

Machine Update

NSLS-II Town Meeting

Emil Zitvogel

Friday February 13, 2015

Topics

- Schedule
- Machine Status Display
- Storage Ring Performance
- Winter Shutdown Highlights
- May Shutdown Plans
- Top-Off Safety System
- Closing Remarks

Accessing the Schedule On-Line

The screenshot shows the Brookhaven National Synchrotron Light Source II website. The browser address bar displays www.bnl.gov/ps/. The website header includes the Brookhaven National Laboratory logo, the text "National Synchrotron Light Source II", and the U.S. Department of Energy logo. A navigation menu at the top includes links for Home, About, For Users & Staff, For Industry, Beamlines, Research, News & Publications, People, and Intranet. The "For Users & Staff" menu is open, showing a list of links: PASS, User Guide, Proposal Cycle, Operating Schedule (highlighted with a red circle), General Executive Order, User Administration Office, Environment, Safety & Health, and Training. Below the navigation menu is a large image of the NSLS-II facility with three orange buttons: Machine Status, Operating Schedule, and User Guide. A text box below the image states: "The next NSLS-II General User and Partner User proposal submission deadline is June 1, 2015." and includes a link to "Proposal Submission Details". A note for NSLS users states: "The original National Synchrotron Light Source has permanently ceased operations. All future synchrotron studies at Brookhaven National Lab will be carried out at NSLS-II. [Transition information](#)". The page is divided into three main sections: "Become a Facility User" (with a link to "Apply for Beamtime"), "Beamline Projects" (with a link to "Beamlines Overview"), and "Announcements" (showing "No announcements at this time."). The "Seminars" section shows a "Full Calendar" button and a listing for "NSLS-II Town Meeting" on Friday, May 13, at 1 pm in Building 703, Large Conference Room. The "Conferences & Workshops" section shows an "Archive" button and a listing for "2015 NSI S-II & CFN Init Users".

Accessing the Schedule On-Line

NSLS-II Operating Schedule for FY2015

		O	S	M	I	C	BC	D
FY2015 Total Hours	8760	2112	1558	460	256	0	1790	2584
FY2015 Total Days	365	88	64.9	19.2	10.7	0	74.6	108

Operation Status Legend

O Accelerator Operations	BC Beamline Commissioning	D Shutdown
S Studies	I Interlock Certification	LH Lab Holiday
M Maintenance	C Machine Commissioning	N Monday

FY15 Shutdown Periods

- Dec 22, 2014 – Jan 20, 2015
- Apr 27, 2015 – June 1, 2015
- Aug 17, 2015 – Sept 28, 2015

[Download Schedule \(PDF\)](#)

Run 14-3 (Calendar Year-Cycle)

