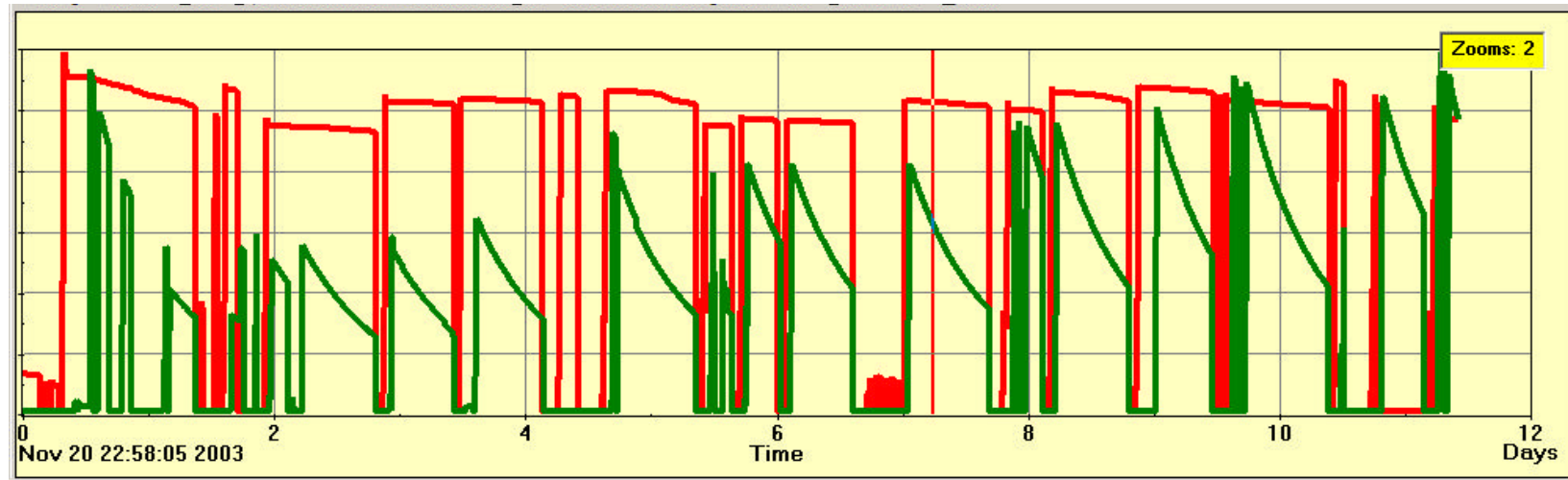


HERA Status

HERA Experiments Coordination Meeting, December 2, 2003
F. Willeke, DESY

- Operations
- Issues:
 - High Beam Pipe Temperature
 - p-Beam Losses
 - specific Luminosity
 - Polarization
- Schedule 2004

HERA Luminosity Running: Procedure works well



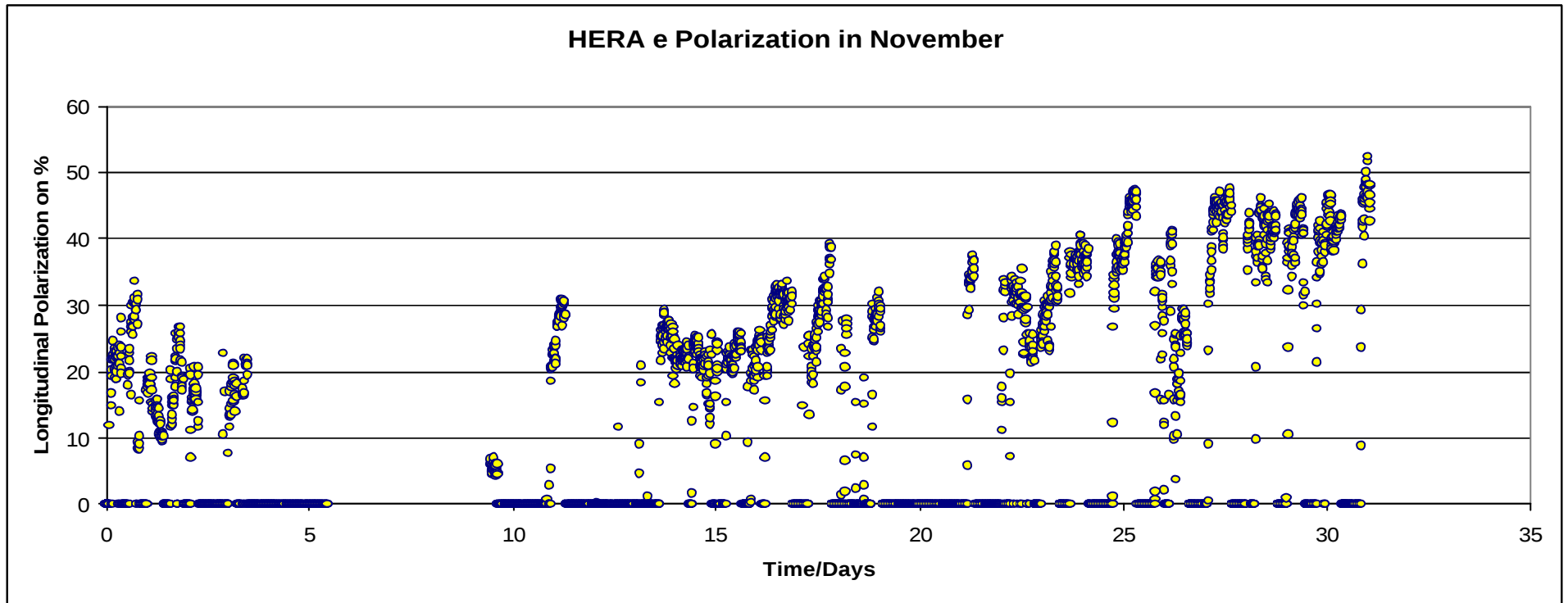
Running Efficiency in November: 40% (due to Nov 4 event)

November 20-30: 52%

Major Technical Problems: Proton beam losses, high temperatures, 208MHz RF, Power Supplies, S.C. Cavities, false temperature alarms

Specific Luminosity low because of large horizontal emittance, planned measures: dispersion correction

