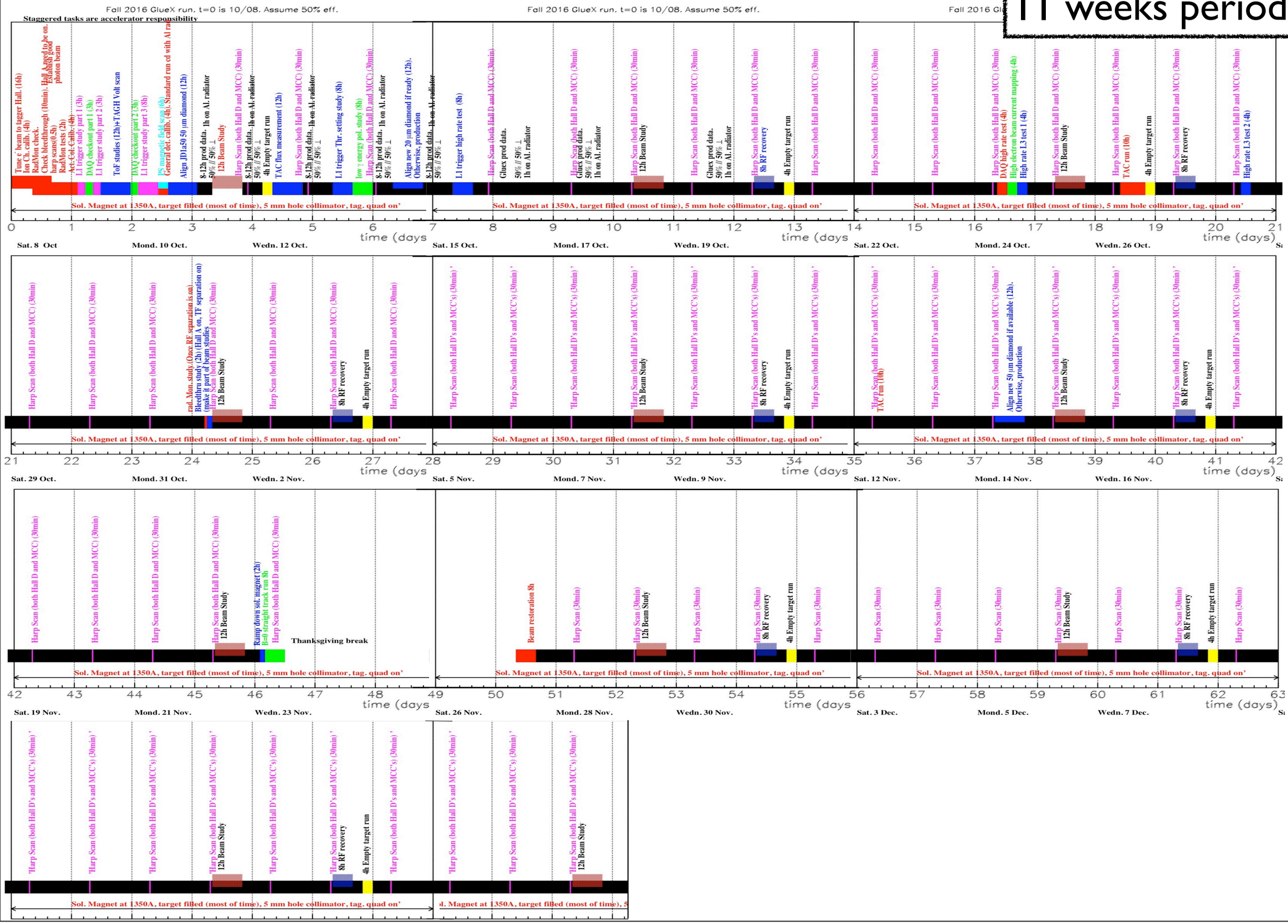
•Vacuum failure of RF-separator cavity + Hall A priority: 2 weeks delay.

Not a time loss for GlueX. (Physics programs go by PAC days)

Run plan: https://halldweb.jlab.org/wiki/index.php/Run_Coordination_Meetings:_Fall_2016_Run

