

ALBA vacuum system installation and commissioning

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On behalf of the vacuum Section at CELLS Engineering
Division

- Overview of the vacuum system of ALBA.
- Installation of the vacuum system.
- First results of the vacuum system commissioning.
- Problems.

Talk outline

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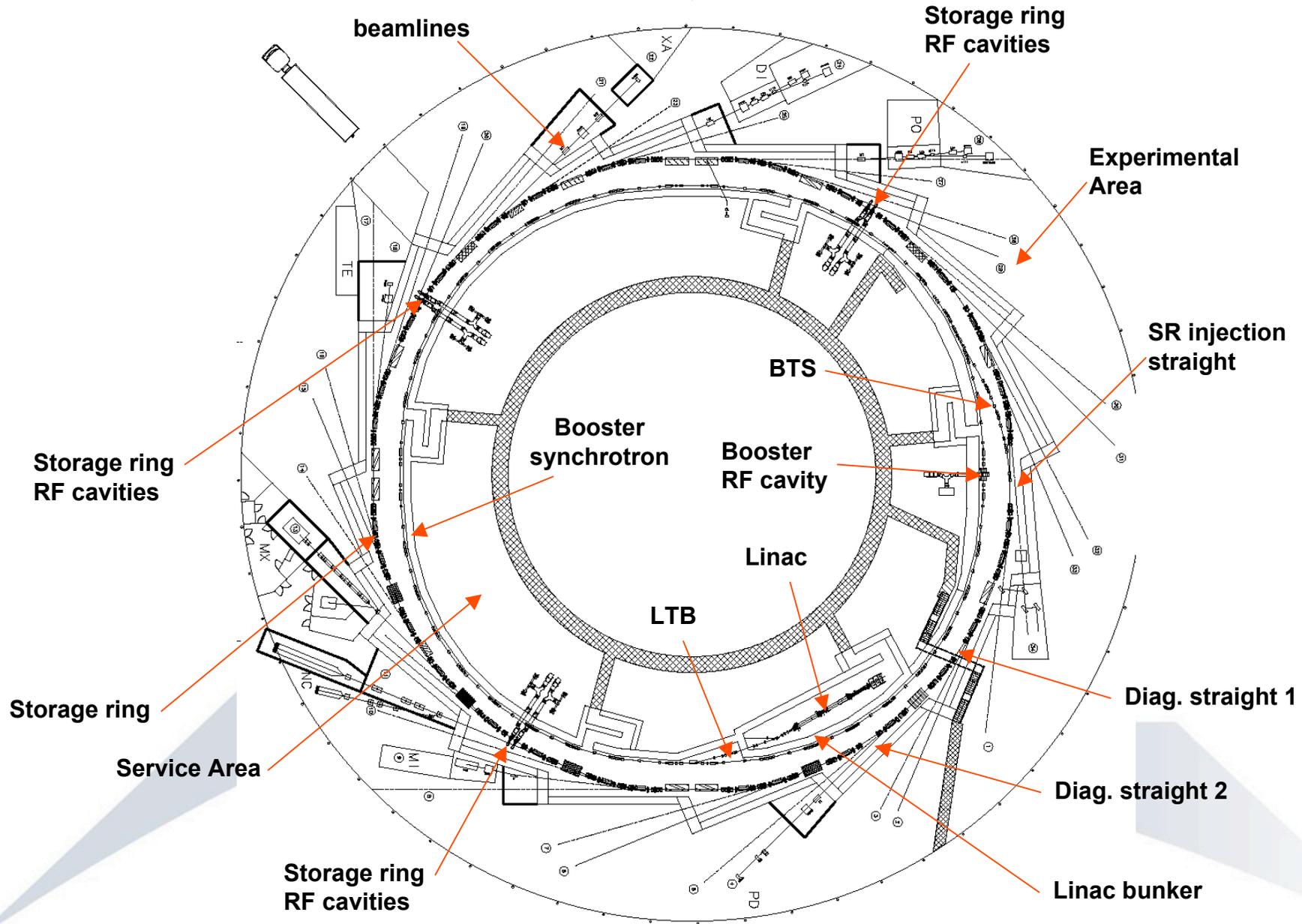