October							November							December							January						
Day	0-4	4-8	8-12	12-16	16-20	20-24	Day	0-4	4-8	8-12	12-16	16-20	20-24	Day	0-4	4-8	8-12	12-16	16-20	20-24	Day	0-4	4-8	8-12	12-16	16-20	20-24
1	I	I	I	I	I	I	1	BC	BC	BC	BC	BC	BC	1	BC	BC	BC	BC	BC	BC	1	D	D	D	D	D	D
2	I	I	I	I	I	I	2	BC	BC	BC	BC	BC	BC	2	BC	BC	BC	BC	BC	S	2	D	D	D	D	D	D
3	I	I	I	I	I	BC	3	BC	BC	BC	BC	BC	BC	3	S	S	M	M	M	M	3	D	D	D	D	D	D
4	BC	BC	I	I	BC	BC	4	BC	BC	BC	BC	BC	BC	4	M	M	M	M	M	M	4	D	D	D	D	D	D
5	BC	BC	I	I	BC	BC	5	BC	BC	S	S	BC	BC	5	M	M	M	M	M	M	5	D	D	D	D	D	D
6	BC	BC	I	I	BC	BC	6	BC	BC	BC	BC	BC	BC	6	M	M	M	M	M	M	6	D	D	D	D	D	D
7	BC	BC	I	I	BC	BC	7	BC	BC	BC	BC	BC	BC	7	M	M	S	S	S	S	7	D	D	D	D	D	D
8	BC	BC	BC	BC	BC	BC	8	BC	BC	BC	BC	BC	BC	8	S	S	BC	BC	BC	BC	8	D	D	D	D	D	D
9	BC	BC	M	M	M	M	9	BC	BC	BC	BC	BC	BC	9	BC	BC	BC	BC	BC	BC	9	D	D	D	D	D	D
10	M	M	I	I	BC	BC	10	BC	BC	BC	BC	BC	BC	10	S	S	M	M	M	M	10	D	D	D	D	D	D
11	BC	BC	BC	BC	BC	BC	11	BC	BC	BC	BC	BC	BC	11	M	M	M	M	S	S	11	D	D	D	D	D	D
12	BC	BC	BC	BC	BC	BC	12	BC	BC	BC	BC	BC	BC	12	S	S	BC	BC	BC	BC	12	D	D	D	D	D	D
13	BC	BC	I	I	BC	BC	13	BC	BC	M	M	BC	BC	13	S	S	BC	BC	BC	BC	13	D	D	D	D	D	D
14	BC	BC	I	I	BC	BC	14	BC	BC	BC	BC	BC	BC	14	S	S	BC	BC	BC	BC	14	D	D	D	D	D	D