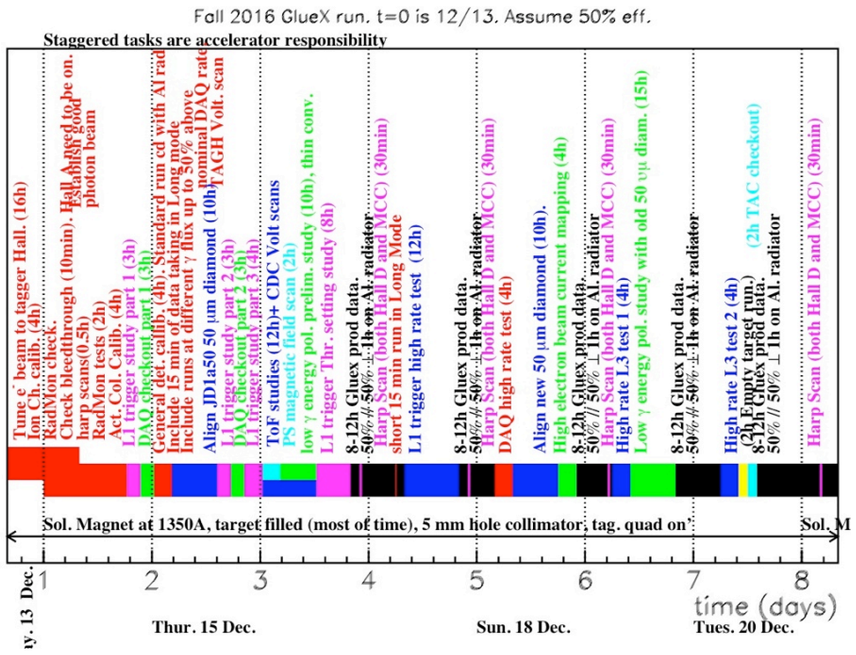
Original run plan

11 weeks period



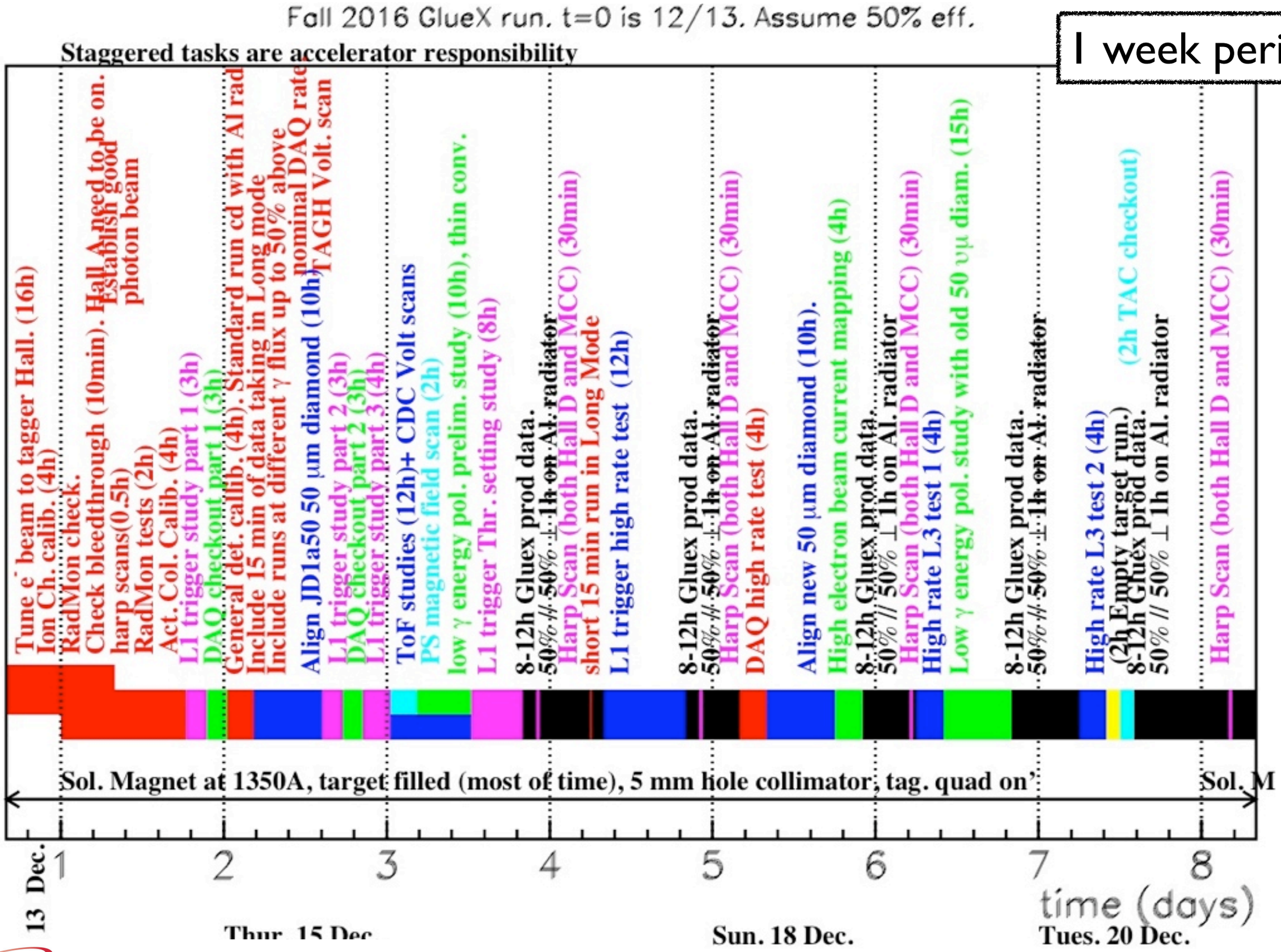
Thursday, February 16, 2017

Actual run plan

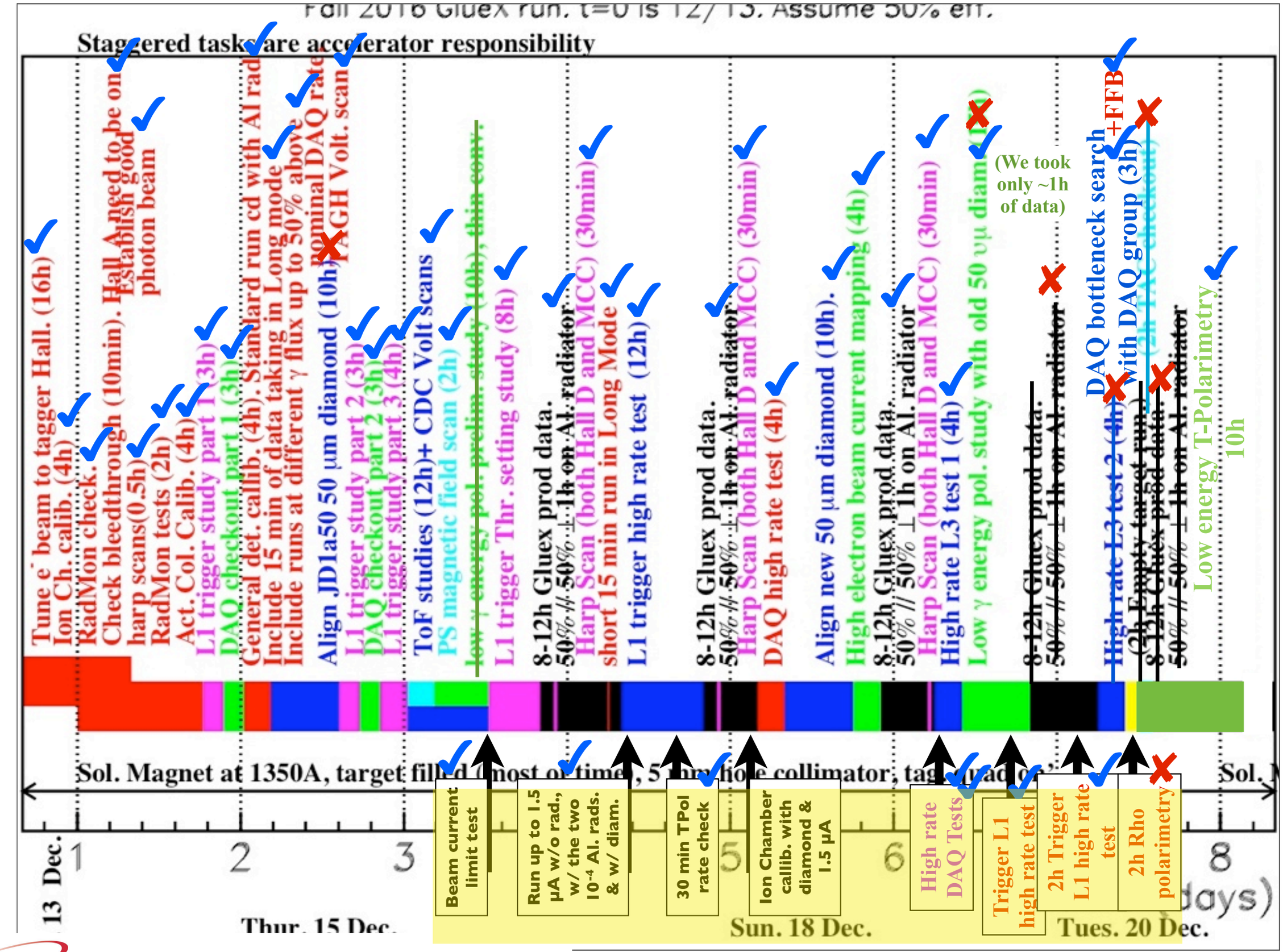


1 week period

Actual run plan



What was done



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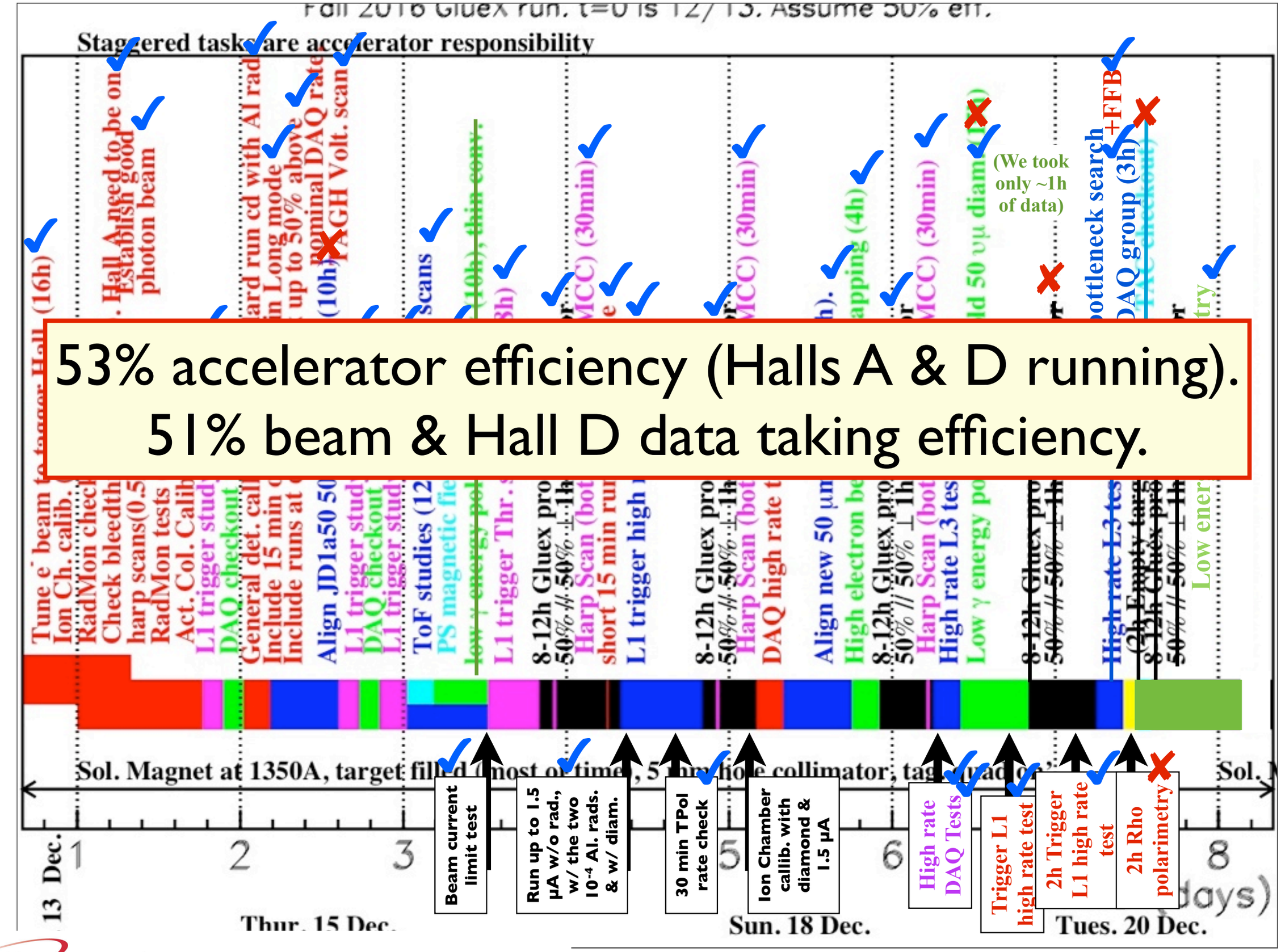

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Accelerator:

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- Other small tests: Act. Col. fast calibration ✘, energy determination code ✘
- Establish physics-quality beam ✘

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Hall D main goals:

- **Gather GlueX low luminosity polarized data with its necessary systematic data.** ✘
  - We did gather enough data for global detector checkout.
  - 2 nights of data taking in production mode. (No Al. radiator triggers, solenoid at 1200A.)

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- **Gather GlueX low luminosity polarized data with its necessary systematic data.** ✘
- Check high rate trigger/DAQ/L3 performances and gather data to assess performance during GlueX high luminosity run. ✓

  Lot of beamtime and work dedicated L1 trigger and DAQ.

  Results: expect to run production in **Spring 17 at 50-70 kHz**. (This is now confirmed). Spring 16 ran around 30 kHz.

