Status Report Accelerators

Åke Andersson

On behalf of the Machine group operating MAX -I, -II & -III:

Dionis Kumbaro (Injector, storage rings; operation)

Per Lilja (Storage rings, injector; operation)

Lars Malmgren (Radio frequency systems, diagnostics)

Robert Nilsson (Radio frequency systems, diagnostics)

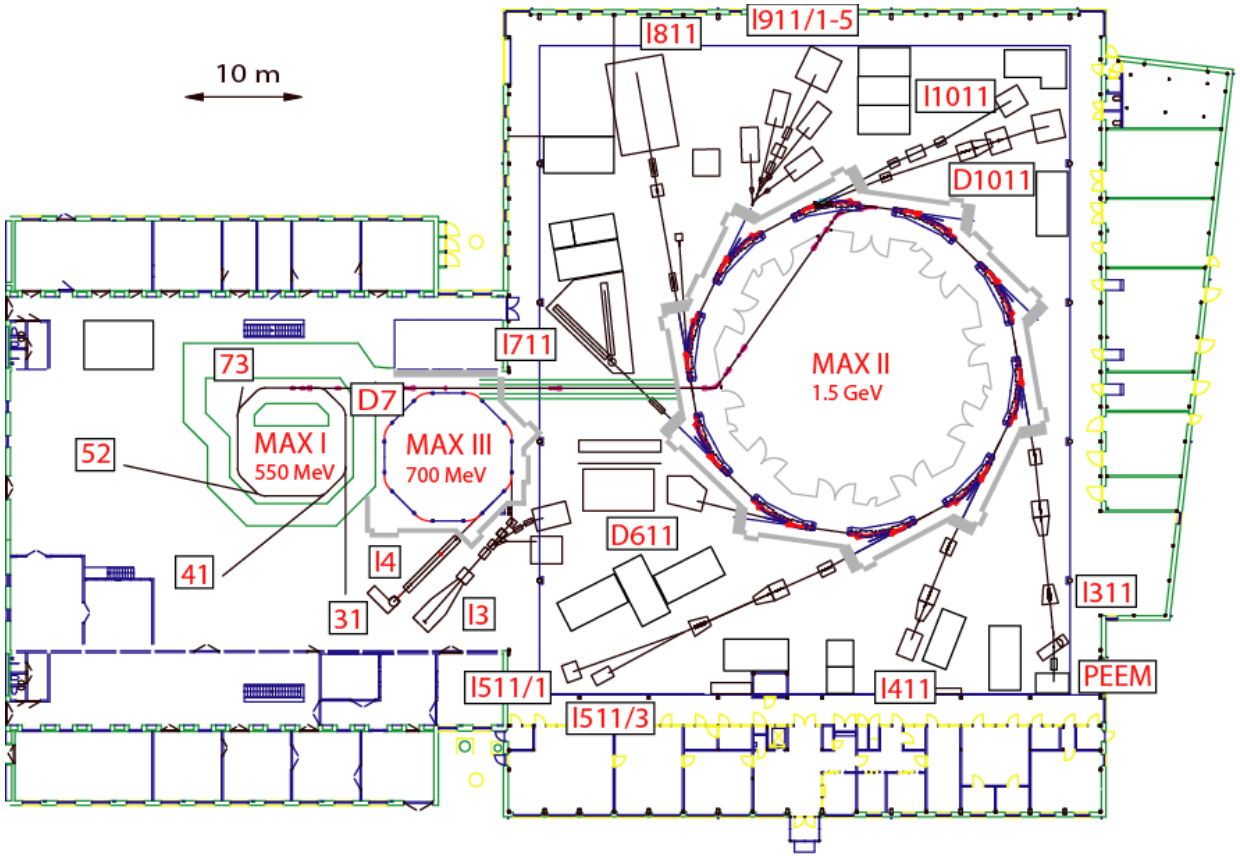
Aleksandar Mitrovic (Radio frequency)

David Olsson (Radio frequency)

Filip Lindau (Laser systems)

Mikael Eriksson (Advisor)

Overview ”MAX-IV Laboratory”



