



Saturation with LHC-Beam on the SPS Beam Current Transformers

AB/BDI - Day

CERN - 14th January 2004

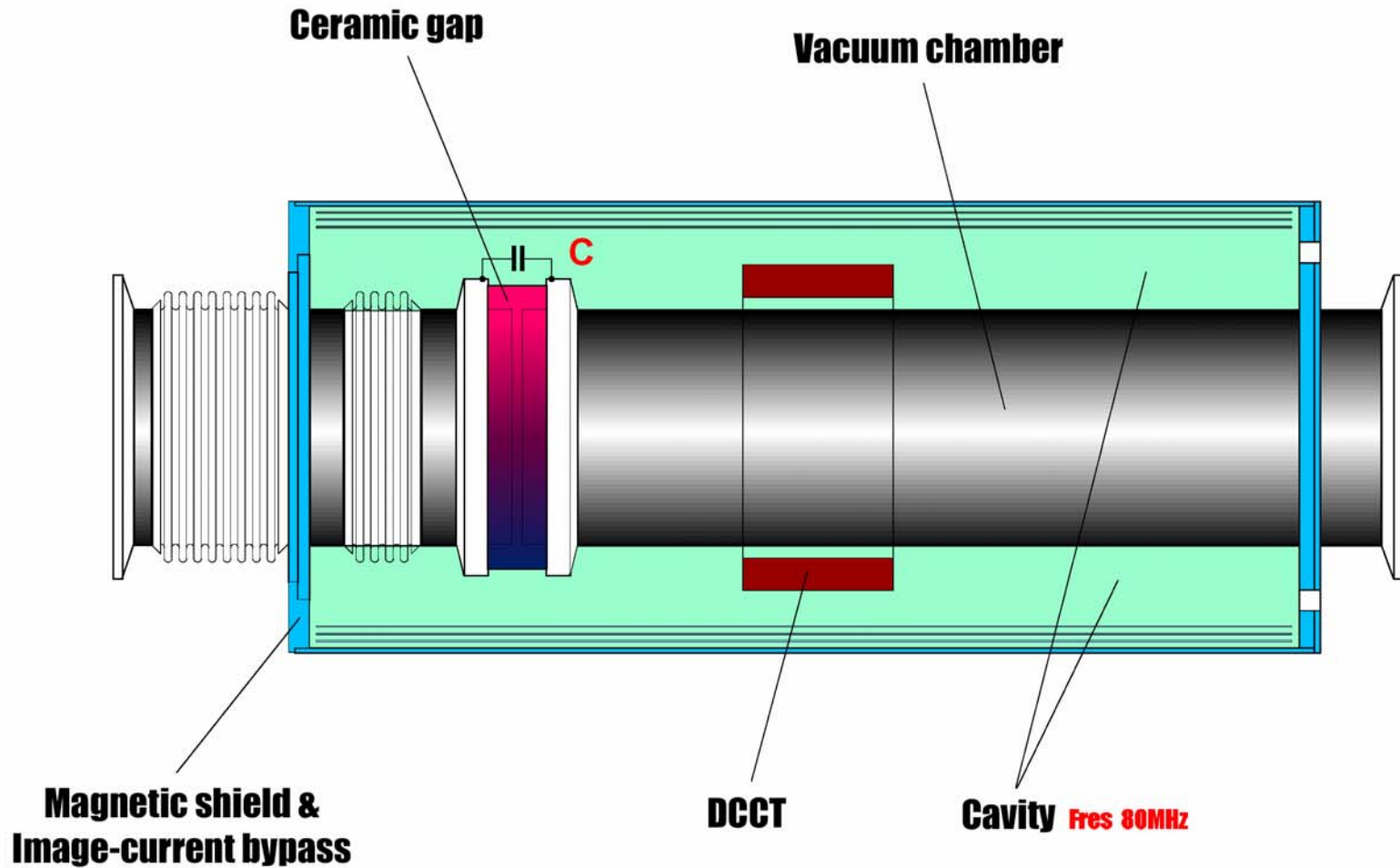


Outline

- 2002
 - first nominal LHC batches, saturation after 2nd injection above $0.8E13$ p/batch ($1.1E11$ protons/ bunch)
- During shut down 02-03
 - construction of a Test-Setup for investigation
 - damping of the cavity excitation & measurements
- 2003
 - saturation after 3rd injection above $0.8E13$ p/batch
- During shut-down 03-04
 - studies with new Test-Setup with beam equivalent intensities
- Conclusion