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- Check high rate trigger/DAQ/L3 performances and gather data to assess performance during GlueX high luminosity run. ✓
- ToF/CDC HV scans. ✓
- (Commission ComCal for PrimEx) ✓

Also done:

- Aligned and used 58 μm diamond JD-70-100. ✓ Goniometer operated reliably. ✓
- Gathered reasonable statistics to study small polarization at low photon energy (with both rho and TPol). ✓
- Used new collimator vertical motion successfully. ✓

Para and perp differences

Rates:

Para, perp rate difference: ~5-10% rate difference. Much improved compared to Spring 16 (30%). Supports the hypothesis that we were missing part of the J1a50 diamond. (Goniometer motion fixed, larger diamond)

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Polarization at top of coherent peak

Rho analysis (Preliminary, A. Austregesilo):

Para: 32.7 ± 1.3%(stat); Perp: 32.0 ± 1.2%(stat)

TPol analysis (Preliminary, N. Sparks):

Para: 31.4 ± 4.7%(stat); Perp: 36.0 ± 4.8%(stat)

No para/perp polarization difference like in Spring 16 (~44 ± 1.5% para, 38 ± 1.5% perp).

Lower than the ~40% obtained in Spring 16 with 3 different diamonds.

Maybe due to special beam tune: focus on diamond rather than collimator ⇒ dilution of coherent beam core.
Supported by higher Spring 17 polarization.

Polarization at low energy

Preliminary numbers:

TPol: 3.5% +/-1.1%. (Para: 8.0 +/-1.1%, perp 0.3 +/-1.1%)
Rho: 3.5% +/-0.5%.

Agrees with the 5% seen in Spring 16 after normalizing to 40% polarization at the top of the coherent peak.

This will be discussed in beamline session tomorrow (R. Jones).

Problems

- Several trips of the solenoid power supply occurred while ramping it up. To be safe, the run was done at 1200A rather than at the planned 1350A. Solved for Spring 17 run.

- A bad FCal crate (crate 10) severely limited the DAQ performance for production. Solved for Spring 17 run.

- Could not quickly align old J1a50 diamond. (May have partly fallen from the holder.) Probably fixed for Spring 17 run.

- Beam tune was not adequate for production or polarimetry studies. Solved for Spring 17 run.

Conclusion

Fall 16 was not the expected start of production for Gluex, but it allowed us to start the Spring 17 run in excellent position.

Spring 17 run

- Operation is for physics running. Energy: 11.64 GeV (Same as Fall 16)
- Priorities:
  1. Hall B and C Key Performance Parameter.
  2. Establish that 5-pass RF separation works and is reliable. Important for Fall 17 run.
  3. GlueX. (Needed to reach goal #2)
  4. Hall C commissioning/Physics.
  5. Hall A physics when Hall C is down.

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- Hall D configuration:
  - Solenoid at 1350A. Repetition rate: 250 MHz (Fall 16: 500 MHz)
  - 50 μm diamonds (2 old: J1a50 + **J70-100** 1 new:J70-105), 1 backup 17 μm diamond (new JD70-104).
  - Tagger quadrupole on (negative polarity).
  - 5mm collimator hole (2-day test on 3.4mm with thin JD70-104).
  - LH2 target.

Schedule and organization

Timeline (7 weeks):

- Jan. 26th-29th: Electron beam restoration.
- Jan. 30th-Mar. 22nd: Hall D Spring run.

Run plan: https://halldweb.jlab.org/wiki/index.php/Run_Coordination_Meetings:_Spring_2017_Run

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Timeline (7 weeks):

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Run responsibilities:

Leadership: C. Meyer, M. Shepherd, E. Chudakov, E. Smith

Run Coordinators:

- Thur. Jan. 26 - Sun. Jan. 29 (4 days): A. Deur (accelerator restoration)
- Mon. Jan. 30 - Wed. Feb. 8 (10 days): A. Deur
- Wed. Feb. 8 - Wed. Feb. 15 (7 days): M. Dalton
- Wed. Feb. 15 - Wed. Feb. 22 (7 days): A. Ostrovidov
- Wed. Feb. 22 - Wed. Mar. 1 (7 days): W. Boeglin
- Wed. Mar. 1 - Wed. Mar. 8: (7 days): S. Dobbs
- Wed. Mar. 8 - Wed. Mar. 15: (7 days): R. Jones
- Wed. Mar. 15 - Wed. Mar. 22: (7 days): D. Lawrence

Physics Division Liaison: Benedikt Zihlmann.