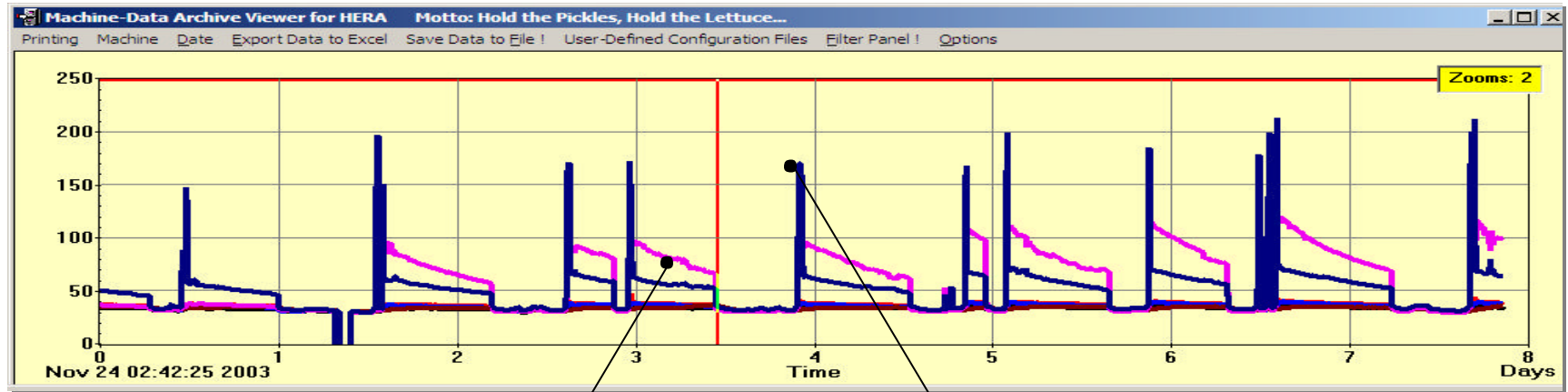
HERa Polarization



Slow increase of Polarization: iterative optimization of beam energies, harmonic bumps and tunes

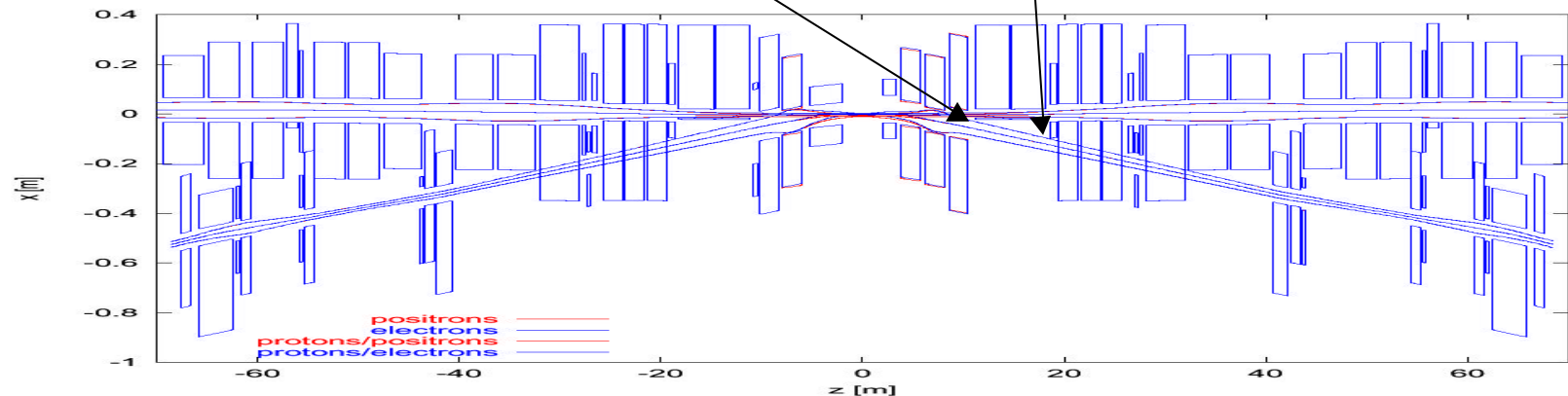
Further measures planned: Dispersion correction, horizontal and vertical (dedicated time needed)

