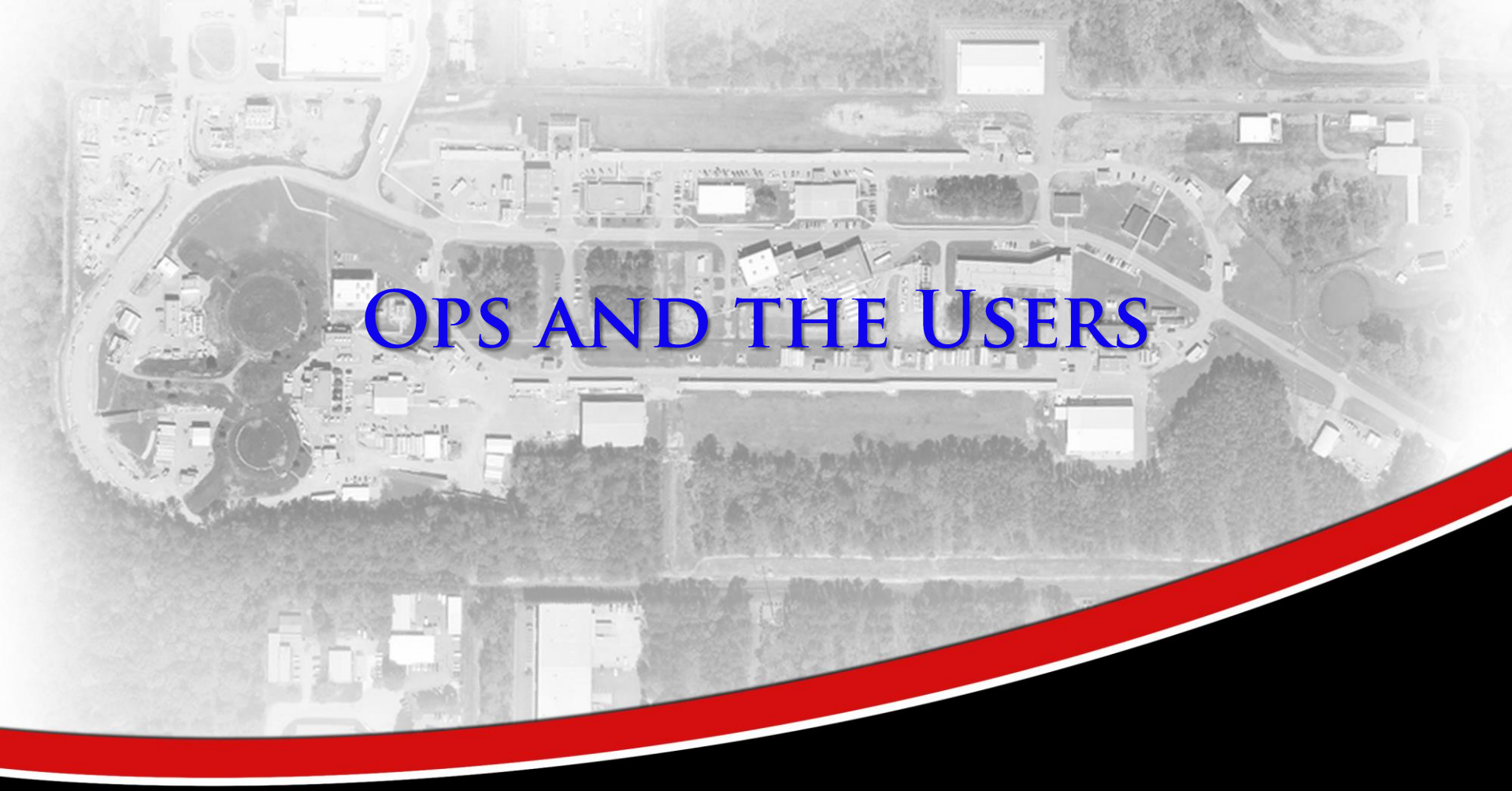


Ops and the Users

Mike McCaughan

Ops Staytreat, 07/16/15

Thomas Jefferson National Accelerator Facility is managed by
Jefferson Science Associates, LLC, for the U.S. Department of Energy's Office of Science

Jefferson Lab

Customer Service

Baseline Control Room staffing: Crew Chief, Operator 1 (ARM), & Operator 2 (SSO)

Sample problem:

Executing a procedure – ex. Polarization measurement (Moller measurement setup, Compton tuning, etc.)