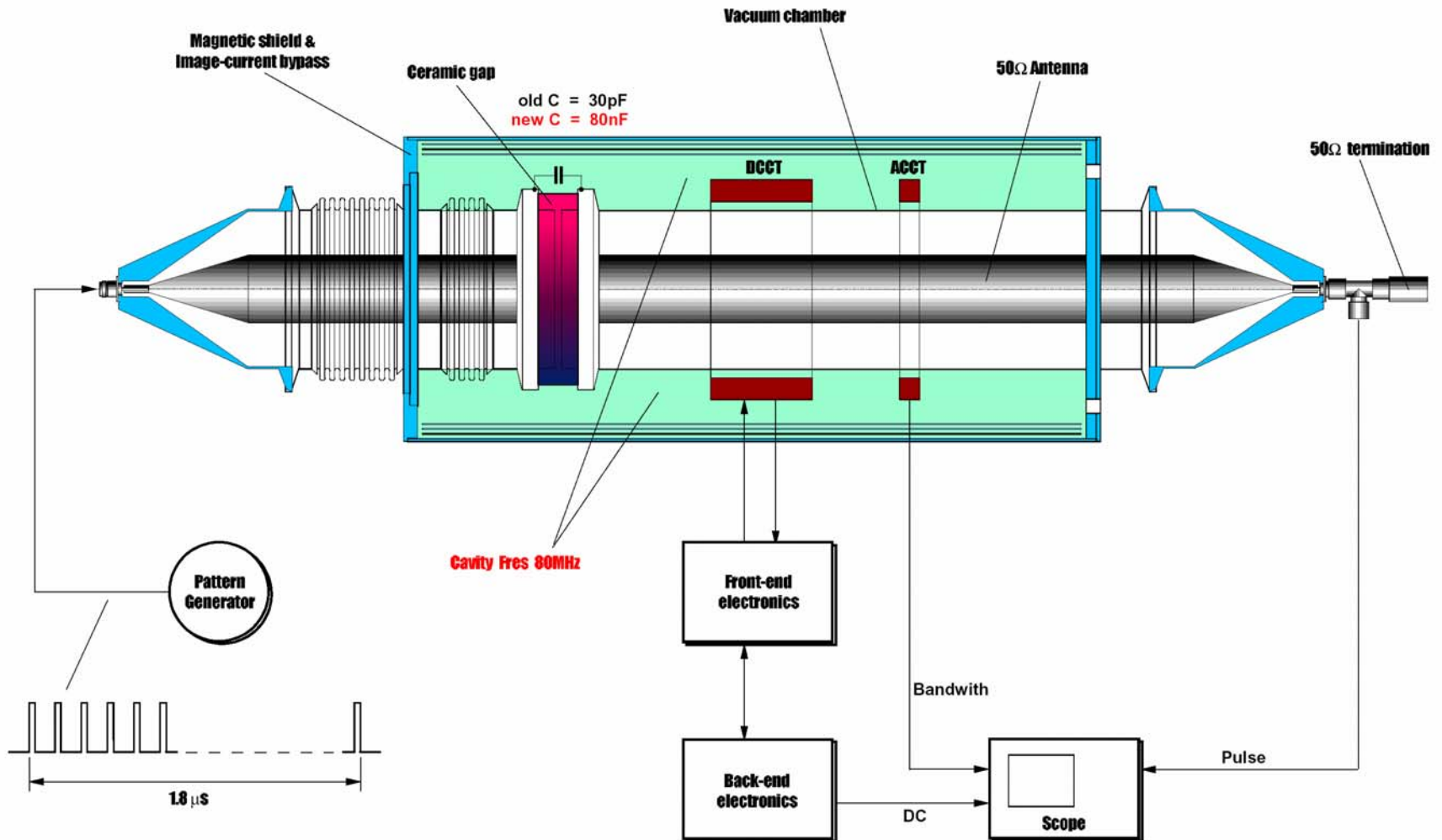


SPS DCCT Assembly





First Test-Setup for investigation

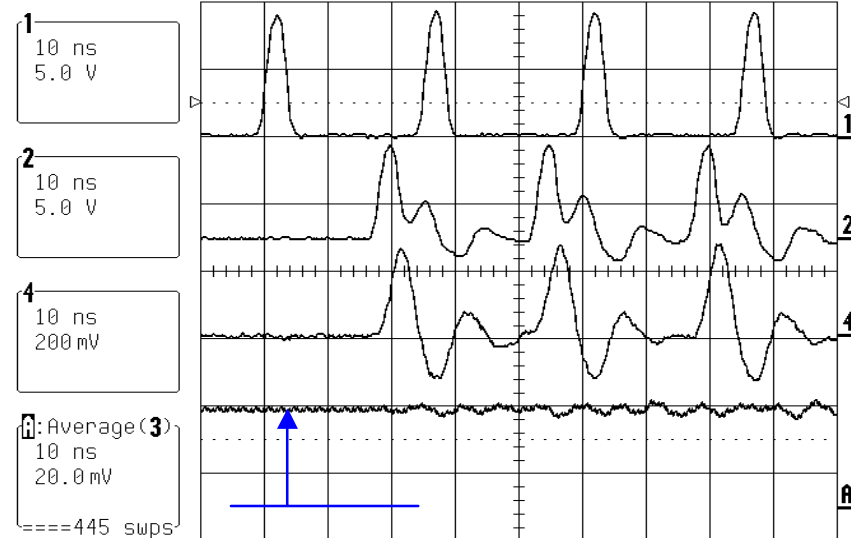




Damped cavity excitation on BCT 1

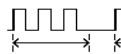
BCT 11601 without added capacitor on gap
C = 30pF Simulated LHC batch

4-Feb-03
18:43:27

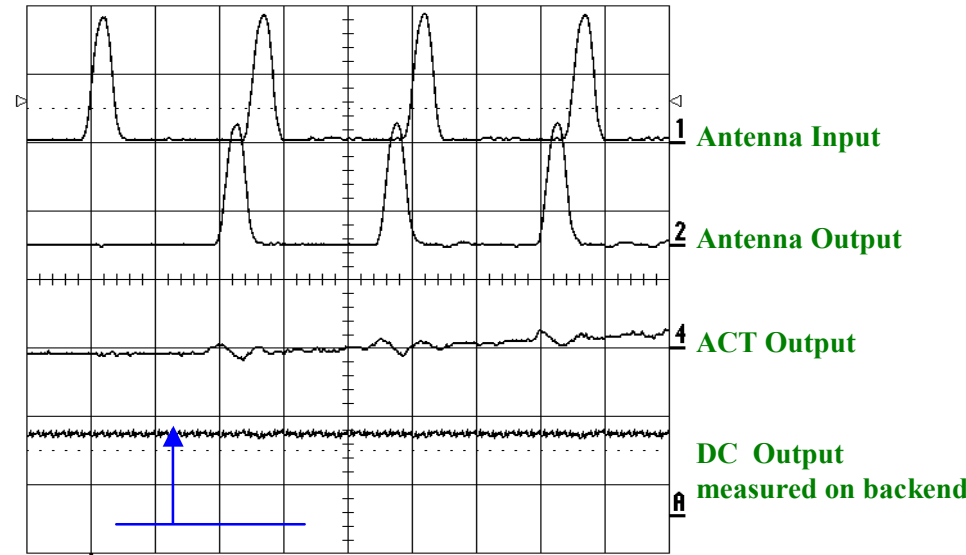


10 ns RIS

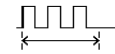
- 1 5 V 50Ω
- 2 5 V 50Ω
- 3 20 mV DC
- 4 .2 V 50Ω