High Beam Pipe Temperatures Limited e-Beam Intensity



SR 11m pi

SR 19m ea



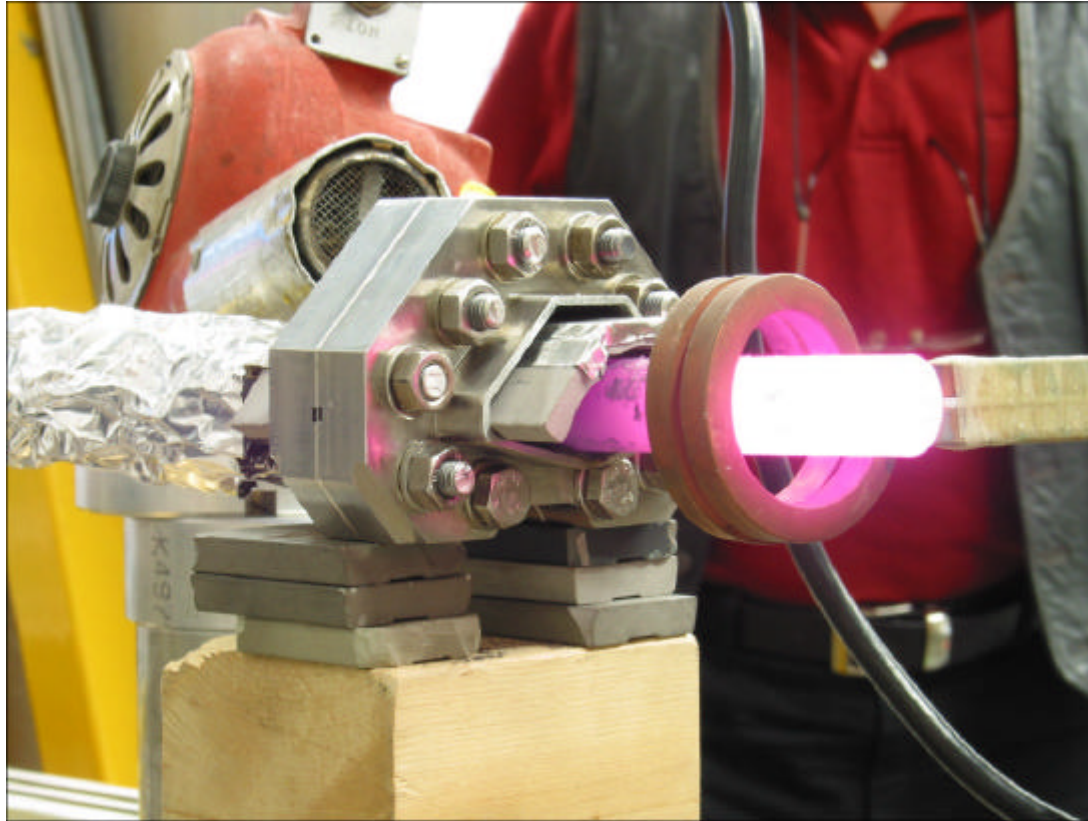
p-Flange Temperature Problem

High
Temperatures in
HERA South
Right 11m

p-pipe



Test with local heating of the VAT flange
as used for the p-Beam pipe at SR 11m



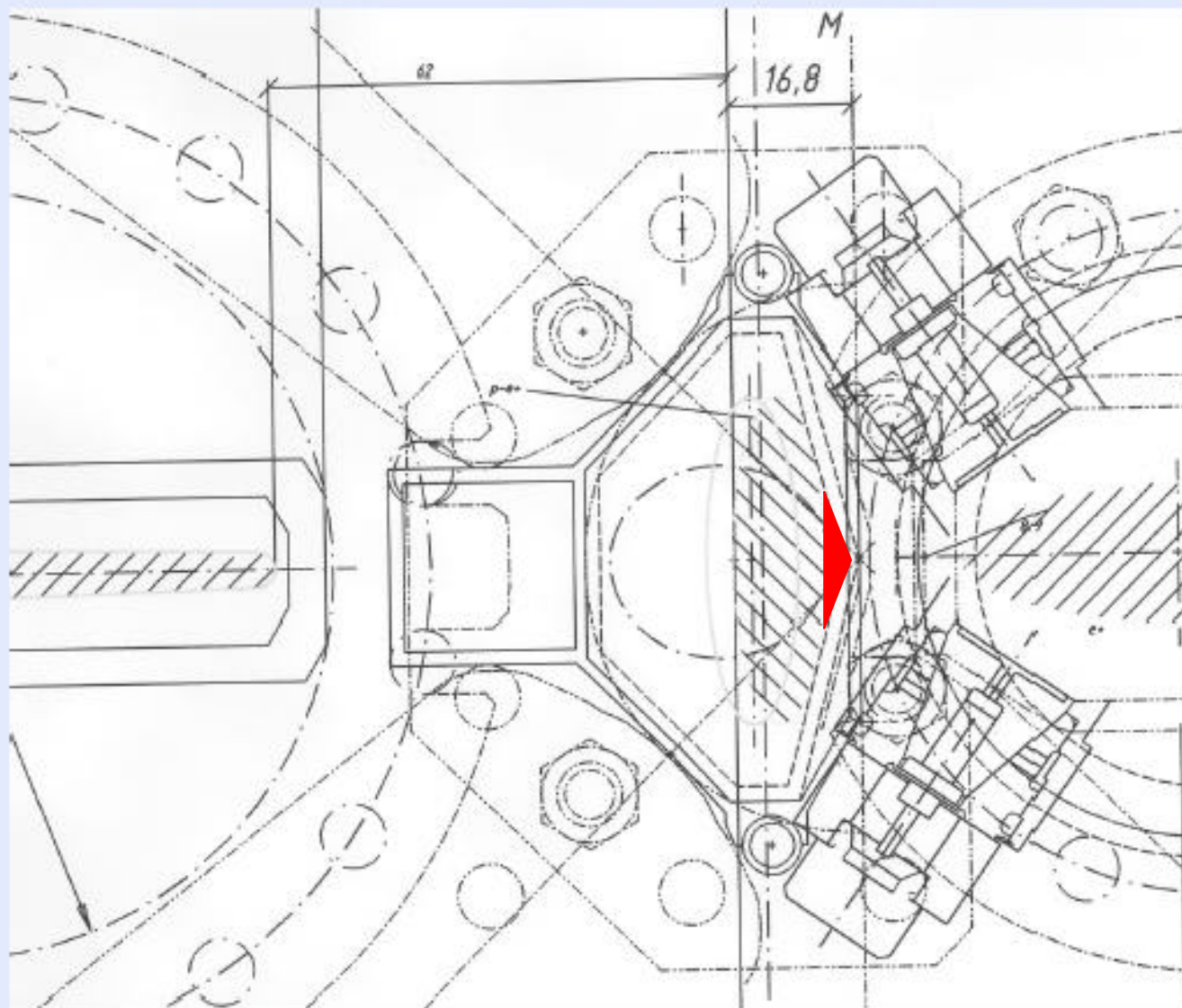
Result: VAT Flange can stand temperatures up to 250°C
and left right $\Delta t = 100^\circ\text{C}$ without developing a leak

However: Conflat flange survives the same test

Strategy with Beam Pipe Temperatures

- SR 19m temperatures to be avoided by beam steering
- SR 11m pi, increase temperature limit to 150°C (done)
- Measure alignment absorber 4 on Dec 4
- Produce new 11m Absorber with shielding without coating as fast as possible (end of the year) ➔➔
- Then increase e-beam intensity without temperature limit SR11m
- If there is a leak: exchange absorbers
- If there is a leak before: try to realign absorber 11 if misaligned

Modification of Absorber 4



Fast Proton Beam Losses

Problem:

Alarm system too slow to dump the proton beam before losses occur in case of a trip of a low- β quadrupole power supply

→ Radiation, Quenches

→ Radiation dose in HERA halls exceeds 1mSv/y, strain on s.c. magnet system

Decision: HERA Experimental Halls become Controlled Area
Reduce probability for uncontrolled proton beam loss
Reduce proton intensity until the above measures are taken

Planned measures:

- Program to make ps more reliable (in progress)
- Use internal P.S. Alarms signal to trigger beam dump directly (80% of trips, in progress)
- Delay p.s. alarms if possible (ground fault alarm, done, 5% trips)
- Detect p.s. dI/dt (in progress)
- Use BPM alarms (available in principle)
- Shorten integration time of loss monitors by a factor 10 (under consideration)
- Installation of fast loss monitors at critical locations (under consideration)
- Detection of beam current losses (under consideration)

Controlled Areas in the HERA Halls

Maßnahmen in den HERA Hallen (III)

Die Festlegung der Kontrollbereiche ist am Freitag abgeschlossen worden. Es sind, bzw. werden folgende Kontrollbereiche in den HERA Hallen eingerichtet:

HERA Nord ab 1.12.2003:

- Raum 100 (Experimentierhalle)
- Räume 101, 201, 301, 307
- Nebentreppe ab 6. Stock

HERA Süd ab 15.12.2003:

- Raum 100 (Experimentierhalle)
- Räume 101, 201, 301

HERA West ab 15.12.2003:

- Komplette (ab Hallen-Zugängen)
- Ausnahme: Räume der BSG
- Wichtiger Hinweis: Alle Räume im hinteren Teil der Halle, d.h. im nicht unterkellerten Bereich sind nur aus formalen Gründen als Kontrollbereiche ausgewiesen, da es nur einen regulären Zugang zur Halle West gibt. Büros, Werkstätten und andere Räume können in diesem Bereich wie gewohnt weiter genutzt werden.