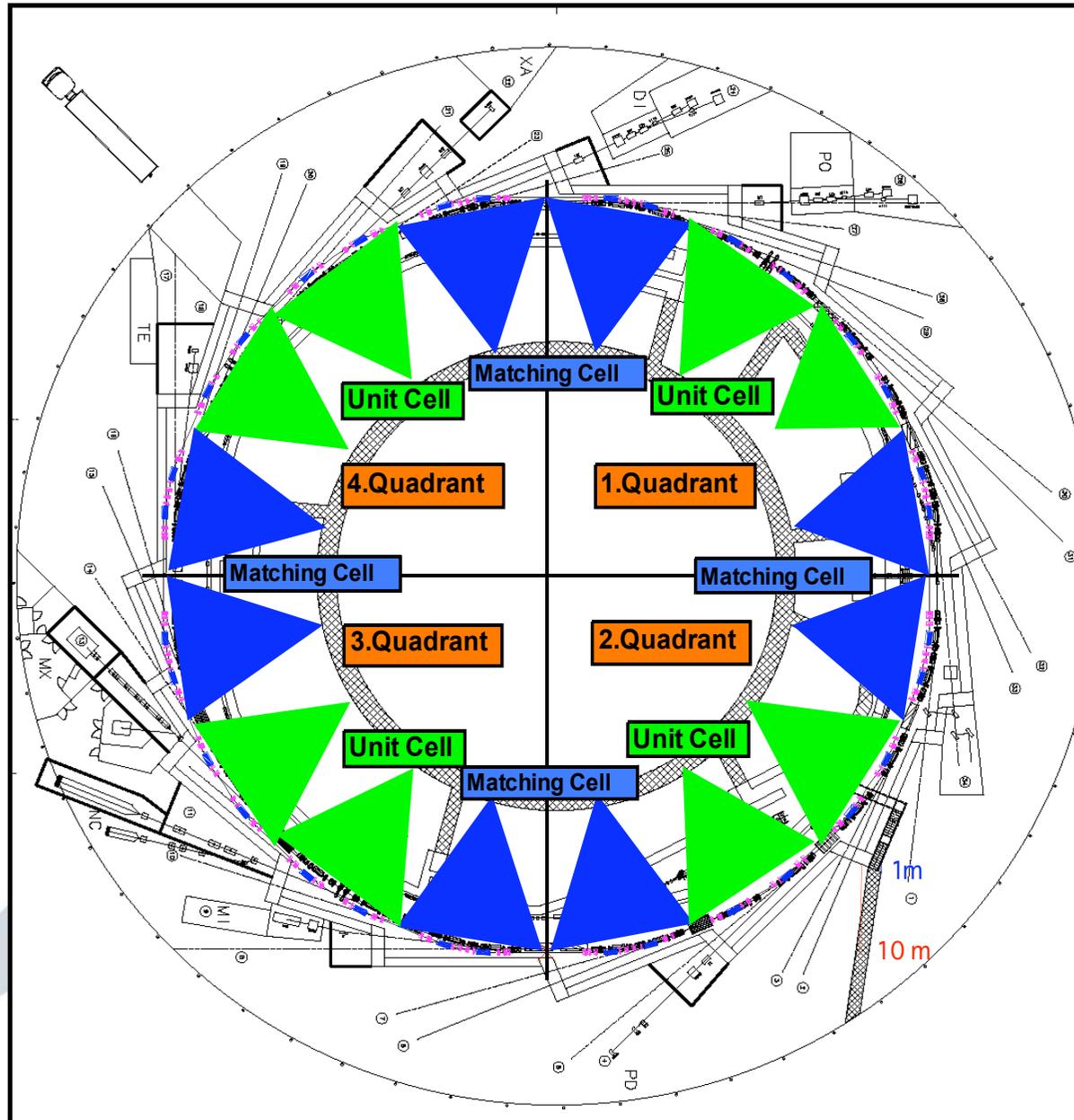




Accelerators layout



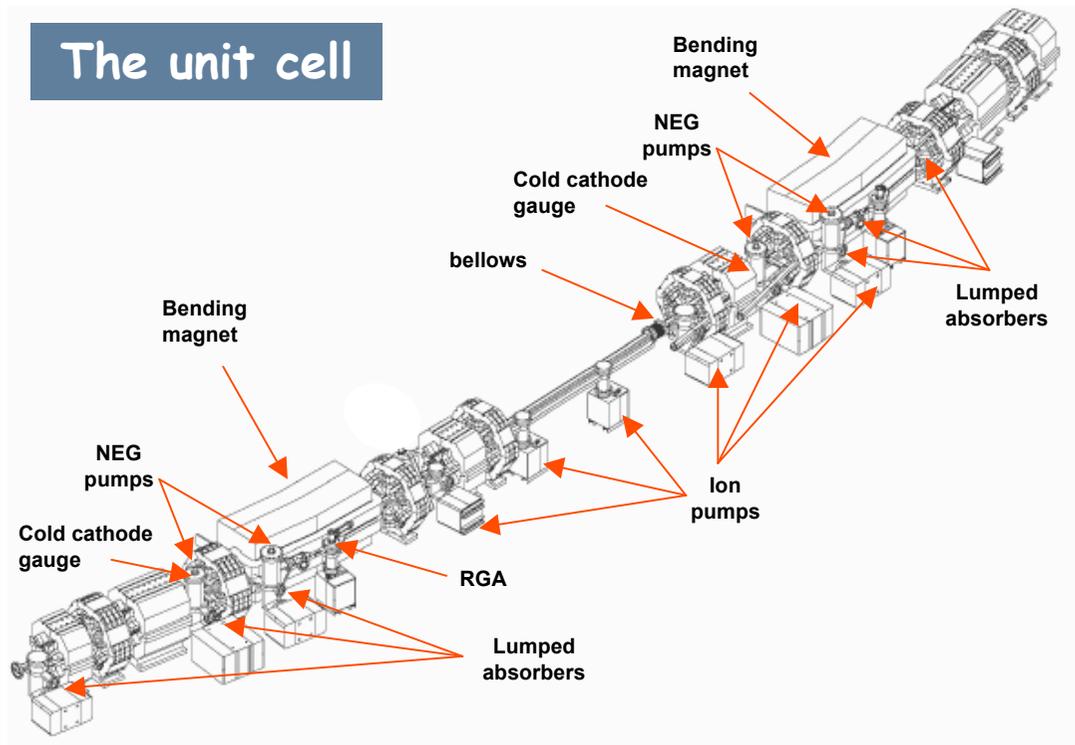
Storage ring layout



16 cells: 8 unit cells and 8 matching cells.

