

# Machine Update

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## **NSLS Town Meeting**

**Emil Zitvogel**

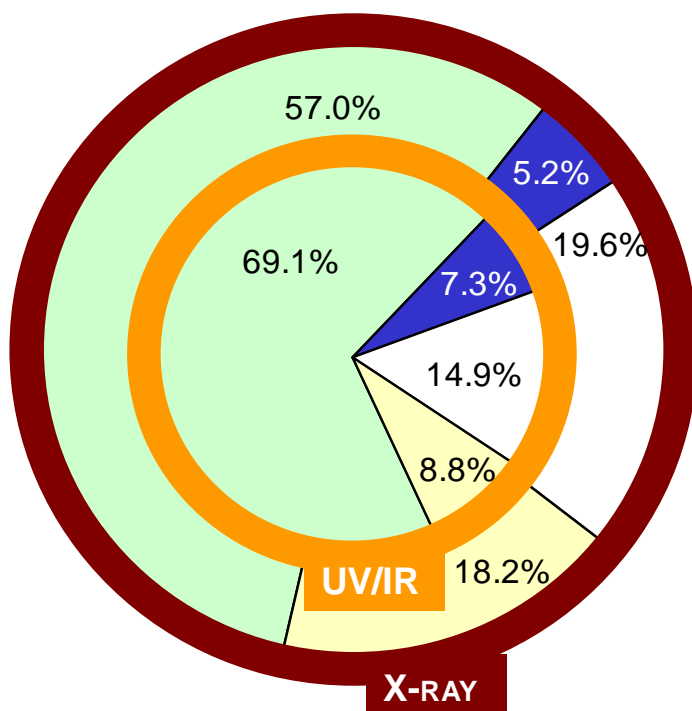
**Friday, August 12, 2011**

# Topics

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- Statistics
- Spring Shutdown Activities
- Accelerator Physics
- VUV Vacuum Leak
- Closing Remarks

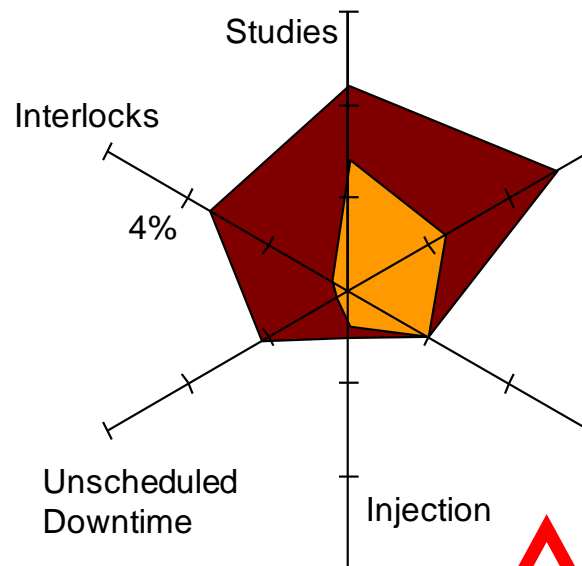
# FY2011 Statistics



Activity /Hours	UV/IR	X-ray
Operations	5039.9	4160.5
Unscheduled Operations	531.8	379.9
Maintenance	1085.0	1427.5
Other	639.3	1328.0

Other Activities	UV/IR	X-ray
Studies	2.8%	4.4%
Com/Con	2.4%	5.2%
Holiday	2.0%	2.0%
Injection	0.8%	1.0%
Unscheduled Downtime	0.3%	2.2%
Interlock	0.5%	3.5%

YTD 7296 Hrs 100 Hrs= 1.4%



User Metrics	UV/IR	X-ray
Reliability	99.5%	96.3%
Availability	10.0%	105.1%



# XRF 4 Solid State Amplifier Installation

- Replaces an antiquated tube amplifier.
- Allowed removal of several other components for improved reliability (100W amp, several support power supplies).
- Feeds 52 MHz RF to 125kW amplifier.