HERA Ost ab 15.12.2003:

- Raum 100 (Experimentierhalle)

Alle bisherigen Kontrollbereiche im abgeschalteten Zustand bleiben weiterhin unverändert bestehen. Die Einrichtung der Kontrollbereiche im Süden, Westen und Osten ist am 15.12.2003 vorgesehen. Dann werden ausreichend Personendosimeter zur Verfügung stehen.

Test of Fast HERA BPM Alarms

Thursday, Nov27, 2003

Test

Test with 2mA Protons in 10 bunches

at 920Gev

Luminosity Optics

Method: Switch of the GA-Power supply in HERA North (turning of pulse-control)

In each Quadrant 8 consecutive BPM's in both planes (hor.&vert.) activated

Test 1: 'Alarm Threshold 57 bit @ +6.5mm, -3.8mm

Test 2: 'Alarm Threshold 37 bit @ +3.5mm, -2.1mm

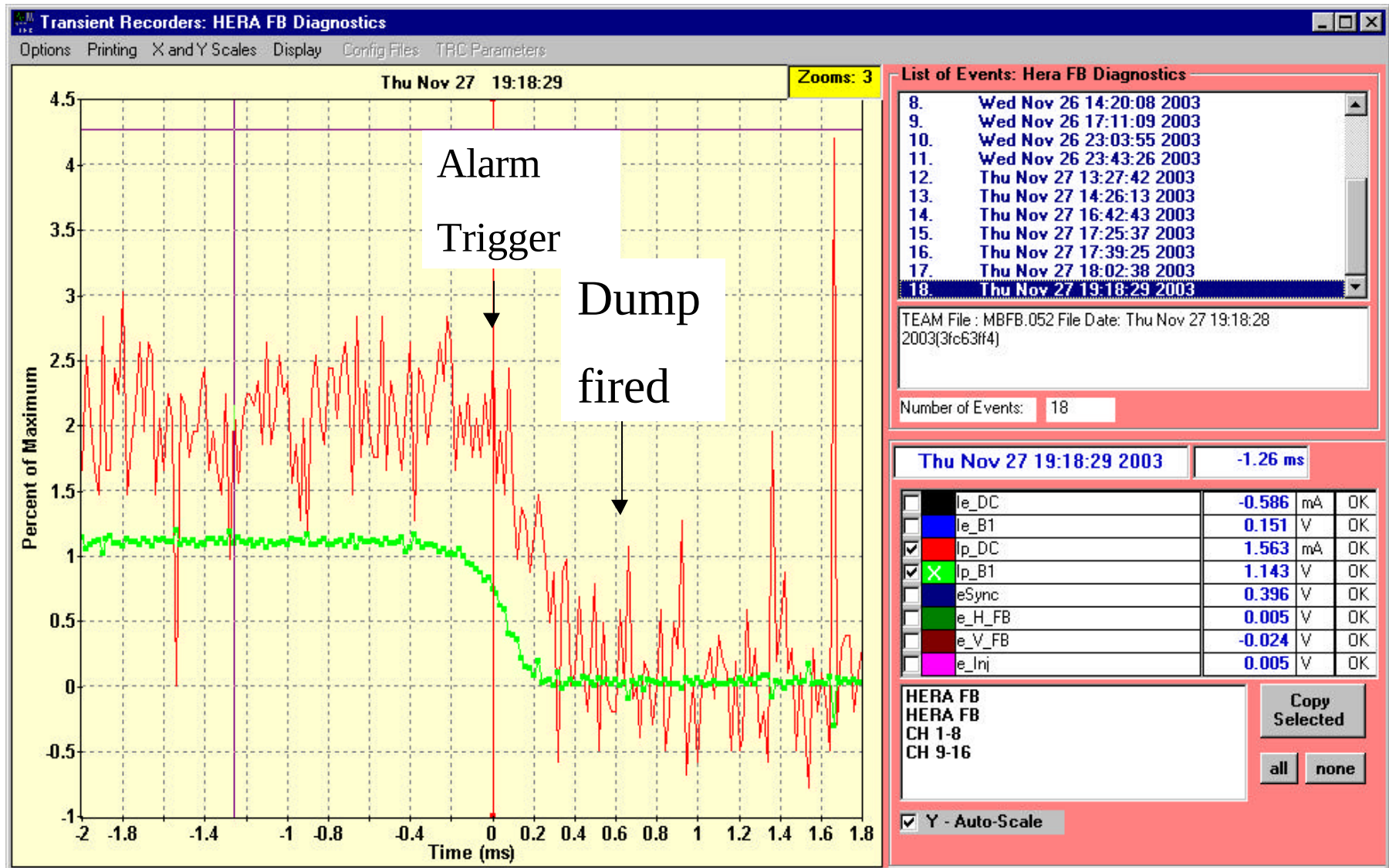
Orbit values in low Beta-Quadrupoles North: $x = 2..4 \text{ mm}$