Operation Schedule

2011				2012			
Date	Week	MAX I	MAX II & III	Date	Week	MAX I	MAX II & III
4/7-10/7	27	Shutdown		2/1-8/1	1	Safety test	
11/7-17/7	28	Shutdown		9/1-15/1	2	Startup	
18/7-24/7	29	Shutdown		16/1-22/1	3	Sync. Rad.	Sync. Rad.
25/7-31/7	30	Shutdown		23/1-29/1	4	Sync. Rad.	Sync. Rad.
1/8-7/8	31	Shutdown		30/1-5/2	5	Sync. Rad.	Sync. Rad.
8/8-14/8	32	Safety test		6/2-12/2	6	Sync. Rad.	Sync. Rad.
15/8-21/8	33	Startup		13/2-19/2	7	Sync. Rad.	Sync. Rad.
22/8-28/8	34	Sync. Rad.	Sync. Rad.	20/2-26/2	8	Sync. Rad.	Sync. Rad.
29/8-4/9	35	Sync. Rad.	Sync. Rad.	27/2-4/3	9	Sync. Rad.	Sync. Rad.
5/9-11/9	36	Sync. Rad.	Sync. Rad.	5/3-11/3	10	Sync. Rad.	Sync. Rad.
12/9-18/9	37	Nucl. Phys.	Sync. Rad.	12/3-18/3	11	Sync. Rad.	Sync. Rad.
19/9-25/9	38	Nucl. Phys.	Sync. Rad.	19/3-25/3	12	Nucl. Phys.	Sync. Rad.
26/9-2/10	39	Nucl. Phys.	Sync. Rad.	26/3-1/4	13	Nucl. Phys.	Sync. Rad.
3/10-9/10	40	Nucl. Phys.	Sync. Rad.	2/4-8/4	14	Shutdown	
10/10-16/10	41	Acc. & BL maintenance		9/4-15/4	15	Acc. & BL maintenance	
17/10-23/10	42	Sync. Rad.	Sync. Rad.	16/4-22/4	16	Nucl. Phys.	Sync. Rad.
24/10-30/10	43	Sync. Rad.	Sync. Rad.	23/4-29/4	17	Nucl. Phys.	Sync. Rad.
31/10-6/11	44	Sync. Rad.	Sync. Rad.	30/4-6/5	18	Sync. Rad.	Sync. Rad.
7/11-13/11	45	Nucl. Phys.	Sync. Rad.	7/5-13/5	19	Sync. Rad.	Sync. Rad.
14/11-20/11	46	Nucl. Phys.	Sync. Rad.	14/5-20/5	20	Sync. Rad.	Sync. Rad.
21/11-27/11	47	Nucl. Phys.	Sync. Rad.	21/5-27/5	21	Sync. Rad.	Sync. Rad.
28/11-4/12	48	Nucl. Phys.	Sync. Rad.	28/5-3/6	22	Sync. Rad.	Sync. Rad.
5/12-11/12	49	Sync. Rad.	Sync. Rad.	4/6-10/6	23	Nucl. Phys.	Sync. Rad.
12/12-18/12	50	Sync. Rad.	Sync. Rad.	11/6-17/6	24	Nucl. Phys.	Sync. Rad.
19/12-25/12	51	Shutdown		18/6-24/6	25	Nucl. Phys.	Sync. Rad.
26/12-1/1	52	Shutdown		25/6-1/7	26	Nucl. Phys.	Sync. Rad.

User operaton 38 weeks/year.
Each week 6 days
➔
5472 hours per year

3 rings ➔ 16 416 h per year

However, MAX-I, after 25 years of user operation, is now retireing from Synchrotron Radiation operation: We are only occationally serving the remaining IR interferometer beam line and two educational beam lines since autumn 2011. *9 user beam lines were in operation over the years.*

MAX-I will continue running as a pulse strecher for nuclear physics as scheduled.

MAX-I, acc. physics ”fun stuff”

SPIE

Advancing light.

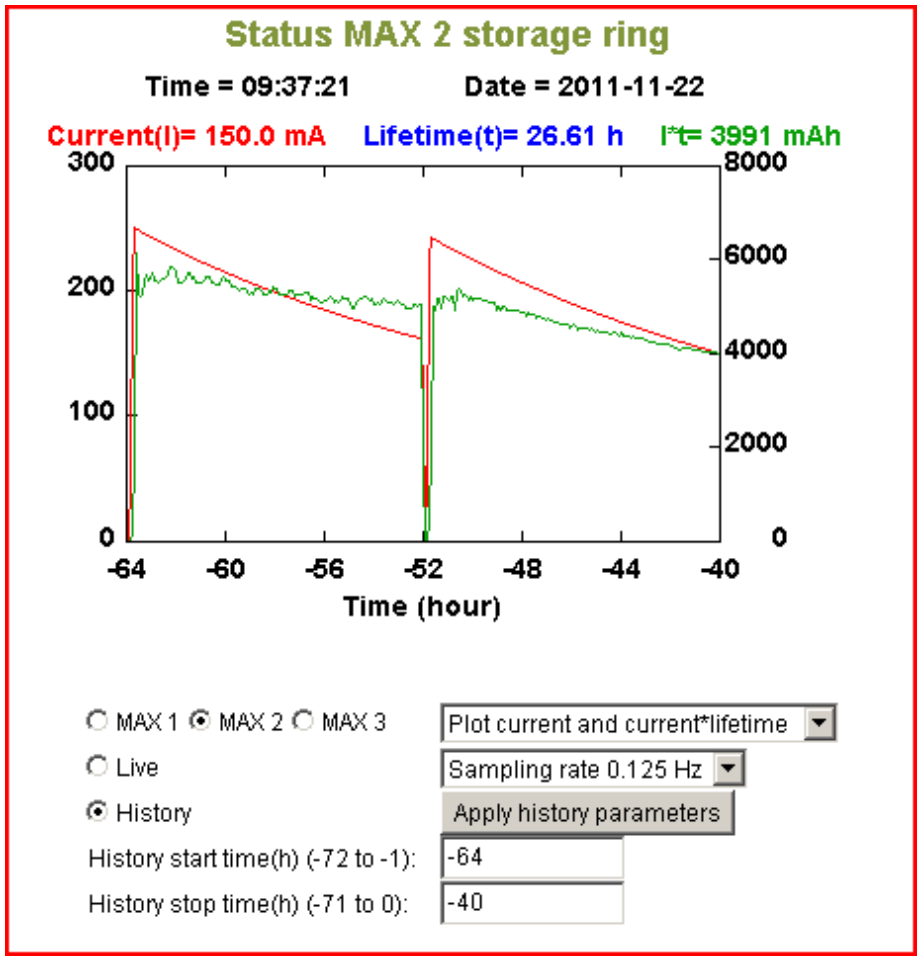
SPIE is the international society for optics and photonics