Run 15-1

Run 15-1 (Calendar Year Cycle)																											
February							March							April							May						
Day	Half Shifts						Day	Half Shifts						Day	Half Shifts						Day	Half Shifts					
	0-4	4-8	8-12	12-16	16-20	20-24		0-4	4-8	8-12	12-16	16-20	20-24		0-4	4-8	8-12	12-16	16-20	20-24		0-4	4-8	8-12	12-16	16-20	20-24
1	BC	BC	BC	BC	BC	BC	1	O	O	O	O	O	O	1	S	S	S	S	O	O	1	D	D	D	D	D	D
2	BC	BC	BC	BC	BC	BC	2	O	O	O	O	O	O	2	O	O	O	O	O	O	2	D	D	D	D	D	D
3	BC	BC/M	M	M	M/S	S	3	O	O/M	M	M	M/S	S	3	O	O	O	O	O	O	3	D	D	D	D	D	D
4	S	S	S	S	BC	BC	4	S	S	S	S	O	O	4	O	O	O	O	O	O	4	D	D	D	D	D	D
5	BC	BC	BC	BC	BC	BC	5	O	O	O	O	O	O	5	O	O	O	O	O	O	5	D	D	D	D	D	D
6	BC	BC	BC	BC	BC	BC	6	O	O	O	O	O	O	6	O	O	O	O	O	O	6	D	D	D	D	D	D
7	BC	BC	BC	BC	BC	BC	7	O	O	O	O	O	O	7	O	O/M	M	M	M/S	S	7	D	D	D	D	D	D
8	BC	BC	BC	BC	BC	BC	8	O	O	O	O	O	O	8	S	S	S	S	O	O	8	D	D	D	D	D	D
9	BC	BC	BC	BC	BC	BC	9	O	O	O	O	O	O	9	O	O	O	O	O	O	9	D	D	D	D	D	D
10	BC	BC/M	M	M	M/S	S	10	O	O/M	M	M	M/S	S	10	O	O	O	O	O	O	10	D	D	D	D	D	D
11	S	S	S	S	BC	BC	11	S	S	S	S	O	O	11	O	O	O	O	O	O	11	D	D	D	D	D	D
12	BC	BC	BC	BC	BC	BC	12	O	O	O	O	O	O	12	O	O	O	O	O	O	12	D	D	D	D	D	D
13	BC	BC	BC	BC	BC	BC	13	O	O	O	O	O	O	13	O	O	O	O	O	O	13	D	D	D	D	D	D
14	BC	BC	BC	BC	BC	BC	14	O	O	O	O	O	O	14	O	O/M	M	M	M/S	S	14	D	D	D	D	D	D
15	BC	BC	BC	BC	BC	BC	15	O	O	O	O	O	O	15	S	S	S	S	O	O	15	D	D	D	D	D	D
16	BC	BC	BC	BC	BC	BC	16	O	O	O	O	O	O	16	O	O	O	O	O	O	16	D	D	D	D	D	D
17	BC	BC/M	M	M	M/S	S	17	O	O/M	M	M	M/S	S	17	O	O	O	O	O	O	17	D	D	D	D	D	D
18	S	S	S	S	BC	BC	18	S	S	S	S	O	O	18	O	O	O	O	O	O	18	D	D	D	D	D	D
19	BC	BC	BC	BC	BC	BC	19	O	O	O	O	O	O	19	O	O	O	O	O	O	19	D	D	D	D	D	D
20	BC	BC	BC	BC	BC	BC	20	O	O	O	O	O	O	20	O	O	O	O	O	O	20	D	D	D	D	D	D
21	BC	BC	BC	BC	BC	BC	21	O	O	O	O	O	O	21	O	O/M	M	M	M/S	S	21	D	D	D	D	D	D
22	BC	BC	BC	BC	BC	BC	22	O	O	O	O	O	O	22	S	S	S	S	S	S	22	D	D	D	D	D	D
23	BC	BC	BC	BC	BC	BC	23	O	O	O	O	O	O	23	S	S	S	S	O	O	23	D	D	D	D	D	D
24	BC	BC/M	M	M	M/S	S	24	O	O/M	M	M	M/S	S	24	O	O	O	O	O	O	24	D	D	D	D	D	D
25	S	S	S	S	S	S	25	S	S	S	S	S	S	25	O	O	O	O	O	O	25	D	D	D	D	D	D
26	S	S	S	S	BC	BC	26	S	S	S	S	O	O	26	O	O	S	S	S	S	26	D	D	D	D	D	D
27	BC	BC	BC	BC	BC	BC	27	O	O	O	O	O	O	27	S	S	D	D	D	D	27	D	D	D	D	D	D
28	BC	BC	BC	BC	BC	BC	28	O	O	O	O	O	O	28	D	D	D	D	D	D	28	D	D	D	D	D	D
							29	O	O	O	O	O	O	29	D	D	D	D	D	D	29	D	D	D	D	D	D
							30	O	O	O	O	O	O	30	D	D	D	D	D	D	30	D	D	D	D	D	D
							31	O	O/M	M	M	M/S	S								31	D	D	D	D	D	D
Total Hours - February						672	Total Hours - March						744	Total Hours - April						720	Total Hours - May						744
Total Days - February						28	Total Days - March						31	Total Days - April						30	Total Days - May						31
February							March							April							May						

Run 15-1 (Calendar Year Cycle)



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BROOKHAVEN SCIENCE ASSOCIATES