 1 DC 2.7 V
H'off 4.20 μs

BCT 11601 with added capacitor on gap
C = 80nF Simulated LHC batch



5 GS/s

 1 DC 3.0 V
H'off 10.8 μs

NORMAL



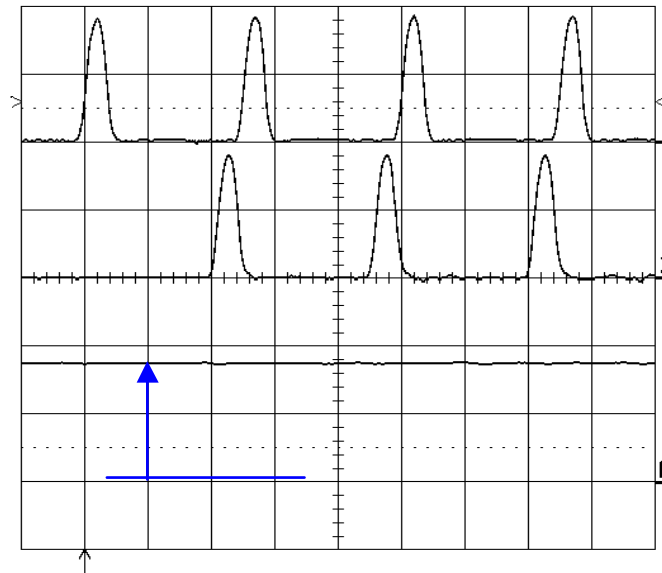
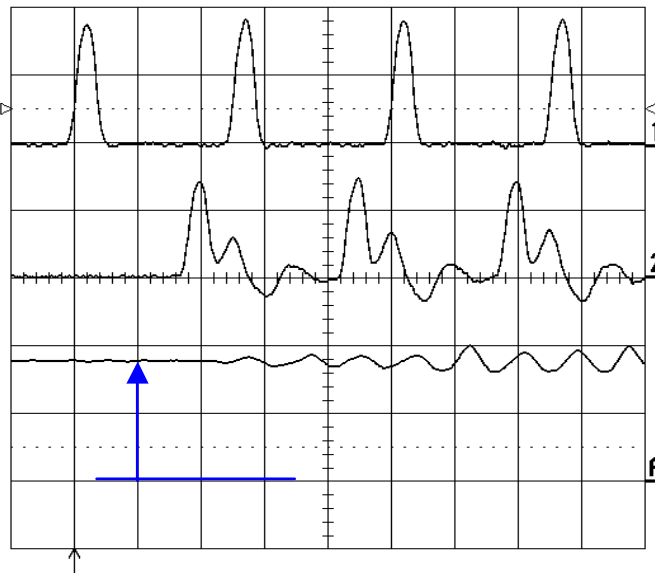
Damped cavity excitation on BCT 3

BCT 31832 without added capacitor on gap
C = 30pF
Simulated LHC batch

BCT 31832 with added capacitor on gap
C = 80nF
Simulated LHC batch

10-Feb-03
15:48:32

1 10 ns
5.0 V
2 10 ns
5.0 V
3 Average(3)
10 ns
20.0 mV
====341 swps



Antenna Input
Antenna Output
DC Output
measured on backend

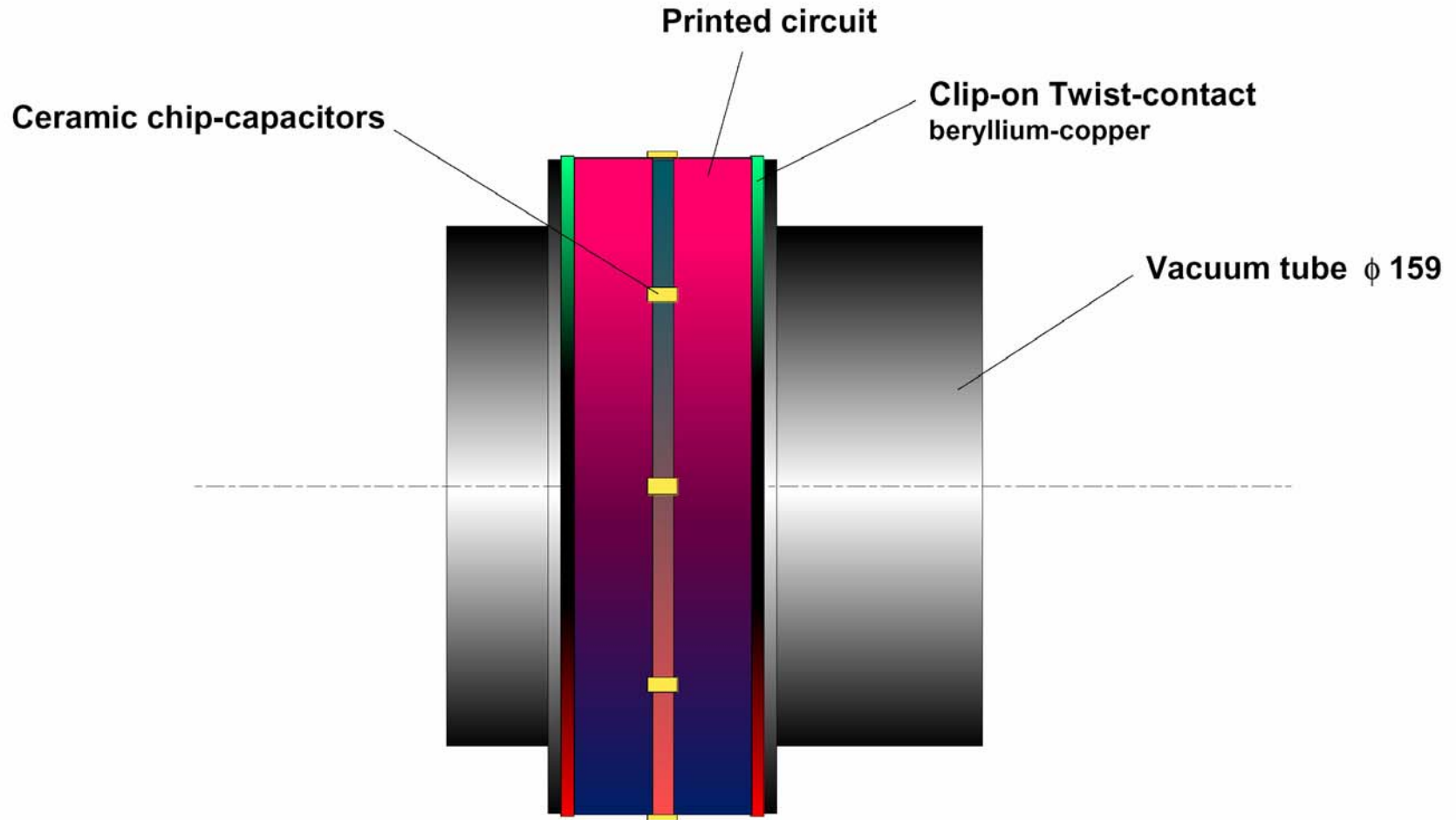
10 ns RIS
1 5 V 50Ω
2 5 V 50Ω
3 20 mV DC
4 .2 V 50Ω