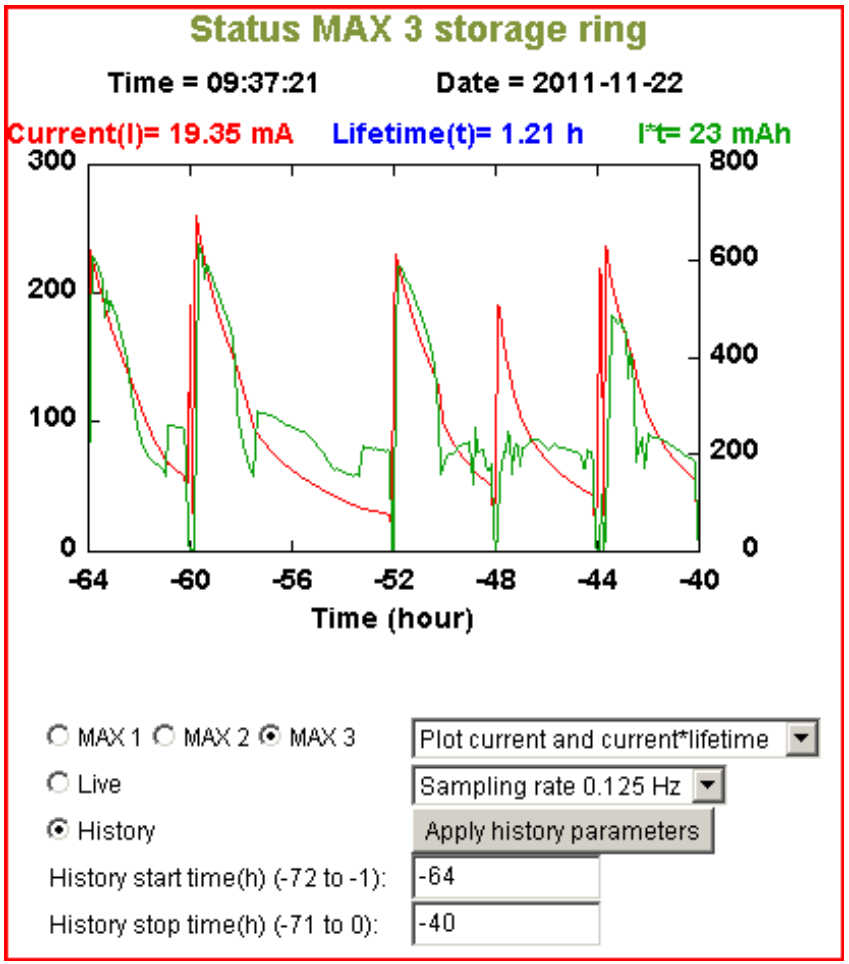
Observation of coherent synchrotron radiation from a 1-mm electron bunch at the MAX-I storage ring (Proceedings Paper)