-Something goes wrong

-Halls notified if problem is expected to take longer than 10 minutes.

-Troubleshooting occurs: One hall may require access while the other is operating…

Late Owl to early Swing shift scenario: (6 a.m.-6 p.m.)

Control Room Staff + PD/Scientists/Engineers/etc. wandering through…

Pros:

- **Radcon available to support accesses too.**
- **EES/CASA/Support staff available to handle many problems; takes pressure off operations.**
- **Many eyes frequently lead to better solutions.**

Cons:

- **Problems may escalate too quickly depending on who is around; this may lead to Zebras. [When you hear hoof beats…] Important to allow ops to eliminate common failure mechanisms before proceeding further afield. It can be easy to get into a mode where these may not be checked as usually they have already been exhausted before assistance is called for.**
- **Extra people may make the control room chaotic resulting in disrupted focusing [Crew chief may eject people from control room if things become too onerous; this option is not frequently exercised].**
- **Hand poison: "This shouldn't affect operations…" [Unintended consequences * Statistics]**

Example:

Lots of staff around, thus communicating, & thus MANY phone calls to the control room. It is not uncommon for one operator to be on the phone nearly the entire shift answering questions/solving problems while the other busily plays SSO to a number of end stations, potentially leaving the crew chief in a position where they may need to monitor the machine in addition to the actions of their Operators.

Divided focus + diminished backup may lead to simple/frustrating mistakes…

Early Swing to late Owl shift scenario: (6 p.m. - 6 a.m.)

Staffing: Just us and the flies on the wall…

Pros

- **Much quieter/easier to focus**
- **Less hand poison – less chance for accidental equipment mishaps when most staff is off site.**

Cons

- **Some staff can become fatigued, particularly on first night or two of a seven day rotation when changing your sleep pattern. On the off weeks Ops must rotate back to day shift for group meetings/projects, or be assigned to any of the shifts for necessary coverage. This can be exasperated by responsibilities/commitments not related to work (school, family, etc.)**

Pro & Con: Less support staff are around; Ops troubleshoots before/while calling in support (which may take a significant amount of time depending on person, where they live…). Long term this build stronger Operations staff.

Example:

- **Problem requires intervention from system expert: Call in + diagnosis/may require Operator for LOTO**
- **First Hall wants access: Arm dispatched if not working on repair, SSO support as Operator or Crew Chief (if operator is executing a procedure for another hall), potentially no one trouble shooting problem… problem compounds quickly with additional accesses.**