5 GS/s

5
□ NORM □ NORMAL
1 DC 3.0 V
H' off 10.7 μs

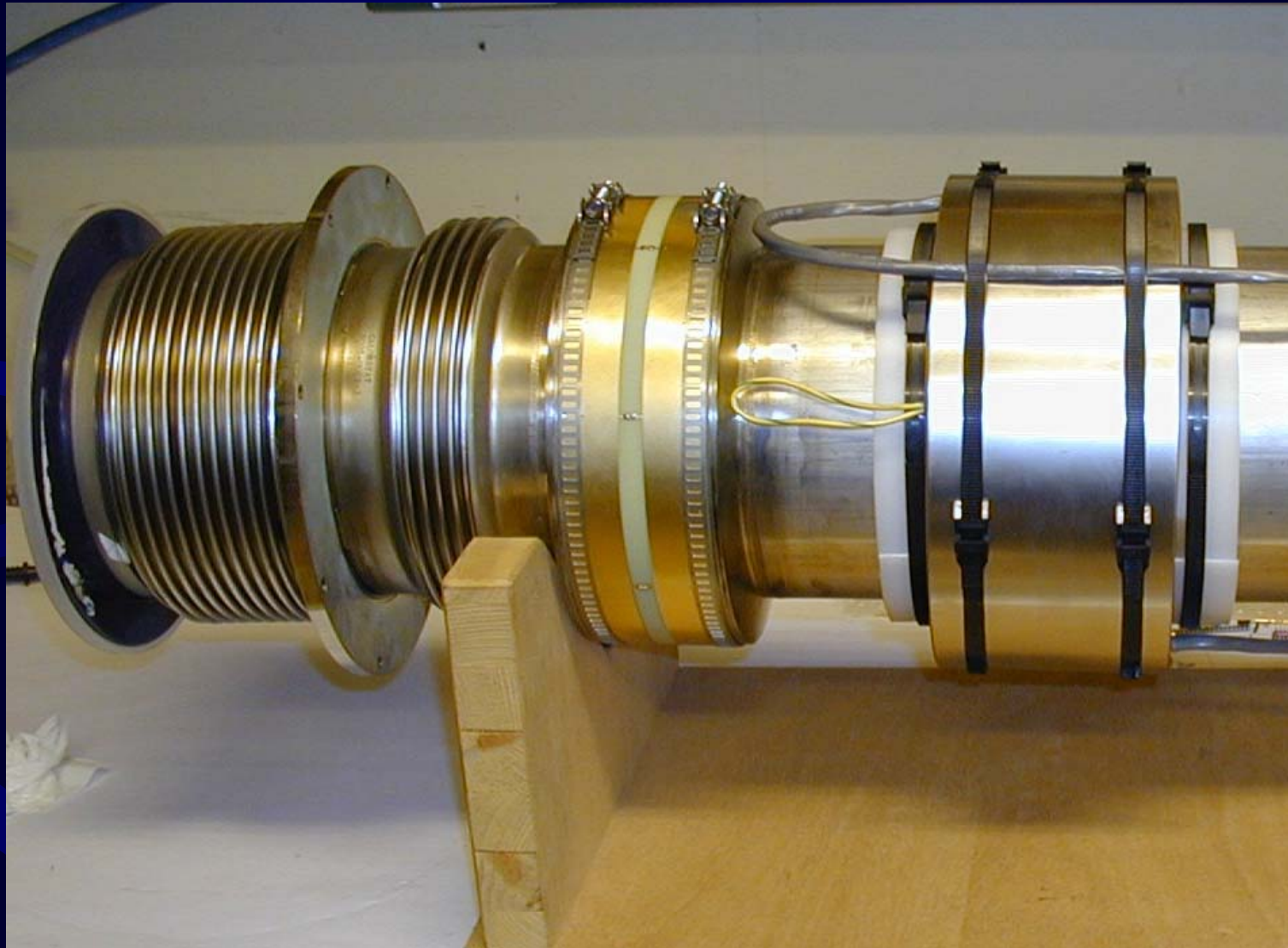


Gap capacitor construction



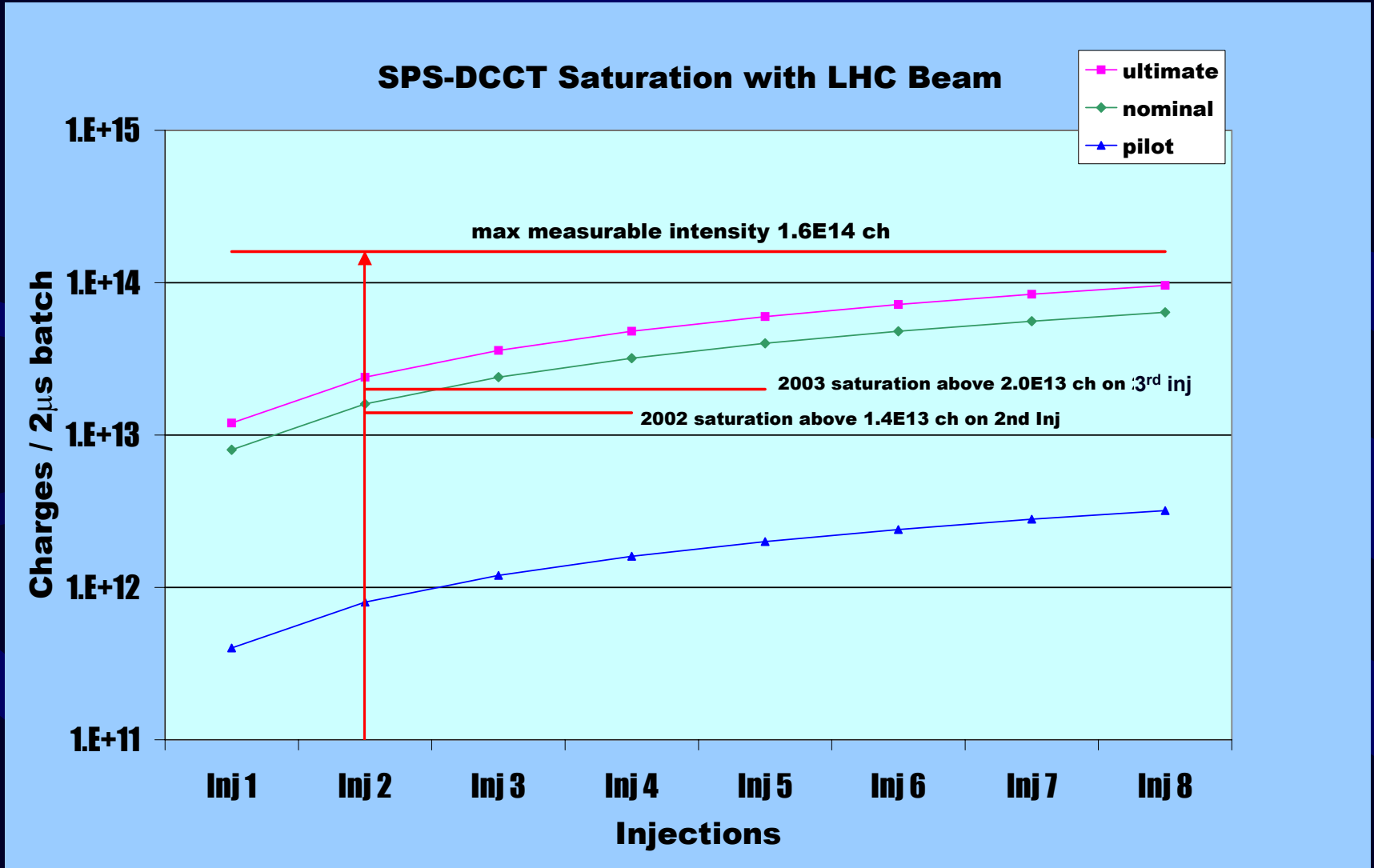


Mounted gap capacitor





Results before & after damping