Author(s): **Ake Andersson; Matthew S. Johnson; Bengt Nelander**

Date: **25 October 1999**

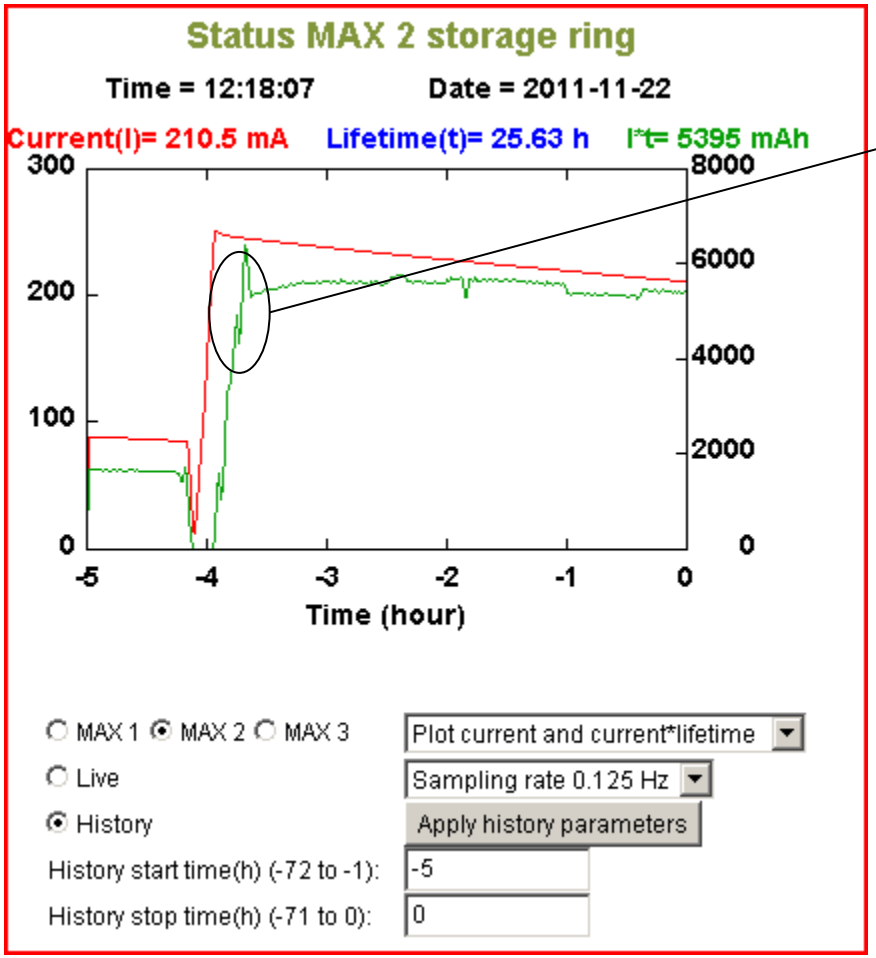
The daily operation scheeme





Injection routine

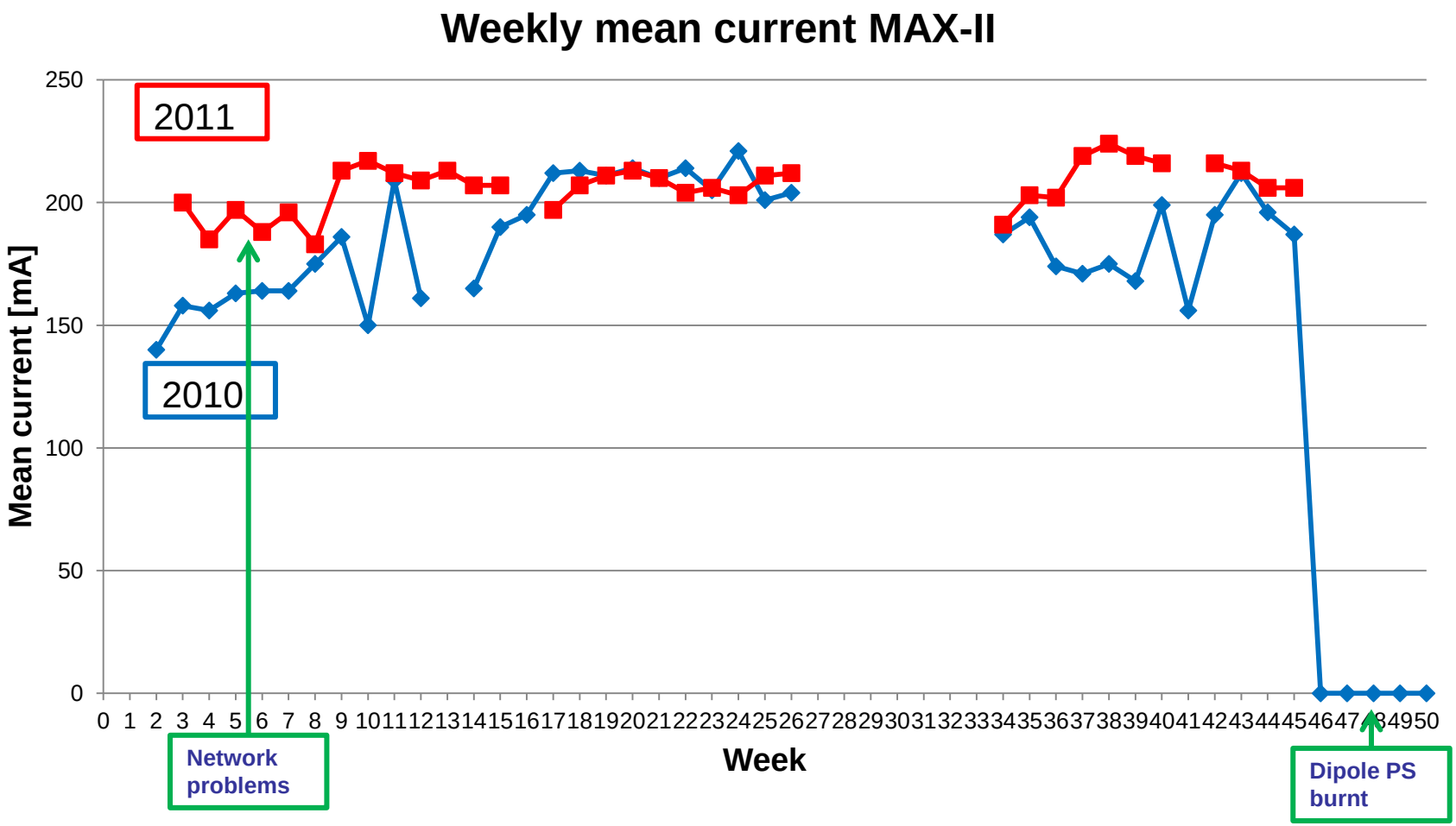
- SC Wigglers ramp down: 6 min
- Undulator gaps opening
- Bem dump (RF off)
- Magnets zero: 0.5 min
- Magnets up to injection energy
- Injection: 3 min
- Energy ramp: 2 min
- SC Wigglers ramp up: 6 min
- Undulator gaps closing