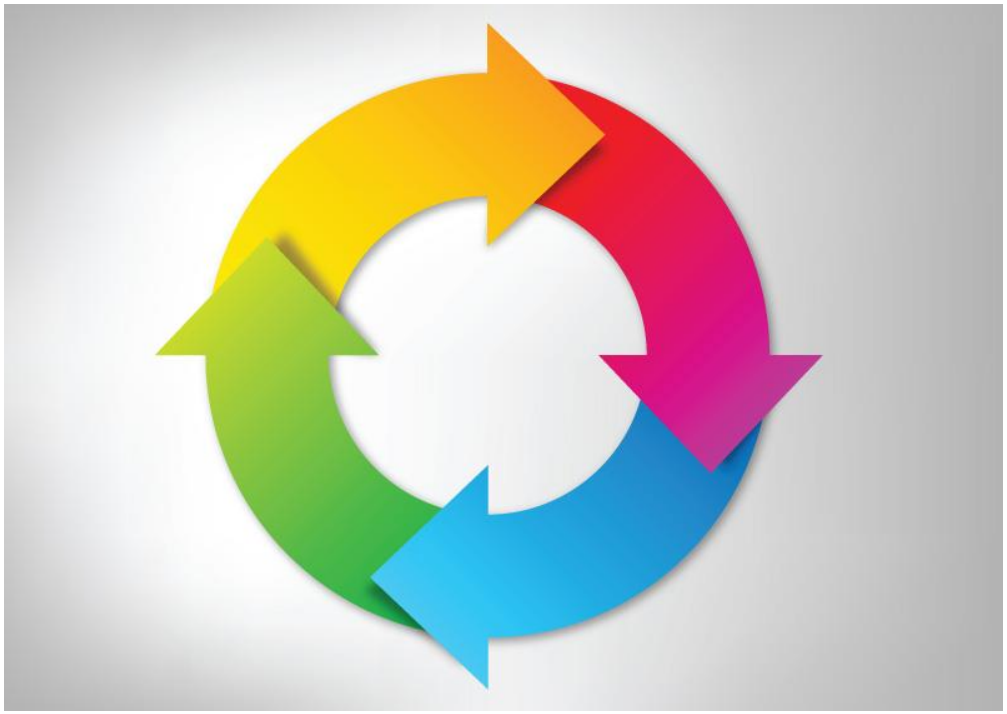
The liaison program

Help us help you…

Liaison Program

Ops Liaison

Geographic Integrator



Physics Liaison

APEL
(Accelerator Physics Experimental Liaison)

Geographic Integrator (AOD 4.1.2):

Geographic Integrators serve as owners of discreet geographic areas of the accelerator site. The Engineering Liaison serves as the primary communication point for all Geographic Integrators.

Responsibilities:

- Be knowledgeable about systems within the geographic area
- Facilitate integration of activities within the geographic area.
- Work with system owners/experts to ensure consistency between CED, song sheets, & installed hardware.
- Facilitate interaction, communication, and cooperation between groups working on tasks that have shared components, systems, and resources.
- Track work progress leading up to and through the hot checkout (HCO) process.
- Identify potential problems affecting performance or schedule and communicate such problems to Operations management and the Engineering Liaison.
- Identify projects that will improve accelerator system function, maintainability, reliability, or safety and communicate these possibilities to the Engineering Liaison and Operations management.

Meetings:

1. Attend 8:00 meeting during operation/HCO & facilitate diagnosis & repair of identified problems.
2. Present status update for the area at the Weekly Summary Meeting (Wed. 1:30 pm).
3. Attend B-Team Meetings as requested and report any limitations within the geographic area that will affect the physics program. Evaluate/facilitate new B-Team initiatives in the area.
4. Lead focus meetings to address any potential or existing issues.

Ops Liaison (AOD 3.1.1.9) :

Each experimental end station has an Operator/Crew Chief assigned as an Operations Liaison.

Responsibilities:

- Facilitate information exchange between Operations and the experimenters both during and in advance of experiments.
- Help identify unique concerns/operating requirements relative to normal operating requirements as well as any potential problems associated with an experiment before they occur and educate both the experimenter and fellow operators.
- Collect and maintain binder documentation To simplify the information exchange process [standard forms have been developed as tools containing Operational Conditions, ES&H information, etc.]
- Ensure all Operators/Crew Chiefs familiarize themselves with binder information before the start of an experiment

Accel-Physics Experiment Liaison (APEL) (AOD 1.3.3):

An accelerator scientist who is appointed to serve as a liaison for all experiments in a specific experiment end station. The Director of Accelerator Operations appoints all APELs.

Responsibilities:

- Collaborate with the user group for each experiment. This includes regularly attending collaboration meetings and proactively advancing known beam transport and beam quality issues.
- Develop and own the beam transport lattice for the hall line and integrate this with all standard operations tools.
- Work with the Operations Hall Liaison to develop control room procedures and operator training.
- Work with the Geographic Integrator for the hall to ensure that the hardware design and installation meets the experiment requirements.
- Participate in experiment commissioning activities.