Measured on BCT3 with nominal LHC-beam

4 injections 72 bunches each 1.1E11 ch/b

4-Jun-03
17:28:32

A: M1

10 ms
0.50 V

B: M2

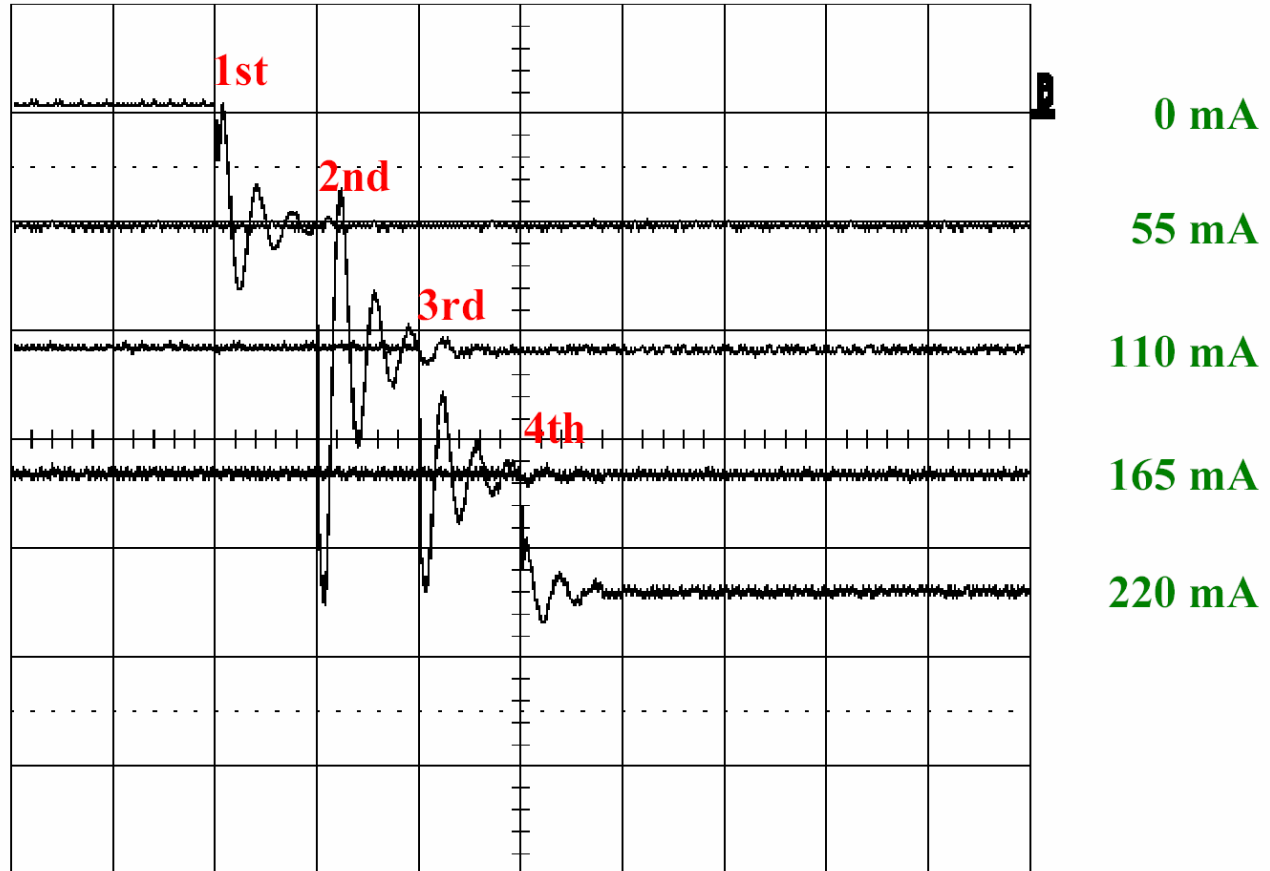
10 ms
0.50 V

C: M3

10 ms
0.50 V

D: M4