Analysis Coordinator: Paul Mattione

Run coordination, subsystem status, data quality monitoring, offline analysis: discussed at daily RC meeting (usually 8:45am, counting house).
RC meeting minutes: https://halldweb.jlab.org/wiki/index.php/Run_Planning_Meeting_Notes,_Feb_9-Feb_15,_2017

Spring 17 runplan

1. Verify electron beam quality and establish photon beam.
2. DAQ, L1 trigger, detectors and beamline checkouts.
3. Realign 58 μm diamond (JD70-100). Later on, align new 17 μm diamond JD70-104.

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   - Harp scans (now once every 2 days).
   - Empty target run every week. Standard production current. (Doing one every week is being questioned).
   - Amorphous runs every day. Goal: gather 10-15% of total number of triggers with Al. radiator.
   - TAC runs. 2 TAC runs (one at the beginning, one in the middle of the run).
   - Physics production with diamond(s) and 5 mm collimator.
     - Balanced amount of $0^o/90^o/45^o/135^o$ data.
     - 2h runs and no more.
     - Switch polarization every run.
     - Started run with 58 μm diamond (JD70-100).
     - When new 17 μm diamond is aligned, do 2 days of production to assess its quality and decide what diamond should be used.
     - Luminosity: Initially, same as Spring 16 run (30 kHz). Test at 50 kHz or higher. If offline analysis indicates that the data are good, run at higher luminosity.

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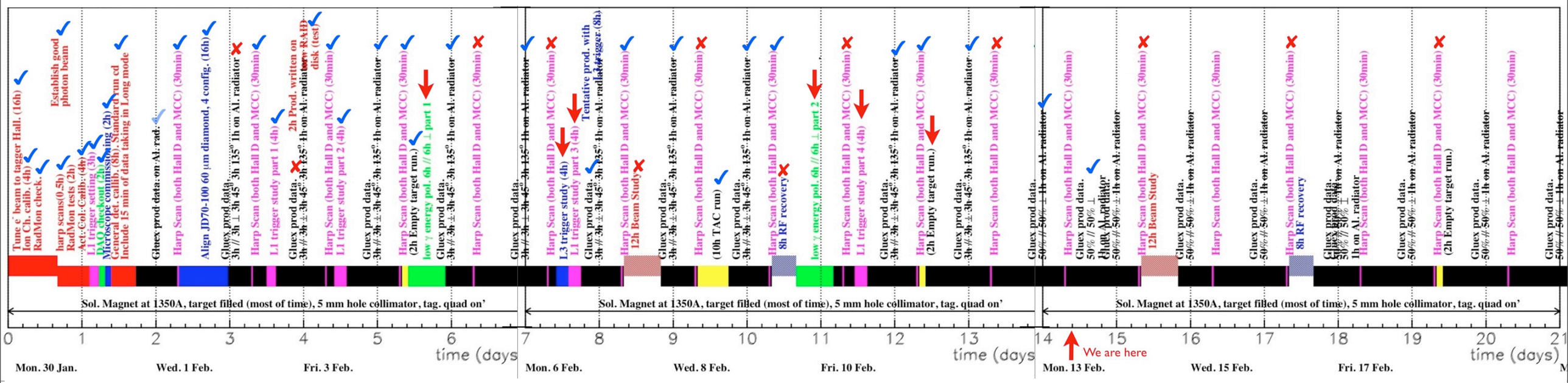
5. DAQ, L1 and L3 trigger tests for high-rate performance tests.
6. Low photon energy polarization measurement (on hold until more studies by R. Jones are done).
7. Straight track run (16h, nominally at the end of the run).
8. Parasitic TRD/ComCal tests.