Points of Contact:

Experimental Facility	Ops Liaison	APEL	Geographic Integrator	Physics Liaison
Hall A	Eric Forman	Yves Roblin	Omar Garza	Doug Higinbotham
Hall B	Brandi Cade	Michael Tiefenback	Chris Gould	Stepan Stepanyan
Hall C	Daniel Moser	Jay Benesch	Ernest Stallworth	Dave Gaskell
Hall D	Michael McCaughan	Todd Satogata	Trent Allison	Alexandre Deur
LERF	Shawn Frierson	David Douglas	Jim Coleman	Steve Benson

Administrative Issues

Procedures and Restrictions…

Operational Restrictions & Updates

- Modifiable by Hall leaders or their designees
- Communicates administrative restrictions & special instructions for the use of devices
- Some (but not all) of the administrative restrictions are also backed up by engineered solutions
- Required for any device which may be exposed to the beam.
- If a device, including a target, is not listed in the operational restrictions the crew chief reserves the right to withhold beam on the basis of a lack of appropriately verified engineering information to safeguard both the device and the neighboring beam line.

Authorized Users and their Areas

Name
Admin
Brian Freeman
All
Arne Freyberger
Hari Areti
Paul Vasilauskis
Hall_A
Doug Higinbotham
Robert Michaels
Hall_B
Volker Burkert
Hall_C
Greg Smith
Steve Wood
Hall_D
Curtis Meyer
Eugene Chudakov

opsweb.acc.jlab.org/internal/ops/ops_webpage/restrictions/ops_restrictions.html

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Accelerator | Hall A | Hall B | Hall C | Hall D | Add, Modify, Remove Restrictions

Accelerator Operational Limits (changes made in the past 2 weeks are highlighted in yellow)

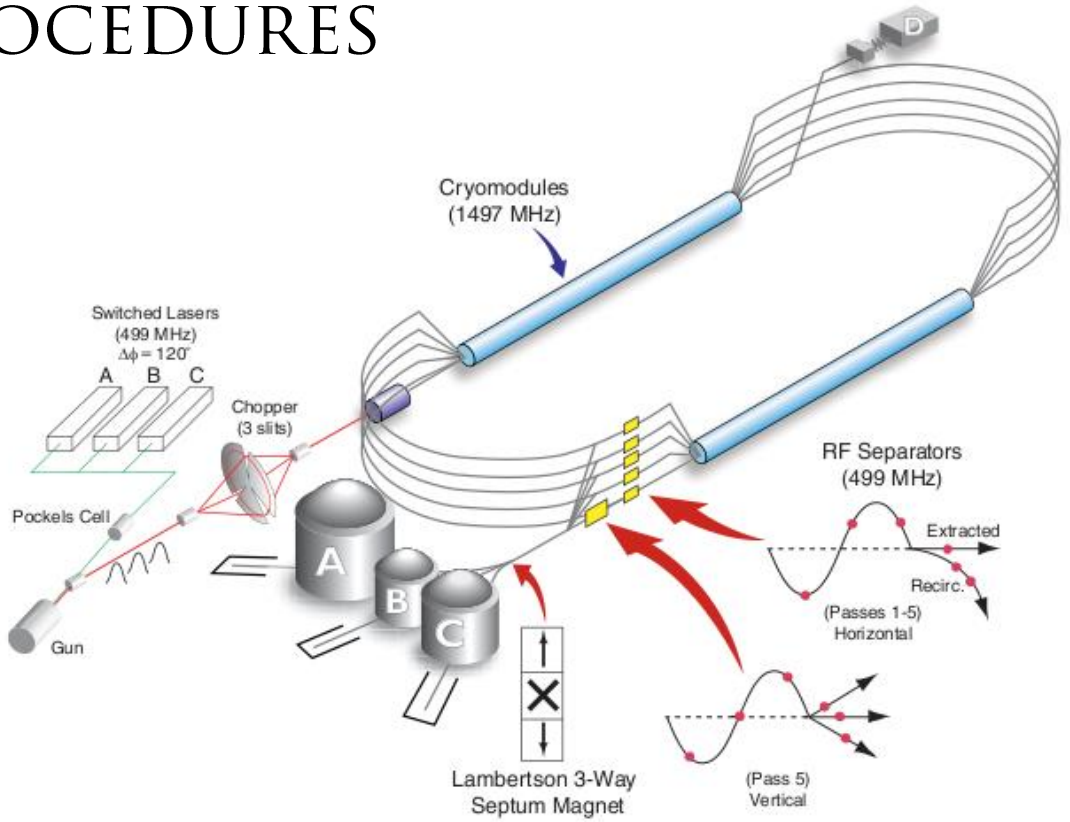
Item	Max. CW Current	Max. CW Power	Raster ON above	Min. Raster Size	Comments
Beamline					
Accelerator Harps	40uA	N/A	N/A	N/A	Operations Department Head approval is required for modifying any machine protection setpoints in the event that harp scans cause beam interuption.
Dump					
0L07 Spectrometer	I=P/V	17kW	n/a	n/a	Current limit is determined from P=IV (17000 W) ~= (165 uA)*(102.56 MV) (Device name is IDL4D00)
100/500 keV Spectrometer Dump	2mA	1kW	n/a	n/a	Current limit determined from P=IV and assumes a maximum nominal energy of 500 keV.
Beam Switchyard Dump	I=P/V	100kW	Always ON	Per Proceedure	Raster must be on for all CW beam delivery and amplitude set per procedure. Limited to 6.5 GeV due to dipole and raster saturation.
Faraday Cup One (130 keV)	1mA	100W	N/A	N/A	Current limit determined from P=IV and assumes the nominal energy of 130 keV.
Faraday Cup Two (~6MeV)	I=P/V	1kW	N/A	N/A	Current limit determined from P=IV. (e.g. 158 uA @ 6.3 MeV)
IDL2D00 Spectrometer Dump (~6MeV)	200uA	1kW	n/a	n/a	Current limit is determined from P=IV and assumes the nominal energy of ~6 MeV.
IDL5D01	10uA	100W	N/A	N/A	Max beam total energy <10MeV.
IFY5D01	10uA	100W	N/A	N/A	Max beam energy <10MeV. Limits identical to IDL5D01 for consistency in the 5D line.
Inline Dump	I=P/V	17kW	n/a	n/a	Current limit is determined from P=IV (17000 W) ~= (165 uA)*(102.56 MV)
Insertable Dumps (Dumplets)	I=P/V	2kW	n/a	n/a	Tune beam only.
Mott Polarimeter Dump	I=P/V	34W	n/a	n/a	No water flow, air cooling only.
Mott Polarimeter Dump	I=P/V	1000W	N/A	N/A	Normal water flow present
Polarized Source Faraday Cup (130 keV)	1mA	100W	N/A	N/A	Current limit determined from P=IV and assumes the nominal energy of 130 keV.