$y = 1...3 \text{ mm}$

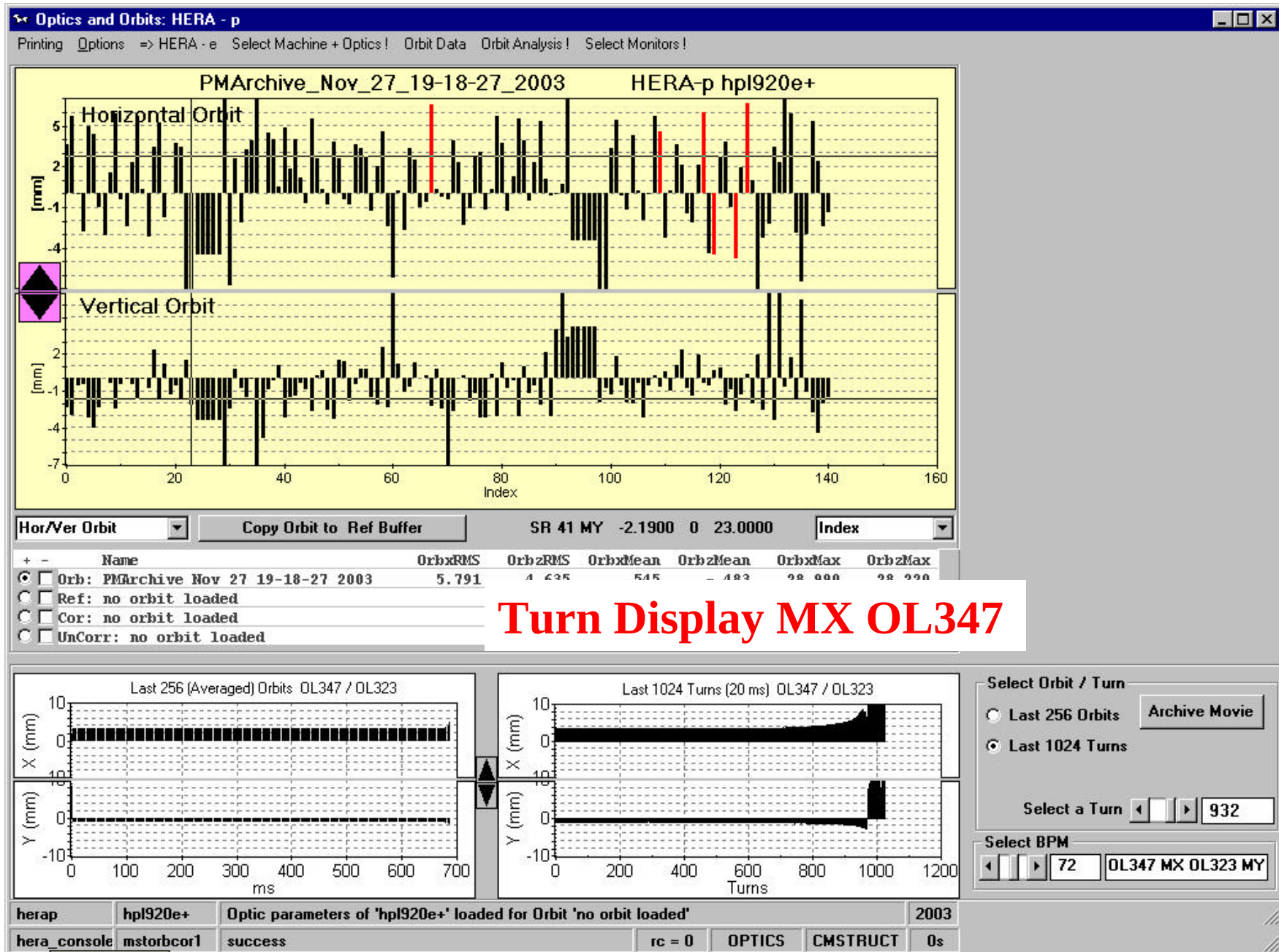
➔ kick $\sim 0.1 \text{ mr}$ for 100% reduction in Magnet current @ 33mm orbit in the arc, 5mm orbit after 14% decay of magnet current