Run plan time chart

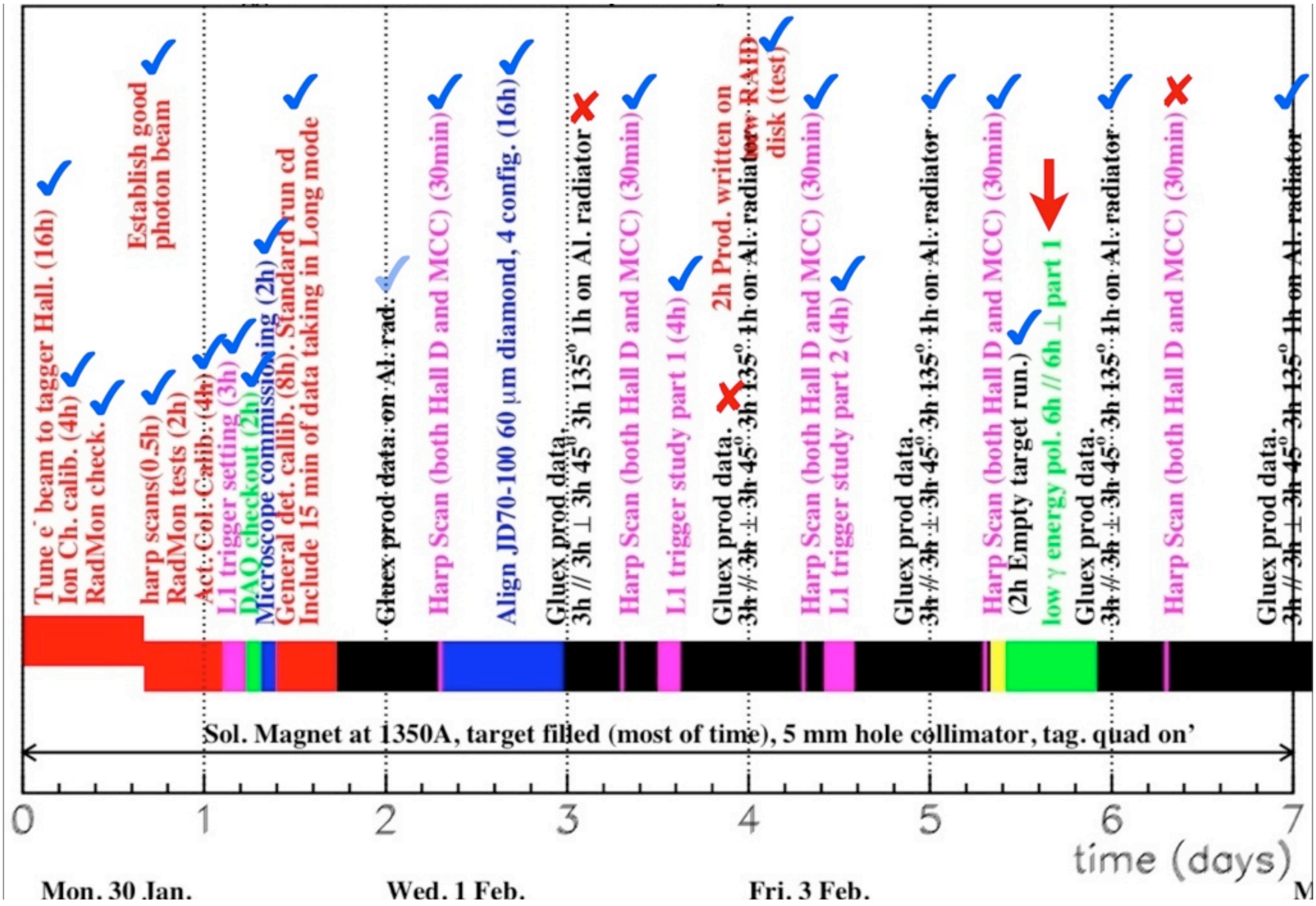
7 weeks period

A. Deur. GlueX collaboration meeting. 02/16/2017

What has been done so far (as of 02/14/17)



e.g. first week



Progress charts updated daily:

https://halldweb.jlab.org/wiki/index.php/Run_Coordination_Meetings:_Spring_2017_Run#Runplan_time_charts

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  - beam scraping upstream and downstream of the radiator.
  - T. Satogata developed automatic procedure to improve focusing.
    - Applied successfully. Beam seems now well focused on collimator (diagnostic is difficult, see H. Egiyan talk on Friday.)
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- One TAC run done (for "free").

Incidents

Accelerator

- Several Central Helium Liquefier trips (6 so far).
- Several ARC power supply problems (breaker, cooling).

Hall D

- Accidental trip of Solenoid (human mistake during maintenance work in Hall D refrigirator building).

⇒Opportunistic TAC run. (Only 2h of beam time loss instead of 10h)