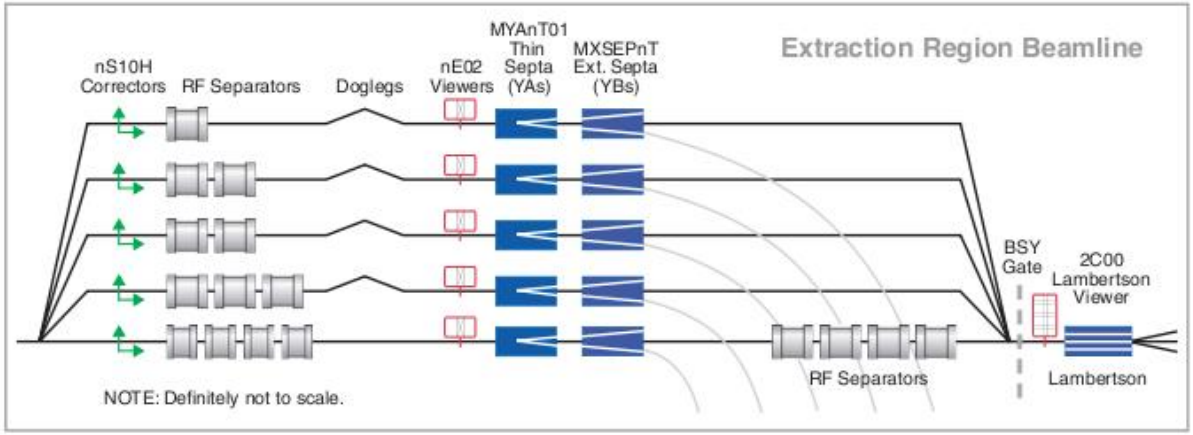
Procedures

Maintaining up to date procedures is essential for the operation of the accelerator.

Many MANY changes made to systems during 12 GeV upgrade.