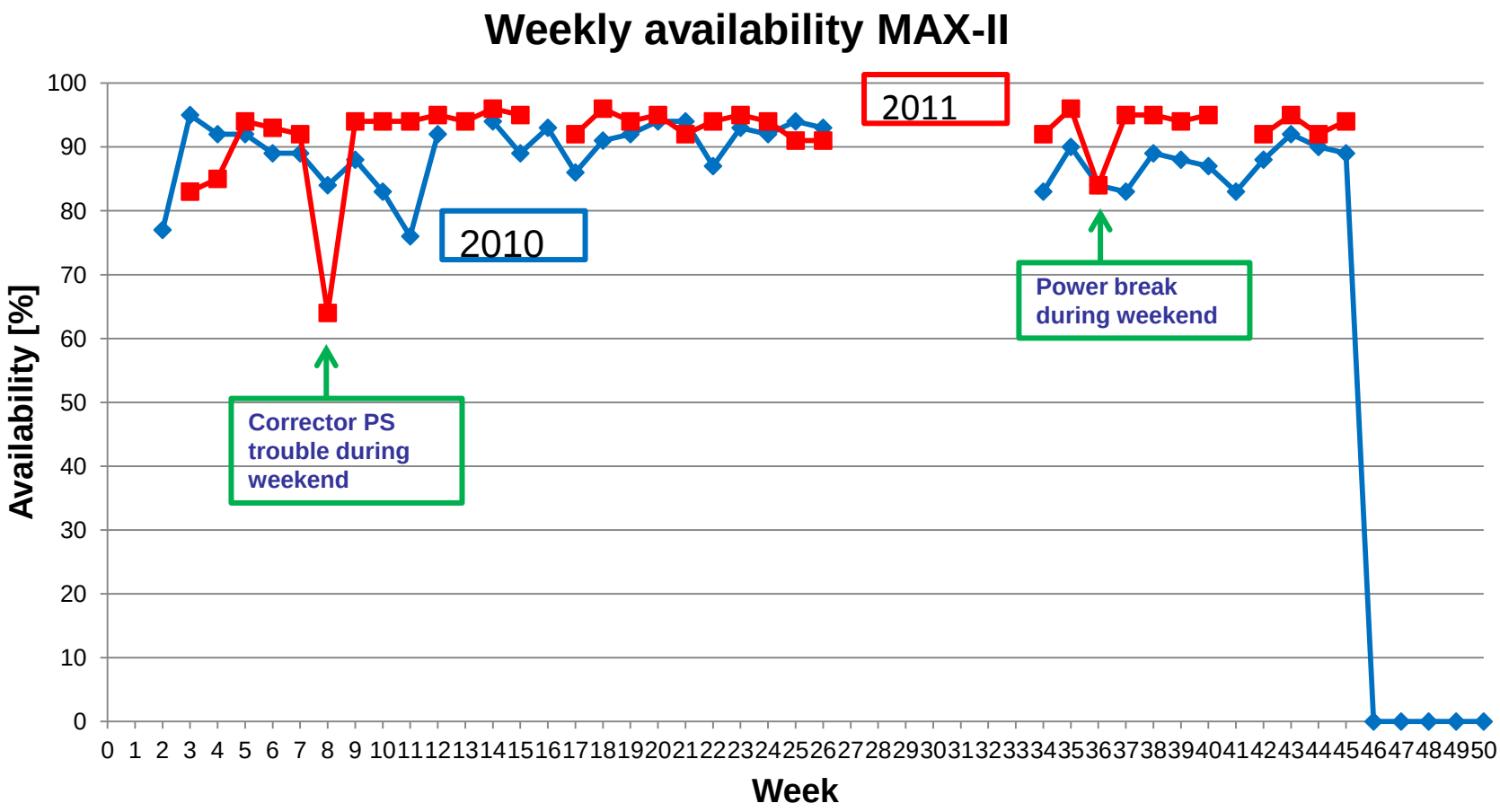
- Landau cavity towards nominal tuning, while SCWs ramping.

➔ No major benefit from ramping down with beam (~ 160 mA).