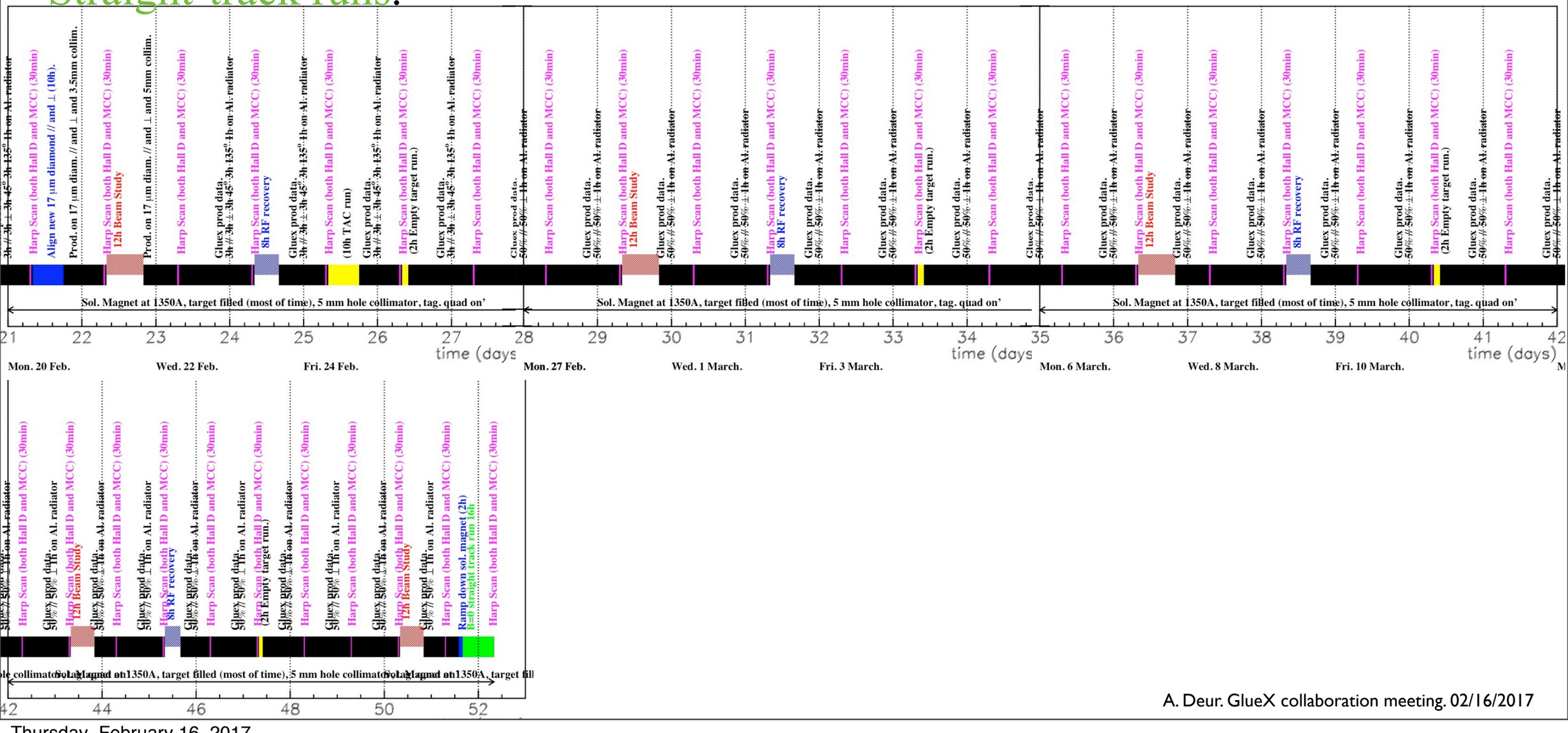
- Target IOC crashes (seemed to now be solved by running program in different computer).
- Frequent DAQ crashes (every few hours).

What remains to be done

A. Deur. GlueX collaboration meeting. 02/16/2017

What remains to be done

- Production, probably at larger rate (~50kHz).
- Levels 1 and 3 triggers tests to prepare for future high luminosity runs.
- Empty target runs (weekly, although this is being discussed).
- TAC run(s),
- Measurement of polarization at low photon energy (?).
- ~2 days of data taken with the new 17 μm diamond and 3.4mm collimator.
- Straight-track runs.



What remains to be done

- Production, probably at larger rate (~50kHz).
- Levels 1 and 3 triggers tests to prepare for future high luminosity runs.
- Empty target runs (weekly, although this is being discussed).
- TAC run(s),
- Measurement of polarization at low photon energy (?).
- ~2 days of data taken with the new 17 μm diamond and 3.4mm collimator.
- Straight-track runs.

Concurrent run with Hall A or C:

- Hall C:
  - KPP (3-pass): Starts ~March 7th. (?)
  - SHMS commissioning: 1-pass
  - (Start physics program: 5-pass, until end of spring run.)

- Hall A:
  - Starting now. Will finish when Hall C starts.
  - Physics (Argon experiment using target designed for ^{3}H): 1-pass.

Summary

Fall 16:

- Start of production for Gluex.
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- Start of production for Gluex.
- Multi-hall operation difficult.
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- Allowed us to prepare well for Spring 17.

Spring 17:

- **Start of production for Gluex**.
- Very good start of run: Most of the specific tasks are done. Large amount of data already taken, 5.8×10^9 triggers (comparable to analysis-worthy triggers from Spring 16, but with lower polarization).
- No major problem so far (accelerator or Hall D).
- 5-pass separator commissioned (1 beam) and worked (1 week).
- Excellent Multi-hall operation (B+D) so far.