Further time is required with the existing man power to write new training material, update all of the old procedures, and identify & write new procedures… please bear with us as the process continues. We are still commissioning the 12 GeV machine…





Overview of RF Separation Components and Extraction Region Beamline Layout

Procedures, Controls, & new installation

The availability/functionality of newly installed devices is subject to the availability of time and resources from all of the parties involved.

- Device is designed and fabricated subject to some set of performance measures.
- Device is prepared for installation/installed.
- Device requires low-level software support to actuate/operate it (drivers, etc.).
- Device requires high-level software support to interact with other pieces of software.
- Device needs to pass through the hot checkout process and have the system owner sign off on its operation.
- Device is available for use by Ops, but lacks training/documentation.
- Documentation / Training may exist, but has not yet provided to a particular rotation. [e.g. Opposite side owl shift if device installed on a Thurs.]

Integration takes time…

Setting up Beam

(1st Beam at AD00 (e3285622))

Beam Studies/Machine setup

A variety of beam studies should be expected as part of ongoing 12 GeV commissioning:

- Separator commissioning
- Energy/Gradient push post Helium processing.
- Testing of software applications to make future setup easier (Auto-steer, Auto-quad, Phaser,…)

Operations will attempt to make this process as transparent as possible to the users, with the understanding that many of these issues must be addressed in order to exercise the full capabilities of the accelerator.

*

*xkcd.com

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Beam Studies/Machine setup

Dedicated time should be allotted to the accelerator (vis-à-vis the Liaisons/Integrator) working in concert with hall personnel to establish a solid base line setup once beam has reached the end station.

Expending shifts up front saves experimental time attempting to optimize detectors to sub-optimal beam. (Improper aspect ratio, dispersion, energy spread, etc.)

Analogously, time should expended at the start of a run to set up the entire accelerator. Setting up to the first extracted hall may result in a setup which needs to be modified later for other experiments

*Dexter's Laboratory

Beam Studies/Machine setup

Analogously, time should expected to be used at the start of a run to set up the entire accelerator. Setting up to the first extracted hall may result in a setup which needs to be changed later to accommodate other experiments, thus resulting in wasted time optimizing to a new setup.