10 ms
0.50 V

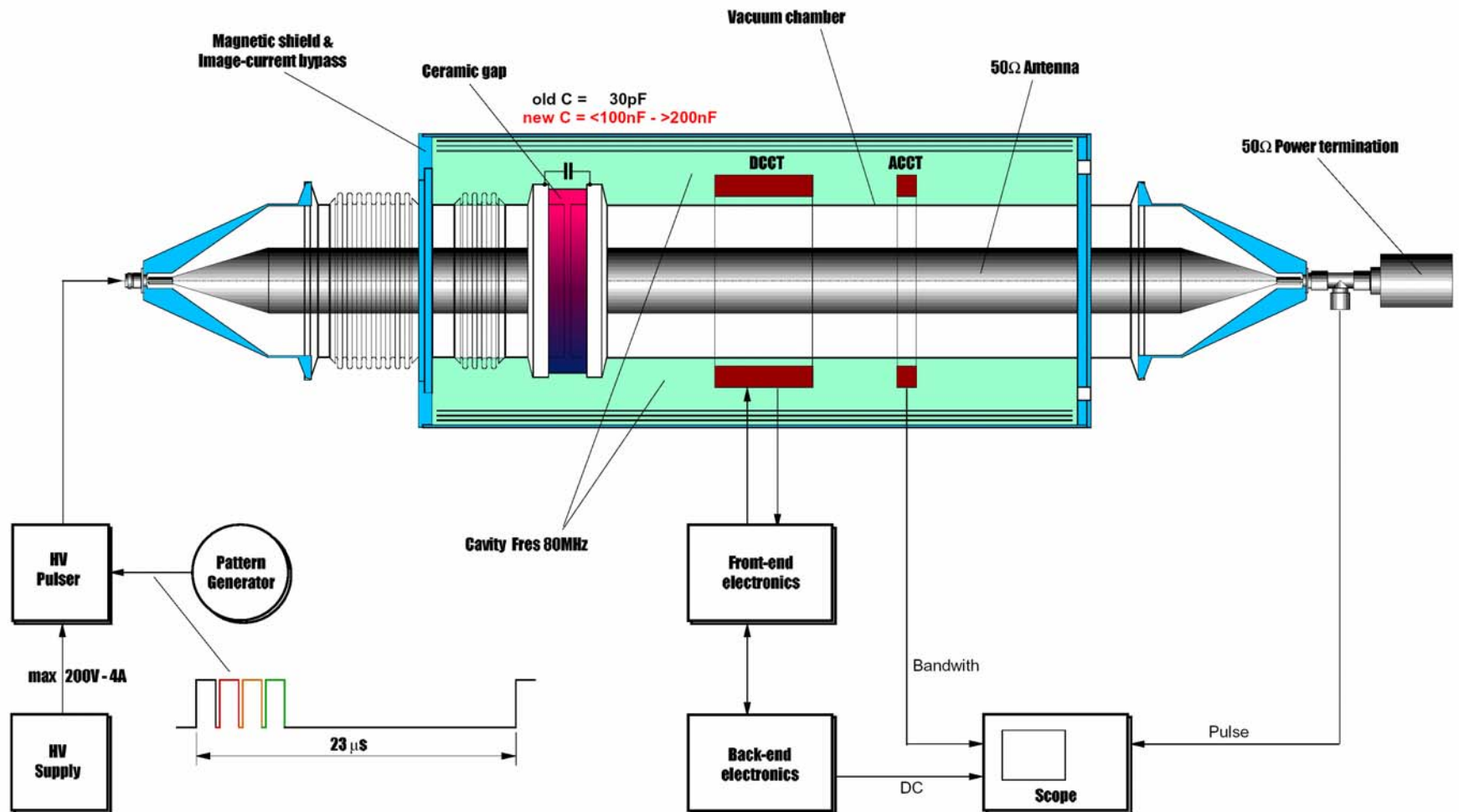


10 ms

← 10.750 s



New Test-Setup with beam equivalent intensities





Simulated nominal LHC-beam

4 batches 1.8us each

12-Jan-04
10:38:19

D: M4

10 ms
0.50 V