Cooling lines are added

New amplifier slides into place

Riggers remove the tube rack



# XRF 4 Solid State Amplifier Installation

Completing the RF connections to the 123kW amp



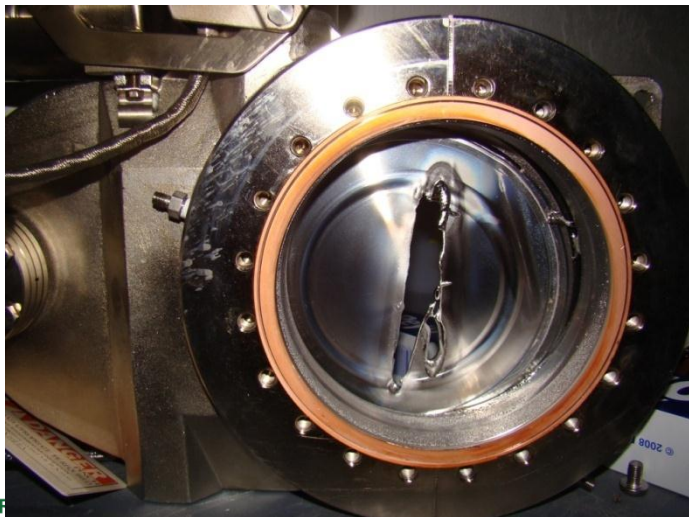
Preparing the circulator





# X16 GP Vacuum Valve Replacement

- Two failures permitted exposure of the GP valve to x-rays.
- Caused significant damage to the valve.
- Equipment protection system was checked at X16 and the rest of the ring following this incident to look for other latent errors.
- Replacement required the bleed-up of SP3 to replace the valve.
- Periodic testing of all equipment protection systems will be done during maintenance and shutdown periods to identify and fix interlock problems.



# X8M3 High Voltage Vacuum Feed-through

- Leak in the high voltage feed-through caused vacuum issues in SP1/8 several times.
- Spray sealant applied each time, but it was only a temporary fix.
- Active corrosion discovered on the braze joint.
- This is a known problem for which Gamma Vacuum has a solution.
- Discussing plans to inspect others at the start of shutdown periods.
- Many have become inaccessible.
- We will maintain an adequate spare stock to see us through to the end of operations.



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Corrosion Testing at Gamma Vacuum

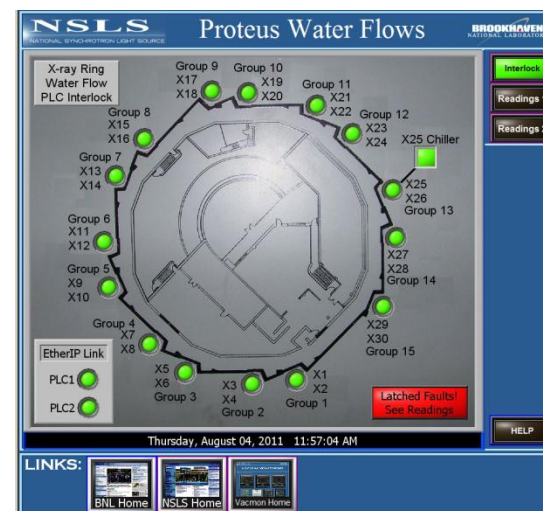
Results are Following Weekend Salt Test



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# More Activities

- Completion of the Proteus Water Flow Monitor System.
  - Helps us locate and repair Proteus faults quickly to minimize downtime.
  - Diagnostic information helps to identify trends in the water flow and fix them before they cause downtime.
- Linac Pulse Counter Installation.
  - An “odometer” for the klystrons.
  - Required following ATF klystron fire.
- XRF1 Temperature Control Valve Replacement.
  - Existing valve had partially failed but still workable.
  - New valve gives a more linear response.
  - Valves will be installed in other systems during future shutdowns.





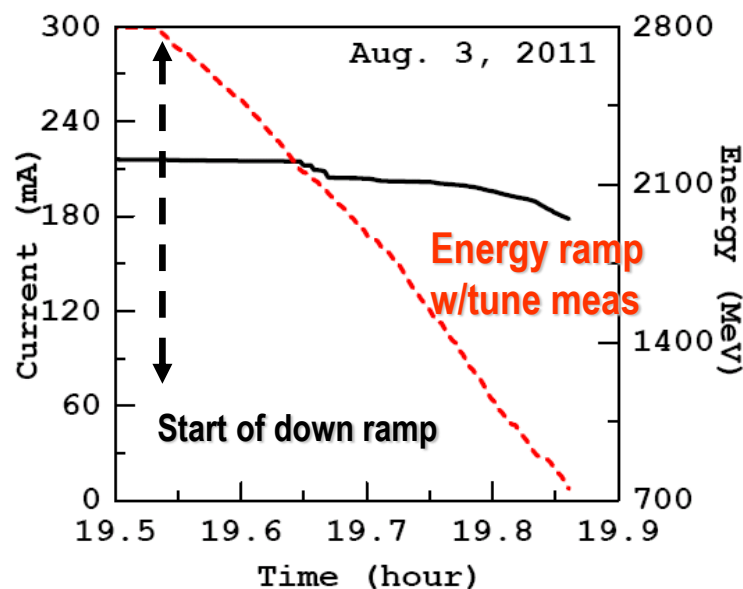
# More Activities

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- HEPA Filter Exhaust System at X6B, X7B, X9, X14A.
- Electrical Sub-station Maintenance.
- X17 Liquefier Controls Upgrade.
- Air Handler Number 1 Work.
  - Supplies cooling to x-ray ring and power supply area.
  - Replaced temperature control valve.
  - Extended air intake to keep snow from blowing up into it and dripping onto x-ray power supplies.
  - Removed stuck exhaust dampers.