1st Test: Threshold at 6.5mm,-3.8mm : HERA-p Beam Current

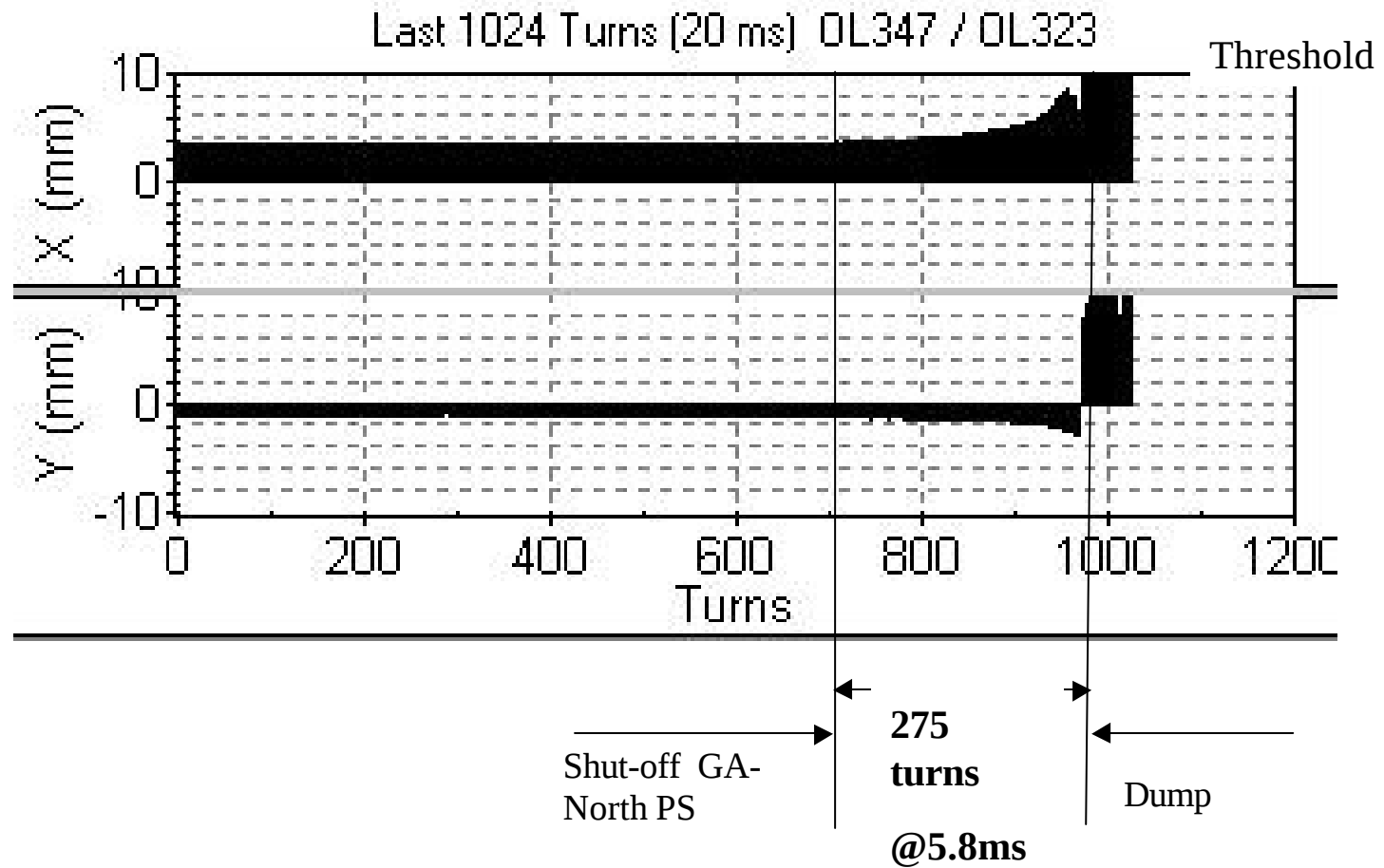
red: DCCT, Green: Horn Monitor



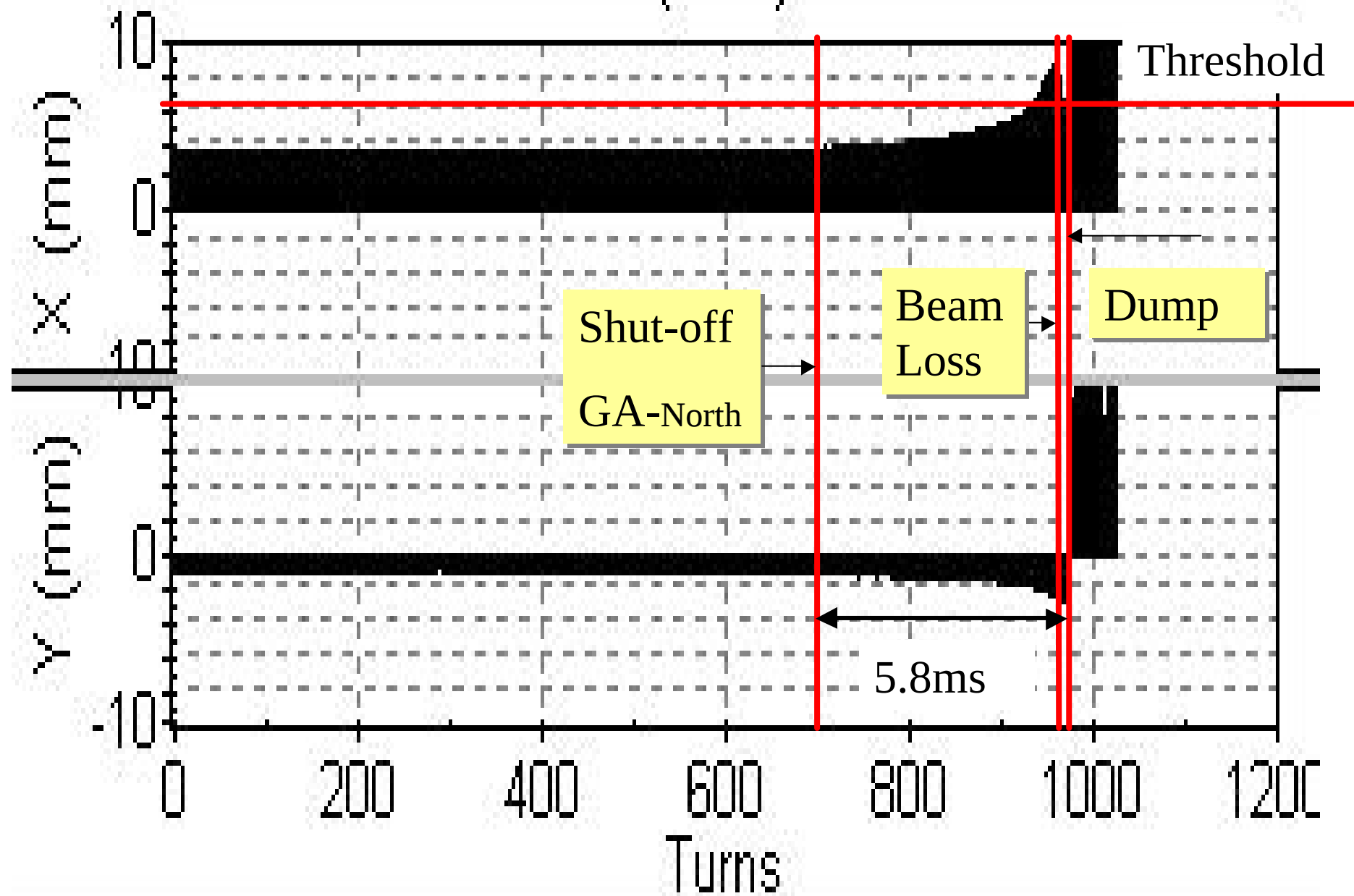
Beam Orbit Summary immediately before Dump



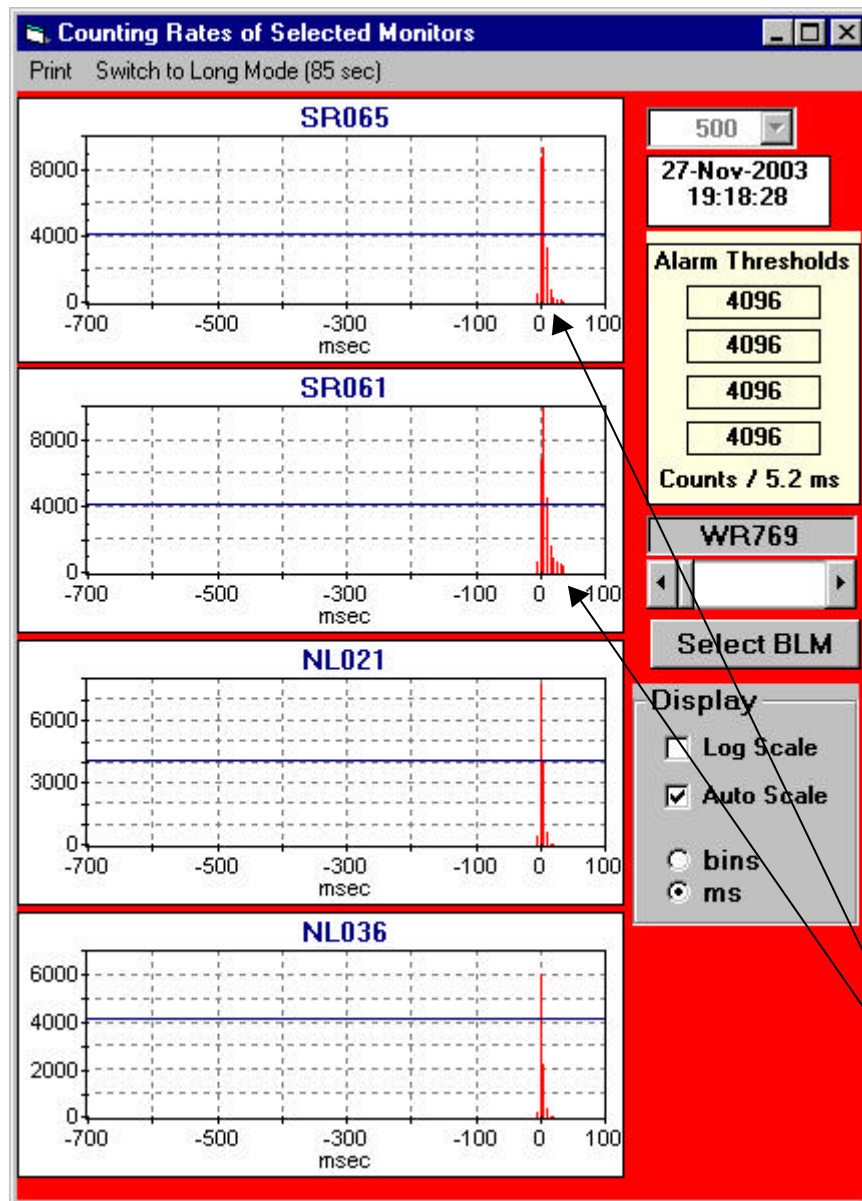
Test 1



Last 1024 Turns (20 ms) OL347 / OL323



1st Test



Archive Alarm Analysis

Print 3-D Chart ErrorList Help?