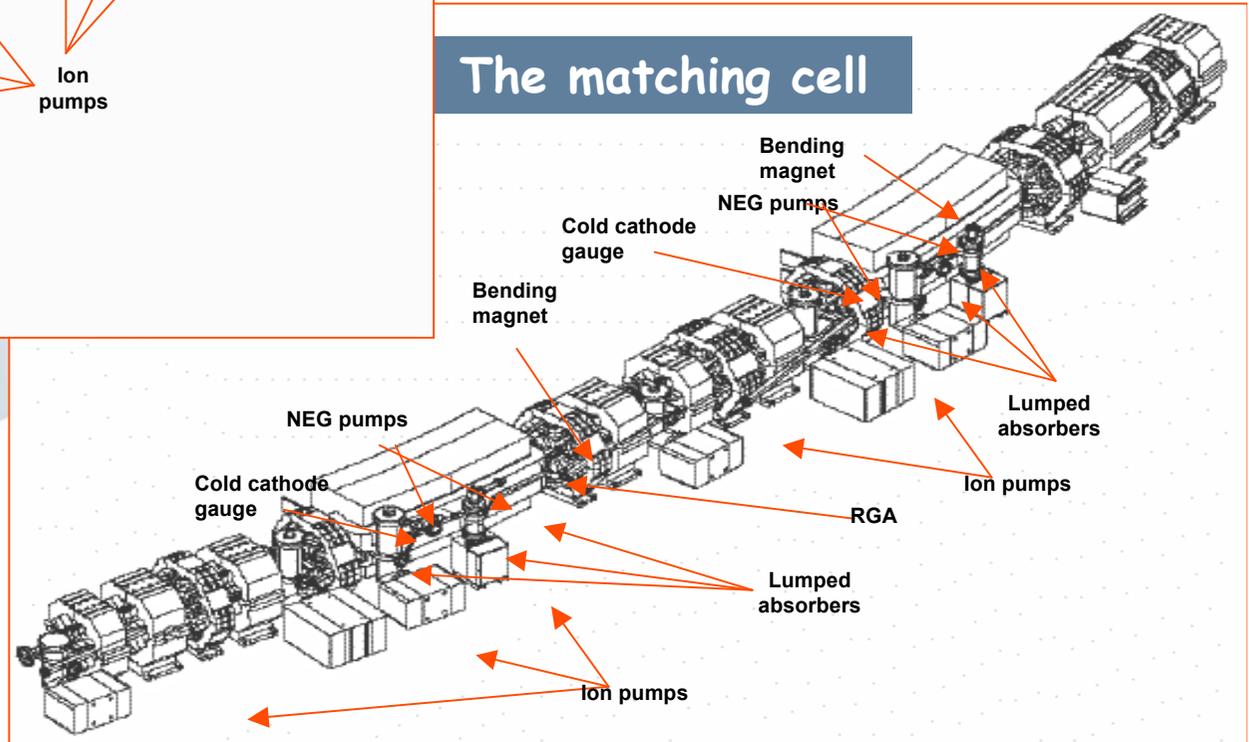
Storage ring layout

The unit cell



16 cells: 8 unit cells (length=13 m) and 8 matching cells (length=11 m)

The matching cell



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Storage ring Installation



Assembly tables alignment in the clean room



Chambers placed on the tables and connected to each other



Tests OK: connect to the strong back and move to the oven.



Once all connected, pumping down, leak test and RGA is done.