Run 15-2

Run 15-2 (Calendar Year Cycle)																											
June							July							August							September						
Day	Half Shifts						Day	Half Shifts						Day	Half Shifts						Day	Half Shifts					
	0-4	4-8	8-12	12-16	16-20	20-24		0-4	4-8	8-12	12-16	16-20	20-24		0-4	4-8	8-12	12-16	16-20	20-24		0-4	4-8	8-12	12-16	16-20	20-24
1	D	D	S	S	S	S	1	S	S	S	S	O	O	1	O	O	O	O	O	O	1	D	D	D	D	D	D
2	S	S	S	S	S	S	2	O	O	O	O	O	O	2	O	O	O	O	O	O	2	D	D	D	D	D	D
3	S	S	S	S	S	S	3	O	O	O	O	O	O	3	O	O	O	O	O	O	3	D	D	D	D	D	D
4	S	S	S	S	S	S	4	O	O	O	O	O	O	4	O	O/M	M	M	M/S	S	4	D	D	D	D	D	D
5	S	S	S	S	S	S	5	O	O	O	O	O	O	5	S	S	S	S	O	O	5	D	D	D	D	D	D
6	S	S	S	S	S	S	6	O	O/M	M	M	M/S	S	6	O	O	O	O	O	O	6	D	D	D	D	D	D
7	S	S	S	S	S	S	7	S	S	S	S	O	O	7	O	O	O	O	O	O	7	D	D	D	D	D	D
8	S	S	S	S	S	S	8	O	O	O	O	O	O	8	O	O	O	O	O	O	8	D	D	D	D	D	D
9	S	S/M	M	M	M/S	S	9	O	O	O	O	O	O	9	O	O	O	O	O	O	9	D	D	D	D	D	D
10	S	S	S	S	S	S	10	O	O	O	O	O	O	10	O	O	O	O	O	O	10	D	D	D	D	D	D
11	S	S	S	S	S	S	11	O	O	O	O	O	O	11	O	O/M	M	M	M/S	S	11	D	D	D	D	D	D
12	S	S	S	S	S	S	12	O	O	O	O	O	O	12	S	S	S	S	O	O	12	D	D	D	D	D	D
13	S	S	S	S	S	S	13	O	O	O	O	O	O	13	O	O	O	O	O	O	13	D	D	D	D	D	D
14	S	S	S	S	S	S	14	O	O/M	M	M	M/S	S	14	O	O	O	O	O	O	14	D	D	D	D	D	D
15	S	S	S	S	S	S	15	S	S	S	S	S	S	15	O	O	O	O	O	O	15	D	D	D	D	D	D
16	S	S/M	M	M	M/S	S	16	S	S	S	S	S	S	16	O	O	S	S	S	S	16	D	D	D	D	D	D
17	S	S	S	S	S	S	17	S	S	O	O	O	O	17	S	S	D	D	D	D	17	D	D	D	D	D	D
18	S	S	S	S	S	S	18	O	O	O	O	O	O	18	D	D	D	D	D	D	18	D	D	D	D	D	D
19	S	S	O	O	O	O	19	O	O	O	O	O	O	19	D	D	D	D	D	D	19	D	D	D	D	D	D
20	O	O	O	O	O	O	20	O	O	O	O	O	O	20	D	D	D	D	D	D	20	D	D	D	D	D	D
21	O	O	O	O	O	O	21	O	O/M	M	M	M/S	S	21	D	D	D	D	D	D	21	D	D	D	D	D	D
22	O	O	O	O	O	O	22	S	S	S	S	O	O	22	D	D	D	D	D	D	22	D	D	D	D	D	D
23	O	O/M	M	M	M/S	S	23	O	O	O	O	O	O	23	D	D	D	D	D	D	23	D	D	D	D	D	D
24	S	S	S	S	O	O	24	O	O	O	O	O	O	24	D	D	D	D	D	D	24	D	D	D	D	D	D
25	O	O	O	O	O	O	25	O	O	O	O	O	O	25	D	D	D	D	D	D	25	D	D	D	D	D	D
26	O	O	O	O	O	O	26	O	O	O	O	O	O	26	D	D	D	D	D	D	26	D	D	D	D	D	D
27	O	O	O	O	O	O	27	O	O	O	O	O	O	27	D	D	D	D	D	D	27	D	D	D	D	D	D
28	O	O	O	O	O	O	28	O	O/M	M	M	M/S	S	28	D	D	D	D	D	D	28	D	D	S	S	S	S
29	O	O	O	O	O	O	29	S	S	S	S	O	O	29	D	D	D	D	D	D	29	S	S	S	S	S	S
30	O	O/M	M	M	M/S	S	30	O	O	O	O	O	O	30	D	D	D	D	D	D	30	S	S	S	S	S	S
							31	O	O	O	O	O	O	31	D	D	D	D	D	D							
Total Hours - June						720	Total Hours - July						744	Total Hours - August						744	Total Hours - September						720
Total Days - June						30	Total Days - July						31	Total Days - August						31	Total Days - September						30
June							July							August							September						