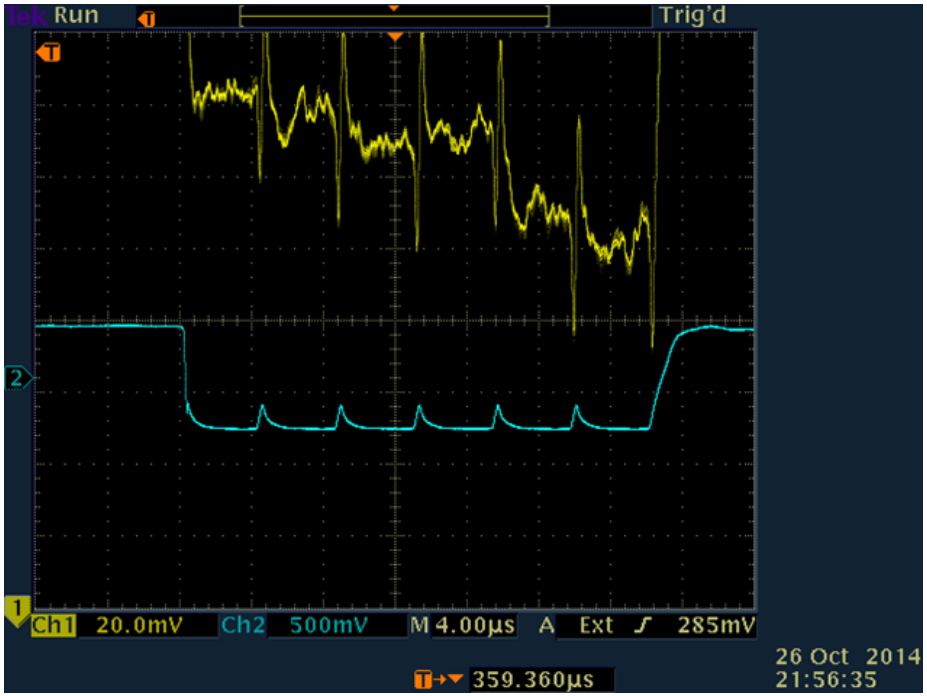
Example: Corner steering

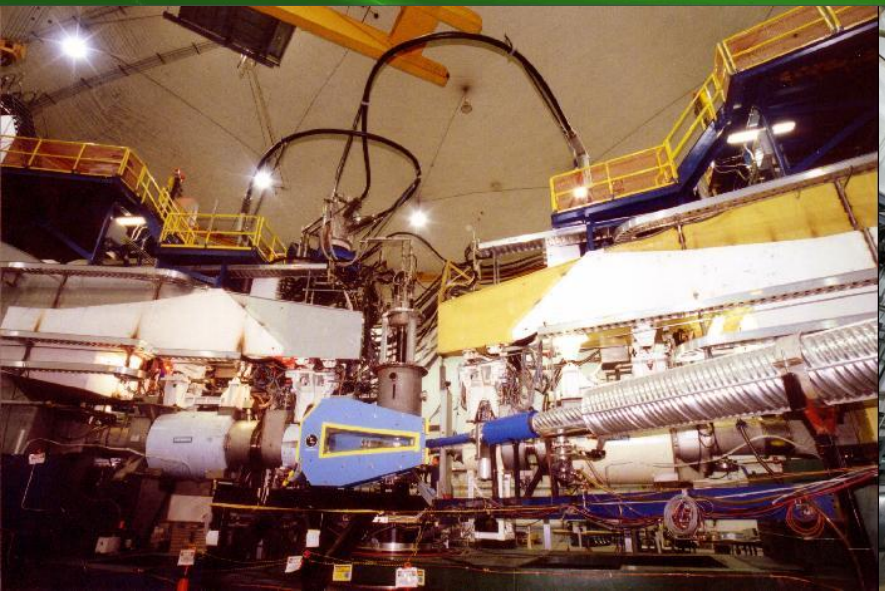
Possibly affects:

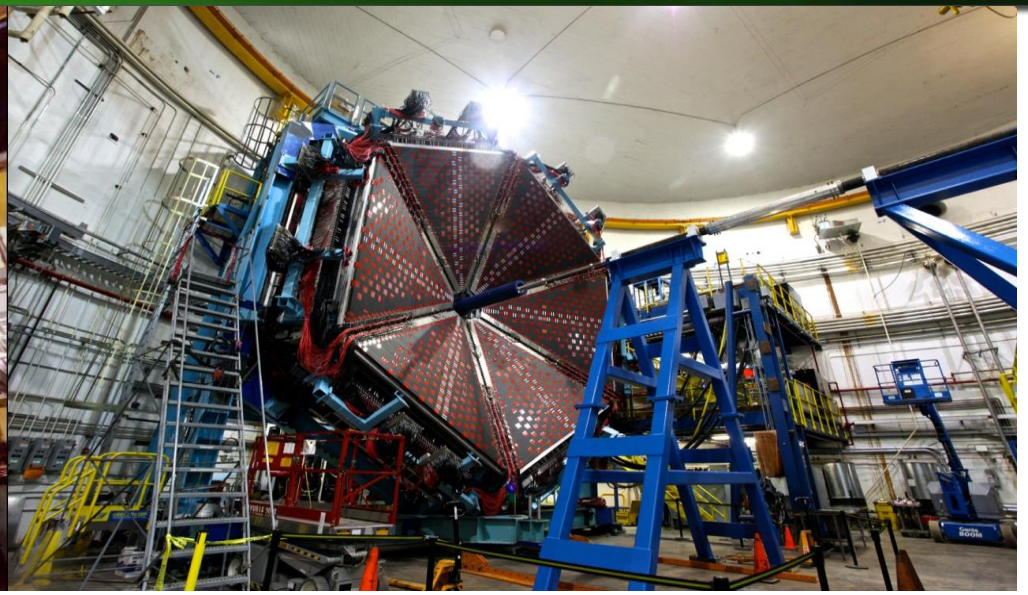
- Path length
- Phase precession

Mitigation:

- Re-matching
- Polarimetry
- Spin dance







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