# X-Ray Down Ramp

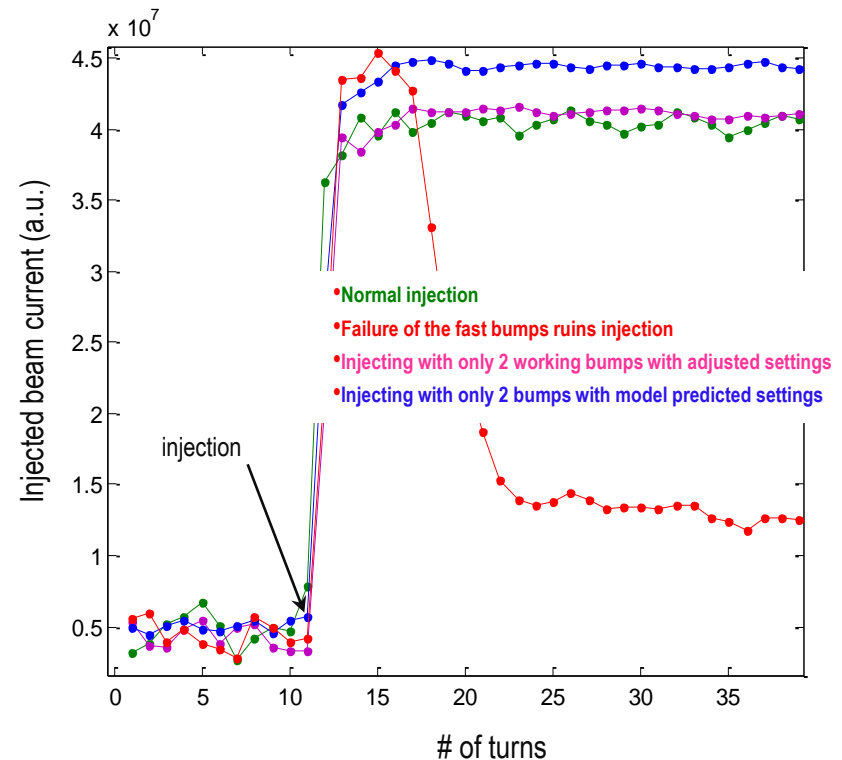
- Advantages of ramping x-ray current down:
  - Reduce radiation losses from beam dump.
  - Reduce the injector (Linac/Booster) on time, and also beam losses since injection starts at 190mA instead of 0mA.
  - Injection time may be shorter, providing a faster down-ramp.
- Successfully held 180mA out of 210mA to injection energy.
- Steps to making it operational:
  - Speed up the down ramp
  - Further reduce low energy losses with help from auto tune measurement.



# Checking the VUV Injection Model

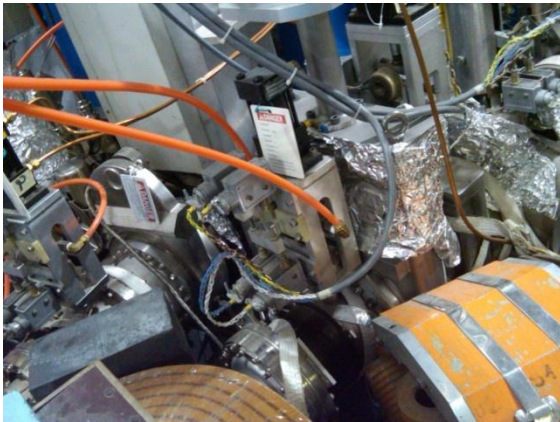
- The VUV injection model was checked and found to be working perfectly well, based on the turn-by – turn diagnostics installed in the ring.
- The failure of one of the three fast bumps kicking the injected beam to the proper trajectory hindered the normal injection process.
- With some adjustments of the two remaining fast kickers it was possible to restore injection (with slower injection rate).
- This case was studied and verified using the VUV injection model.
- Moreover new settings optimizing “2-bump injection” were found from the model and successfully checked during the studies.
- This model will be used for injection optimization as well as investigation and diagnosis of injection problems.

S. Seletskiy



# U6 Water-Cooled Mask Vacuum Leak

- VUV developed a vacuum leak in the water line of the U6 water-cooled mask.
- Failure may be related to bend stress coupled with age and constant exposure to light (U6 is unused and mask stayed closed).
- Mask was replaced with a water-cooled cap.
- Recovery was slow due to the water contamination.
- We still have not returned to pre-failure conditions, but we're close.
- We have spare masks on hand and this one has been rebuilt and is a spare.



# Closing Remarks

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Staff response to operations problems is consistently swift, minimizing the impact to our users.

We continue to perform effective preventative maintenance to keep downtime to a minimum.

Thank you for your time.