Which BLMs Triggered The Alarm?

Search/Test Criteria

Start Search

Start+Stop Bins: **Threshold:**

BLMs Found Before Dump After Dump Ratio of Test to ALRM Threshold

19 4 1 1.00

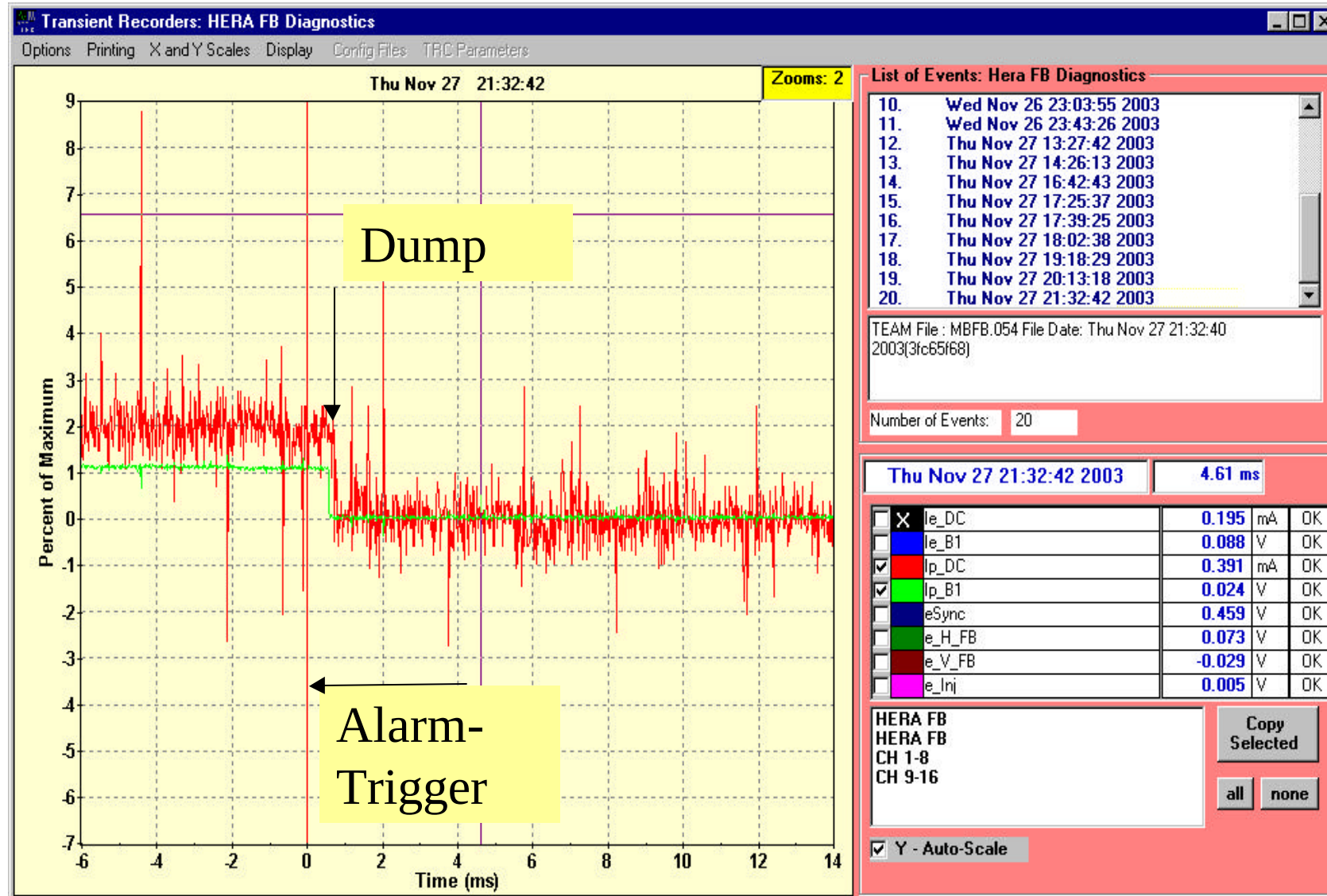
Archive: 27-Nov-2003 19:18:28 920 GeV

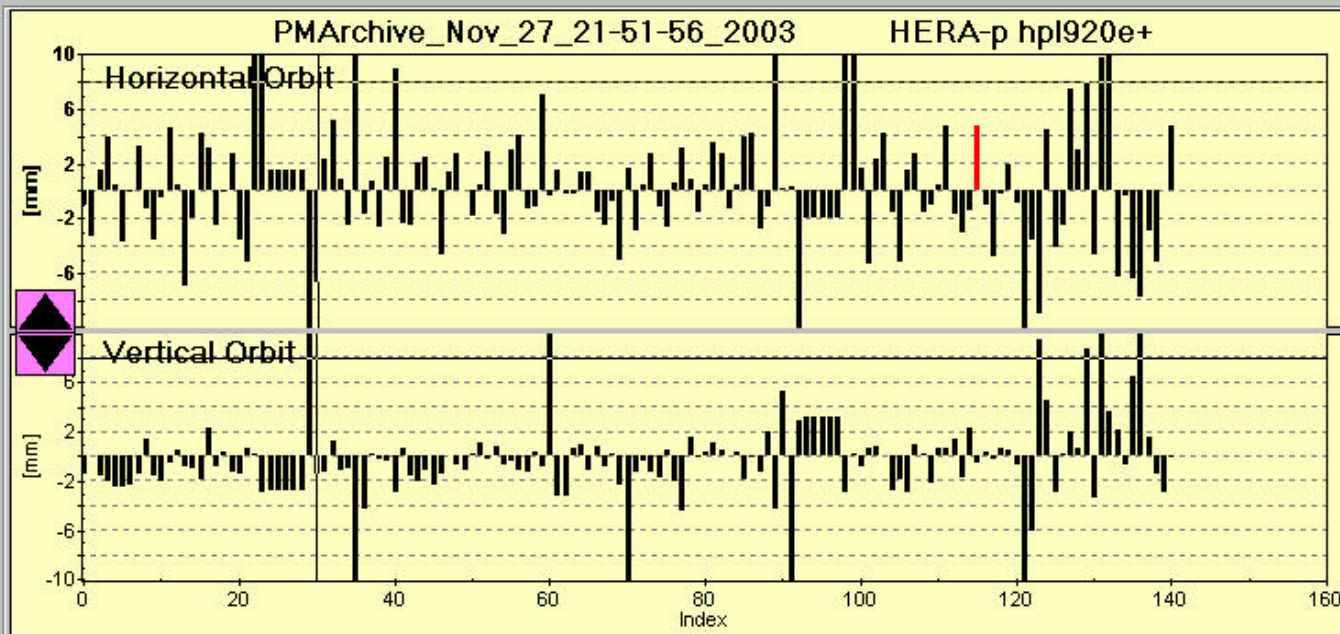
BLM	ALRM	-4	-3	-2	-1	Dump?	1
WR604	128	0	0	0	0	148	0
WR322	128	0	0	0	0	155	4
SR065	4096	0	0	0	548	8786	9385
SR061	4096	0	0	0	736	6868	10005
SR048	4096	0	0	0	49	3759	9184
SR036	4096	0	0	0	0	2805	10579
SR021	4096	0	0	0	0	3087	8973
SL021	4096	0	0	0	0	278	5572
SL274	128	0	0	0	0	261	23
SL369	128	0	0	0	9	149	0
NR061	4096	0	0	0	0	742	5033
NR021	4096	0	0	0	272	5071	1245
NL015	4096	0	0	0	137	3974	5480
NL021	4096	0	0	0	517	7788	4162
NL036	4096	0	0	0	295	6107	2278
NL274	128	0	0	0	0	171	10