Statistics MAX-II



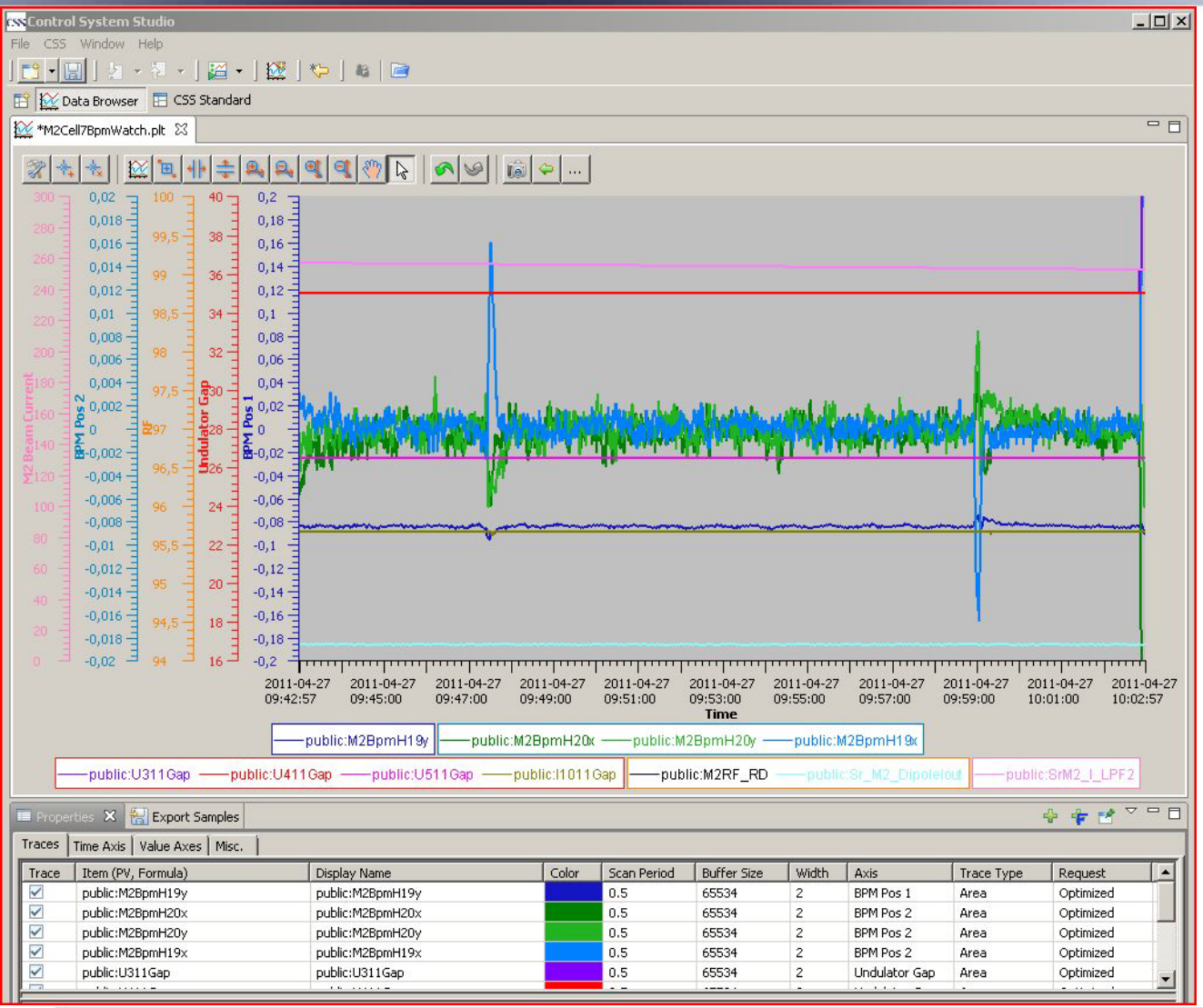
Statistics MAX-II



Machine events 2011

- **MAX-II.**
- **A new dipole PS (1000 A, 240V).**
- **Exchange of one default dipole chamber (faulty RF shield).**
- **Introduction of operator shifts the weekend before start of user operation periods.**
- **A firewall between public and machine network.**
- **Agreement of how to run, and development of, the user D1011 polarization bump.**