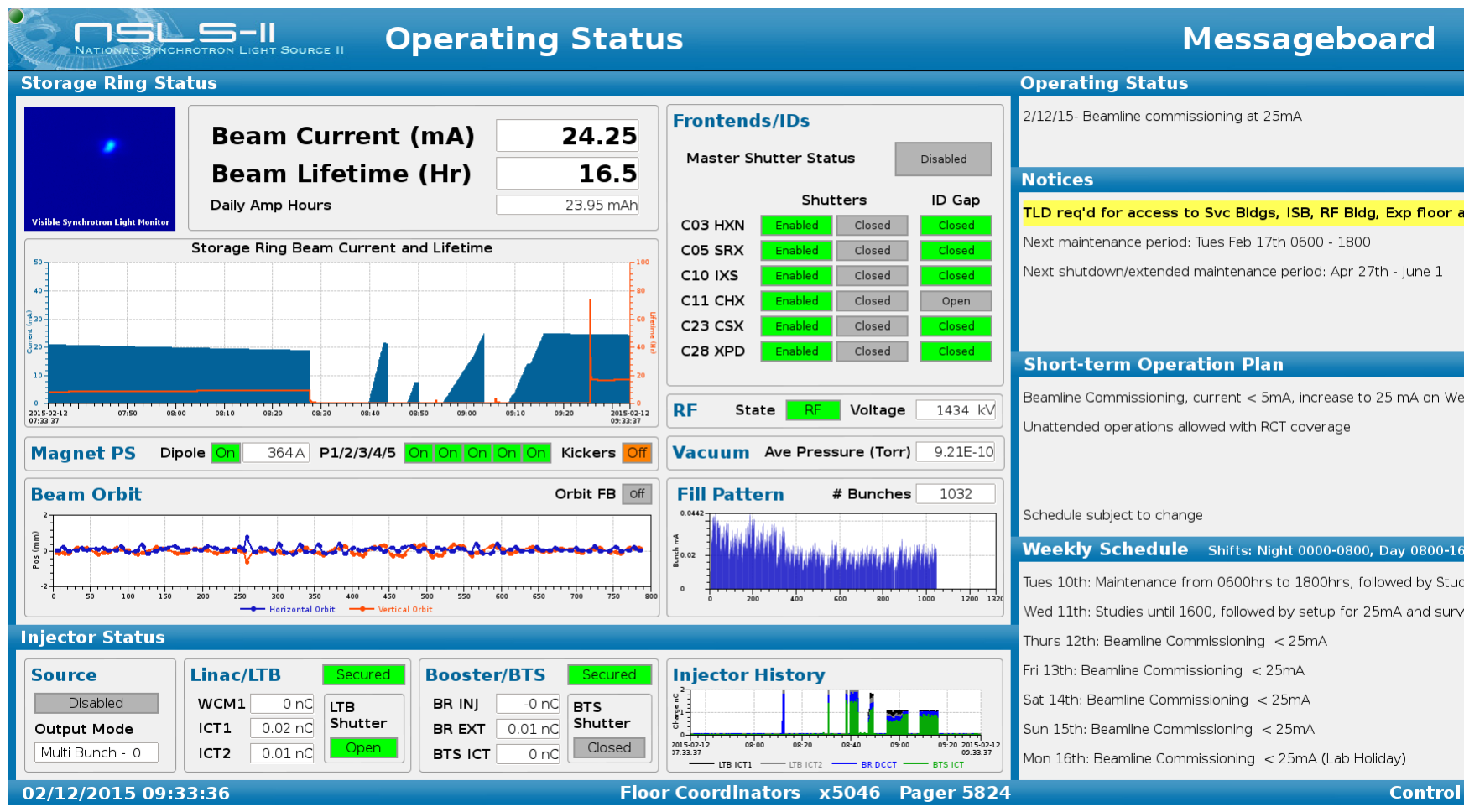
Run 15-2 (Calendar Year Cycle)