Dirty loss with activation

2nd Test Threshold at 3mm,-2mm : HERA-p Beam Current

red: DCCT, Green: Horn Monitor

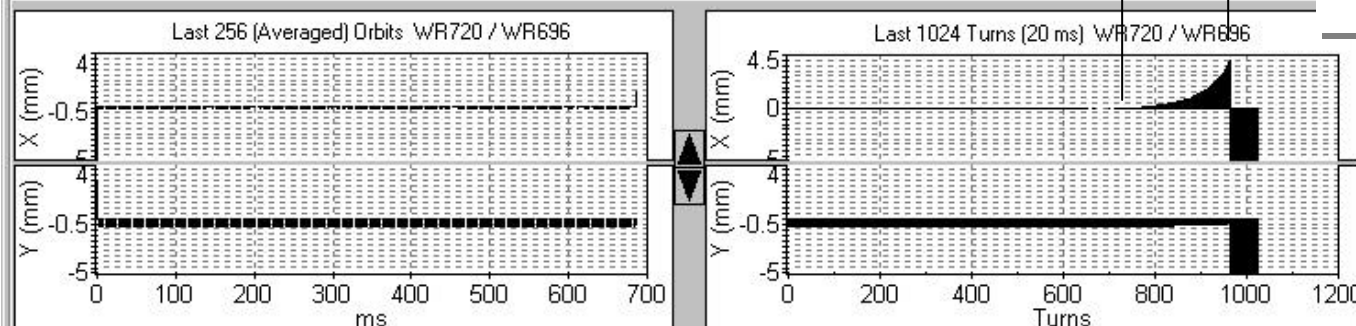


2nd Test

Hor/Ver Orbit SL 61 MX -6.8000 0 30.0000 Index

+ -	Name	OrbxRMS	OrbzRMS	OrbxMean	OrbzMean	OrbxMax	OrbzMax
☒	Orb: PMArchive Nov 27 21-51-56 2003	5.693	5.527	.222	-.114	-23.040	30.031
☐	Ref: PMArchive Nov 27 21-51-56 2003	4.443	5.026	.092	.186	-33.860	30.031
☐	Cor: no orbit loaded						
☐	UnCorr: no orbit loaded						

ca 200 turns,
4.2ms



☐ Last 256 Orbits

☒ Last 1024 Turns

Select a Turn

Select BPM WR720 MX WR696

herap hpl920e+ difference orbit 'PMArchive_Nov_27_21-51-56_2003' - 'PMArchive_Nov_27_21-51-56_2003' 2003

hera_console mstorbcor1 success

rc = 0

OPTICS

CMSTRUCT

0s

Summary of Tests

Tight alarm BPM thresholds of 3mm needed to provide a certain protection

Some software modifications necessary to implement BPM alarms in operating scenario

The time between A1-Alarm and dump is very long , 600 μ s which makes it very difficult for any system which is detecting signals from the beam

Yesterday's 20mA p-Beam Loss

- HERA West Trailer 2. Floor 0.25 mSv
Neutronen dose (KB)
- HERA South Zeus Control Room 0.18 mSv
Neutronendose

HERA Preliminary Schdule 2004

	Start	Dt / 8h	End
Start-up	29.12.2003 07:00	15	03.01.2004 07:00
Luminosity Run	03.01.2004 07:00	99	05.02.2004 07:00
<i>Maintenance Day</i>	05.02.2004 07:00	2	05.02.2004 23:00
Luminosity Run	05.02.2004 23:00	82	04.03.2004 07:00
<i>Maintenance Day</i>	04.03.2004 07:00	2	04.03.2004 23:00
Luminosity Run	04.03.2004 23:00	82	01.04.2004 07:00
<i>Maintenance Day</i>	01.04.2004 07:00	2	01.04.2004 23:00
Luminosity Run	01.04.2004 23:00	103	06.05.2004 07:00
<i>Maintenance Day</i>	06.05.2004 07:00	2	06.05.2004 23:00
Luminosity Run	06.05.2004 23:00	82	03.06.2004 07:00
<i>Maintenance Day</i>	03.06.2004 07:00	2	03.06.2004 23:00
Lumirun	03.06.2004 23:00	82	01.07.2004 07:00
<i>Maintenance Day</i>	01.07.2004 07:00	2	01.07.2004 23:00
Lumirun	01.07.2004 23:00	136	16.08.2004 07:00
<i>Shutdown</i>	16.08.2004 07:00	160	08.10.2004 15:00
Start-up & Studies	08.10.2004 15:00	45	23.10.2004 15:00
Lumirun	23.10.2004 15:00	35	04.11.2004 07:00
<i>Maintenance Day</i>	04.11.2004 07:00	2	04.11.2004 23:00
Lumirun	04.11.2004 23:00	82	02.12.2004 07:00
<i>Maintenance Day</i>	02.12.2004 07:00	2	02.12.2004 23:00
Lumirun	02.12.2004 23:00	37	15.12.2004 07:00
Machine studies	15.12.2004 07:00	24	23.12.2004 07:00

Preliminary