C: M3

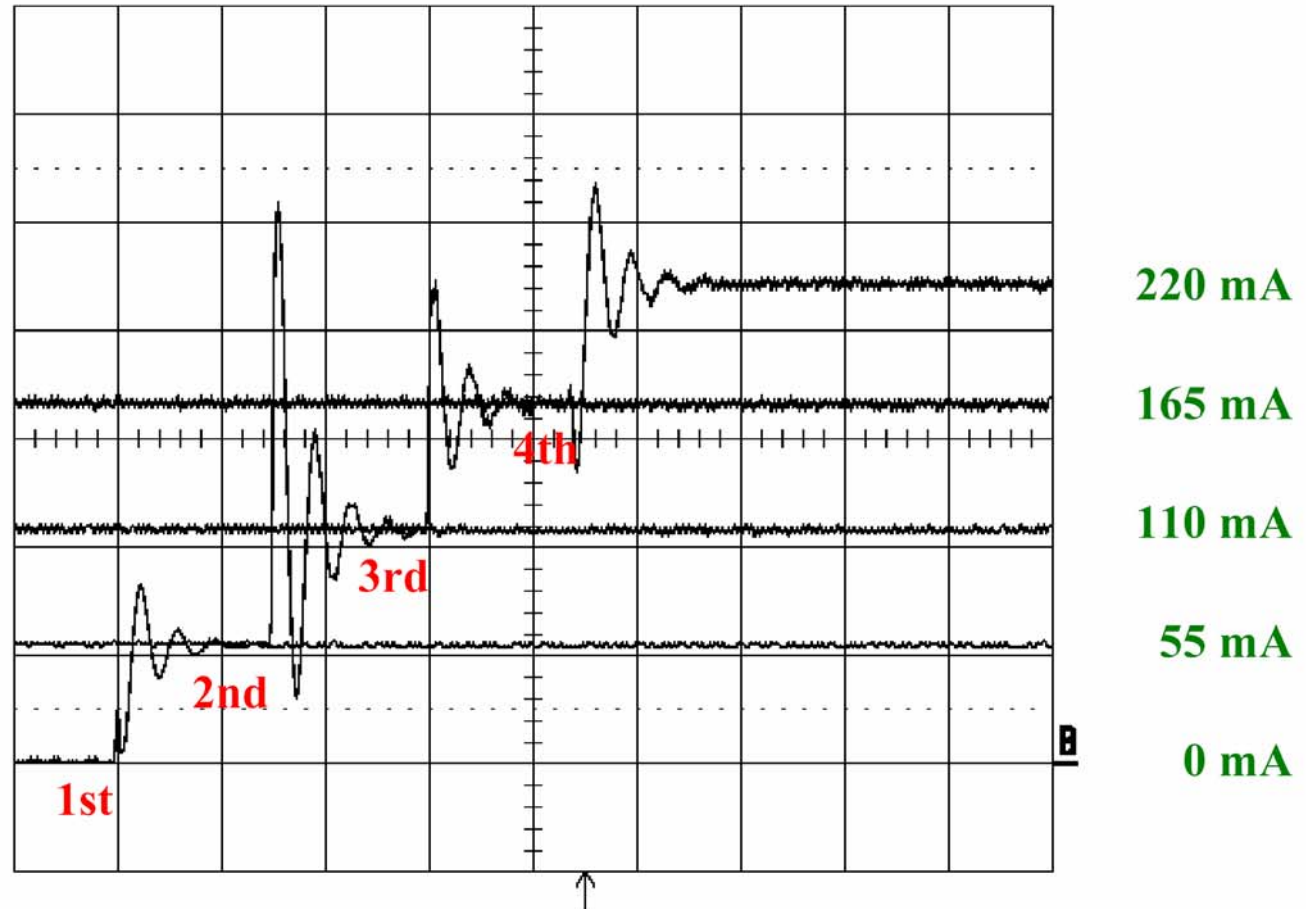
10 ms
0.50 V

B: M2

10 ms
0.50 V

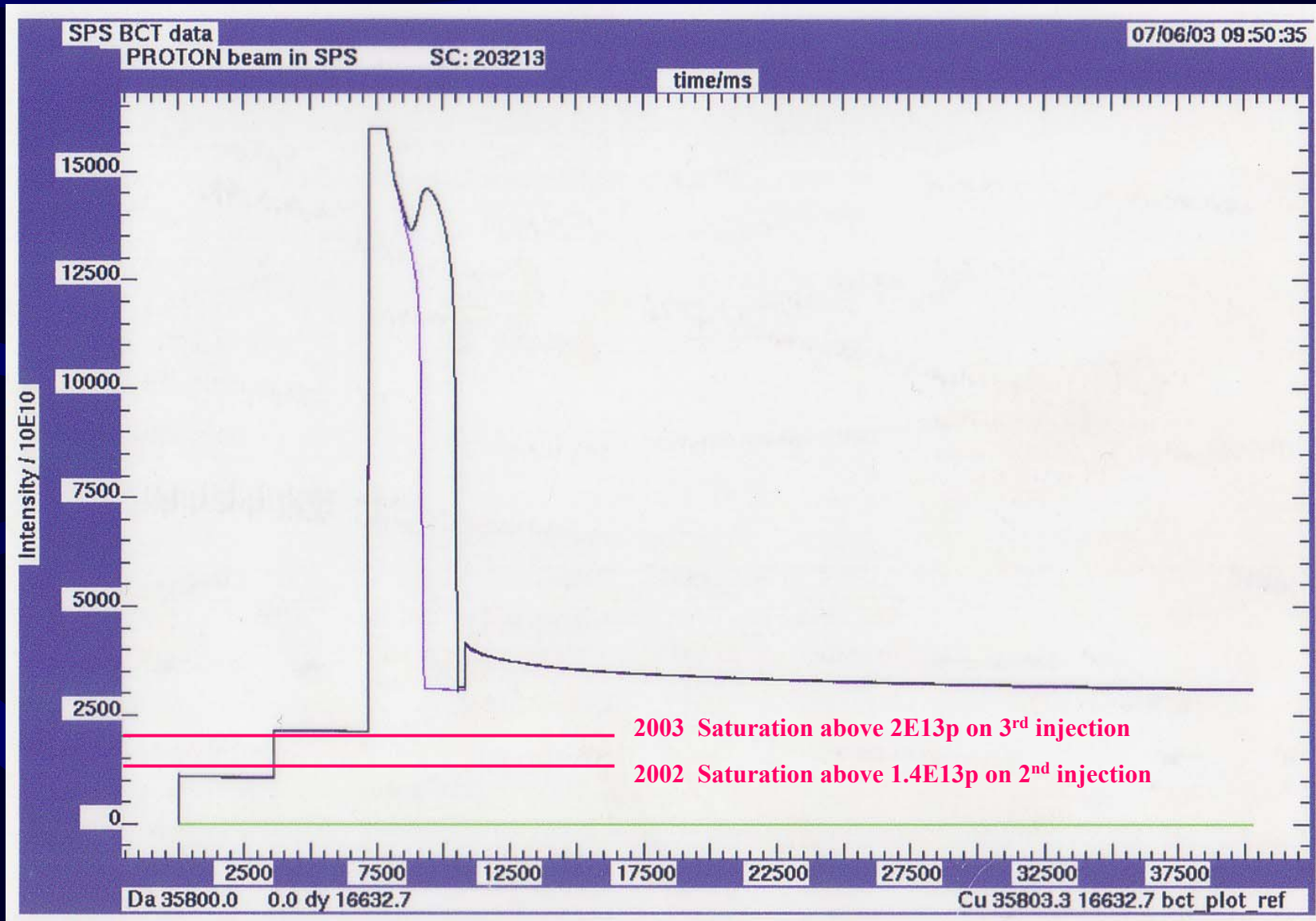
A: M1

10 ms
0.50 V





Saturation after 3rd batch (beam)





Saturation after 3rd batch (simulation)