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Machine Status Display



We are working with ITD to make this page available outside of BNL



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Storage Ring Performance

- All 6 project beam lines have taken first light
- Beam operations is transitioning into a routine, stable mode.
- The SR and front ends are commissioned up to 50 mA
- Beam lines are currently being commissioned/conditioned with 25 mA
- FY15 goal for SR current is 300 mA so we will be pushing the current up to 100 mA in the very near future.
- The SC RF cavity has been successfully conditioned above 1.8 MV
- Second SC RF cavity has been conditioned above 1.8 MV
- Damping wigglers and partial front ends in cells 8 and 18 have been commissioned
- Emittance, transverse stability, relative energy spread meet the design specifications
- Injection efficiency has exceeded 90%



Winter Shutdown Highlights



Safety Shutters for cells 16 and 17

ABBIX Installation (cells 16 & 17)

- ✓ Pulled and terminated cables for Diagnostics, Vacuum and IDs to tunnel and racks.
- ✓ Installed major Front End components
- ✓ Installed water cooling manifolds and plumbing for insertion devices



Front End Cell 17



Provided by Lewis Doom

Winter Shutdown Highlights

NEXT Installation (cells 2, 4, 12, 21)

- ✓ Confirmed sizes of ratchet wall openings and confirmed space with dummy collimator.
- ✓ Surveyed and drilled front end mounting holes

Maintenance Completed

- ✓ Installed shut off valves for all front ends in pentants 4 and 5
- ✓ Replaced multiple DI filters
- ✓ Replaced main carbon and resin filters in cooling tower building
- ✓ Replaced pump seals in Copper DI skid pentant 1 and aluminum DI skid pentant 3
- ✓ Flashed all Titanium Sublimation Pumps in storage ring
- ✓ Replaced dislocated BPM in cell 23 straight section & inspected vacuum pipe for other obstructions
- ✓ Surveyed and Repositioned IDs in cells 5, 11, 23 and 28
- ✓ Investigated and repaired Linac modulator/Klystron communications error.
- ✓ Preventive maintenance on all booster power supplies
- ✓ Recertify PPS for beam lines and front ends in cells 11, 23 and 28
- ✓ Replaced photon shutter position switch actuators
- ✓ Replaced leaking water manifold on dipole magnet C14G05
- ✓ Carried out Q factor studies of second RF cavity in Block House.



May Shutdown Plans

- Focus will be on completing ABBIX installation
- Install C16 & 17 IVUs (3X) including canting magnets and diagnostics
- Install ABBIX ratchet wall collimators & safety shutter stands
- Survey and bake ABBIX front ends
- PPS modifications
- Rework safety shutter switches for project front ends
- Recertify PPS for beam lines and all accelerators
- Install NEXT front end stands (C2, 4, 12, & 21)
- Prep work for installation of 2nd RF cavity (piping, waveguide, etc.)

In consult with Greg Fries & Lewis Doom

Top-Off

- The implementation of Top Off has the highest priority in AD
- Top Off operation is frequent injection of charge into the Storage Ring, while beam is stored, with the photon shutters open.
- The goal is to begin Top Off operation in October.
- Top Off operation introduces one additional hazard.
 - The possibility of sending injected electrons beyond the front end down the photon beam line onto the experimental floor.
- The Top Off Safety System (TOSS) is the engineering control for this hazard.

TOSS Interlocks

The TOSS is required to monitor the following to enable top off:

- The existence of stored beam. A minimum of 50 mA will be required to allow Top Off Operation.
- The Storage Ring Dipole current must be within 1% of nominal.
- The voltage across each dipole must be within 1% of nominal.
- The booster dipole power supply current must be within 1% of nominal extraction current.
- The injection rate must be below 30 nC/minute.

Top Off Critical devices

The TOSS will inhibit triggers to the following:

- The Storage Ring Injection AC Septum
- The Booster Extraction AC Septum

This will inhibit injecting beam into the storage ring if the interlocks are violated.

The TOSS does not dump the stored beam.

The TOSS does not inhibit the gun.

Closing Remarks

These are exciting times!

NSLS-II has advanced toward routine operational conditions quickly and successfully

In the coming months, the SR current will be pushed toward 300 mA

Beam line installation will continue during the planned extended shutdowns

Top Off operation is in development

Thank you all