Beam position MAX-II

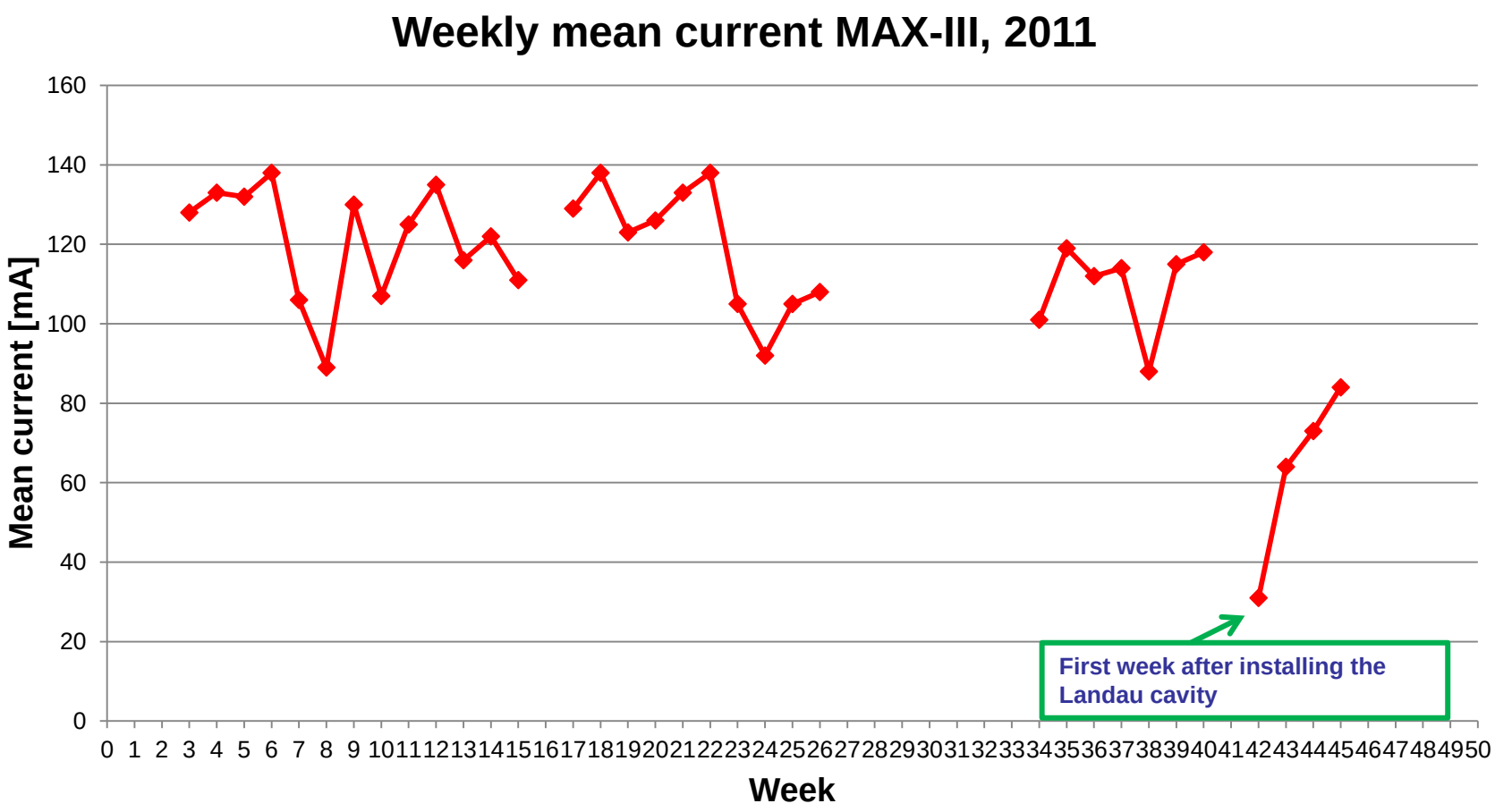


Trace	Item (PV, Formula)	Display Name	Color	Scan Period	Buffer Size	Width	Axis	Trace Type	Request
☑	public:M2BpmH19y	public:M2BpmH19y		0.5	65534	2	BPM Pos 1	Area	Optimized
☑	public:M2BpmH20x	public:M2BpmH20x		0.5	65534	2	BPM Pos 2	Area	Optimized
☑	public:M2BpmH20y	public:M2BpmH20y		0.5	65534	2	BPM Pos 2	Area	Optimized
☑	public:M2BpmH19x	public:M2BpmH19x		0.5	65534	2	BPM Pos 2	Area	Optimized
☑	public:U311Gap	public:U311Gap		0.5	65534	2	Undulator Gap	Area	Optimized