3 batches 1.8us eatch eqvt 1.3E11p/bunch

12-Jan-04
11:24:55

D: M4

.2 s
1.00 V

C: M3

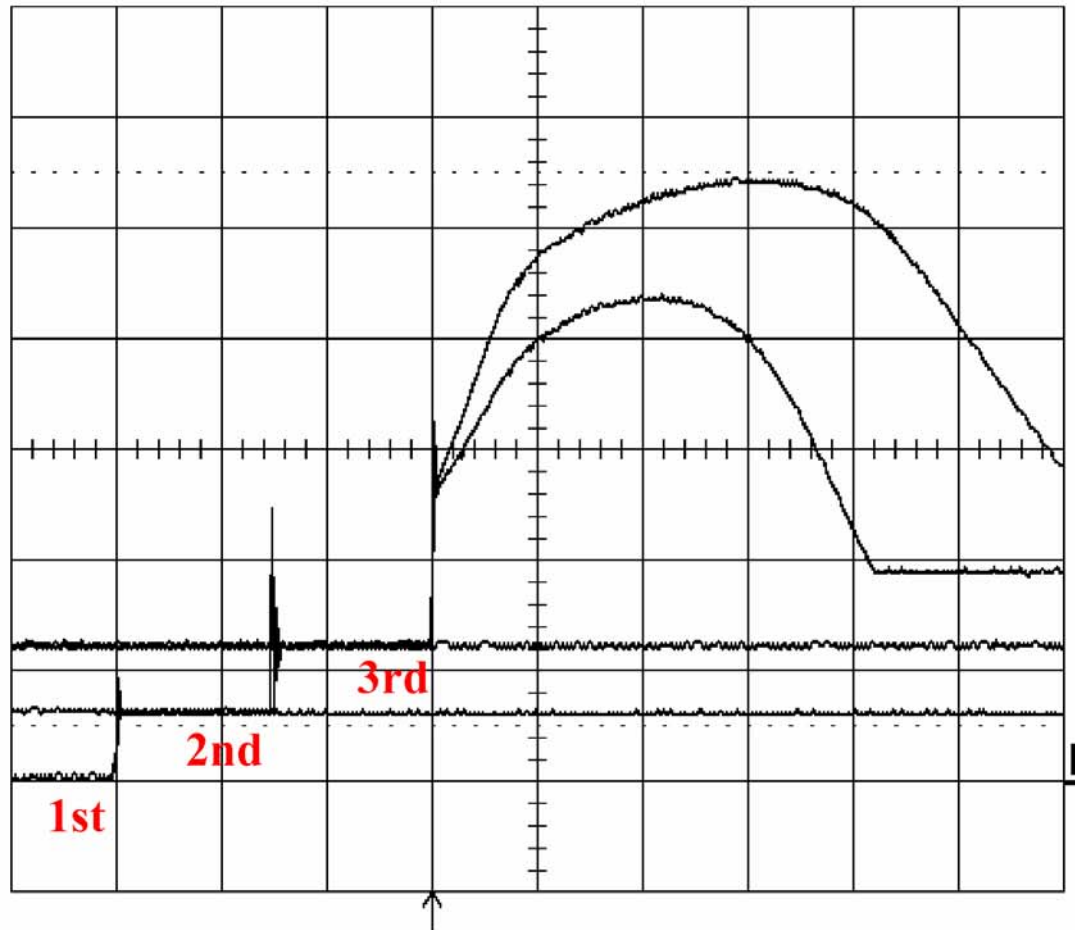
.2 s
1.00 V

B: M2

.2 s
1.00 V

A: M1

.2 s
1.00 V



190 mA
125 mA
63 mA
0 mA

.2 s