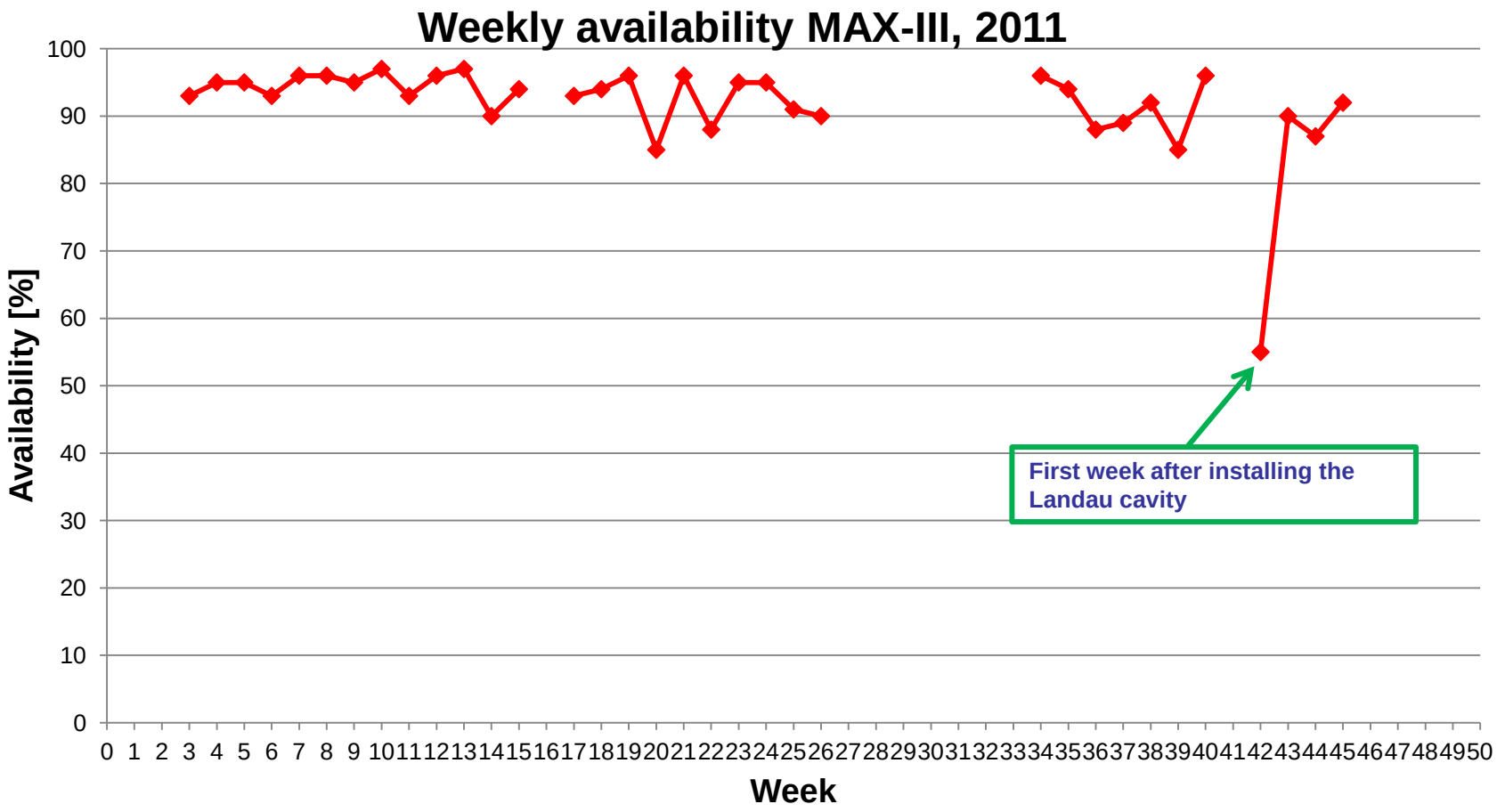
- **Large undulator gap movements ➔ Beam position changes 10 to 40 µm, over 5 to 10 s.**
- **Feed forward tables to local undulator coils are not well adjusted.**
- **Still, beam lines handle this by inhibiting data collection.**

- **Worst disturbances (vertical) came from the ”polarisation bump”.**
- **This is now restricted to slow motion ➔ < 4 µm beam position changes.**
- **Other beam lines usually accept this orbit deviation without inhibiting.**

Statistics MAX-III



Statistics MAX-III



Machine events 2011

- **MAX-III.**
- **Single bunch operation (for machine studies).**
- **New beam size diagnostic beamline (for machine studies).**

- **Beam positioning work: A lot of beam based calibration of BPMs (OK, in spite of a deficient BPM system) .**

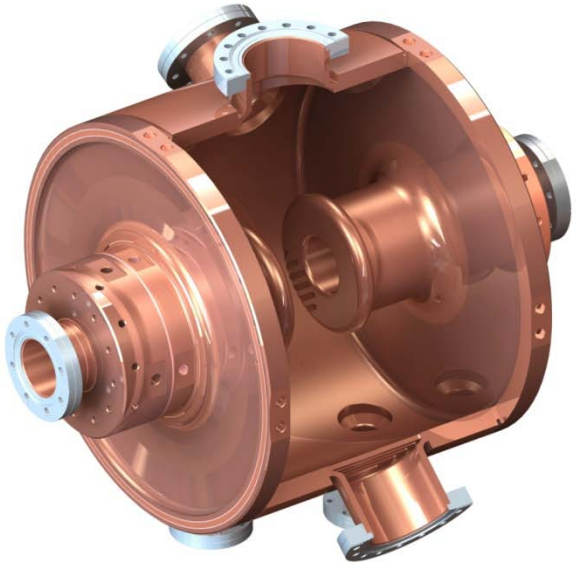
- **Beam lifetime work: A new 300 MHz Landau cavity installed. (Work in progress)**

Some ”dangerous” activities at the lab

- MAX-IV Gun test stand
- MAX-IV Landau cavity test in MAX-III
- MAX-IV Cavity conditioning stand

➔ Need some care not to interfere with the user operation!

MAX-IV Landau cavity



Mechanical design, Elsayed Elafifi, MAX-lab

THANK YOU!