Storage ring Installation

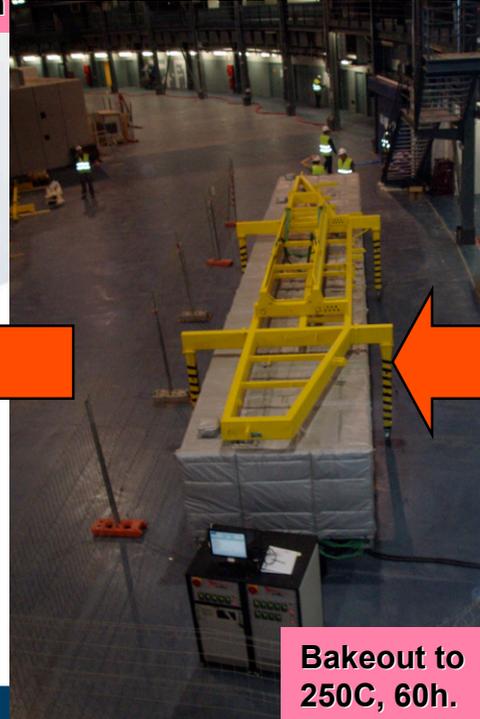


Chambers inside the oven

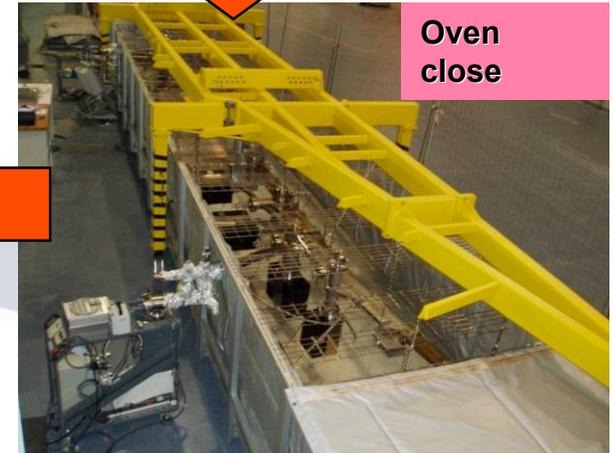
Pumping down, leak test and RGA scan



Movement through the experimental hall

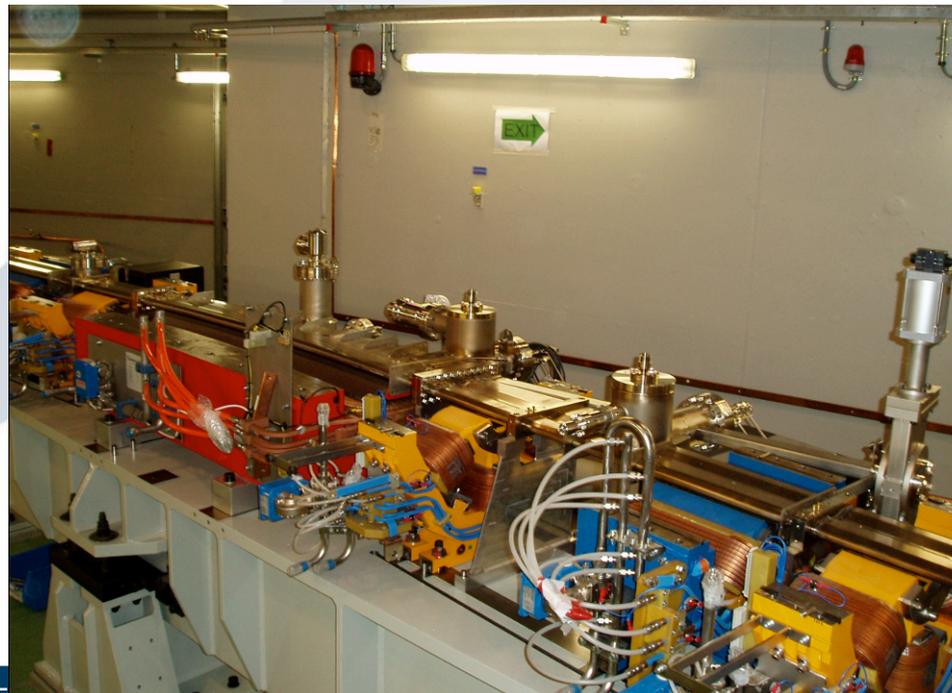
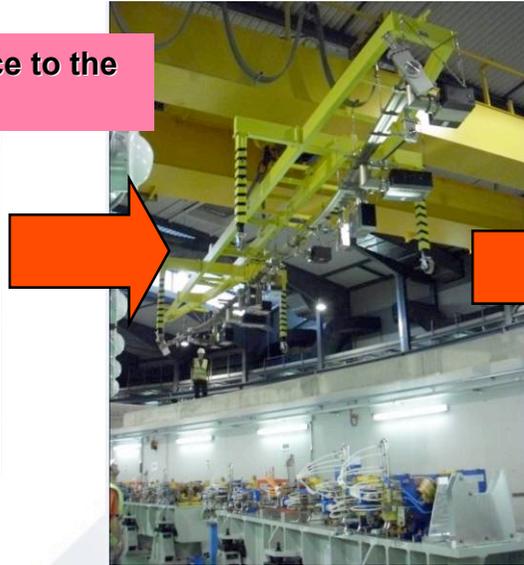
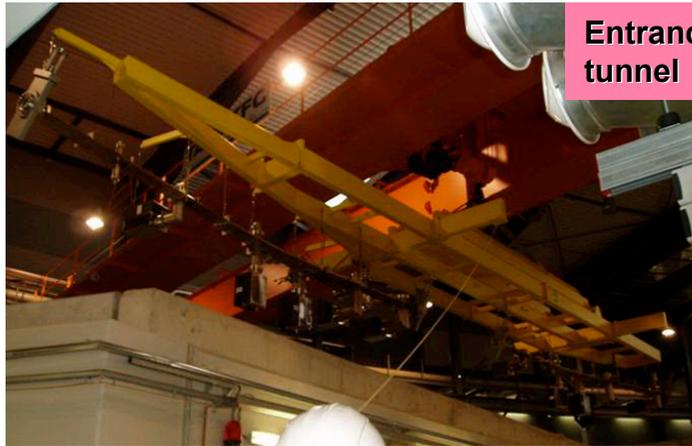


Bakeout to 250C, 60h.



Oven close

Storage ring Installation



The sector is in place, ion pumps connected, RGA scan is done then magnets closed.

Storage ring Installation

RF straight
installation

RF Cavity

HOM
dumper





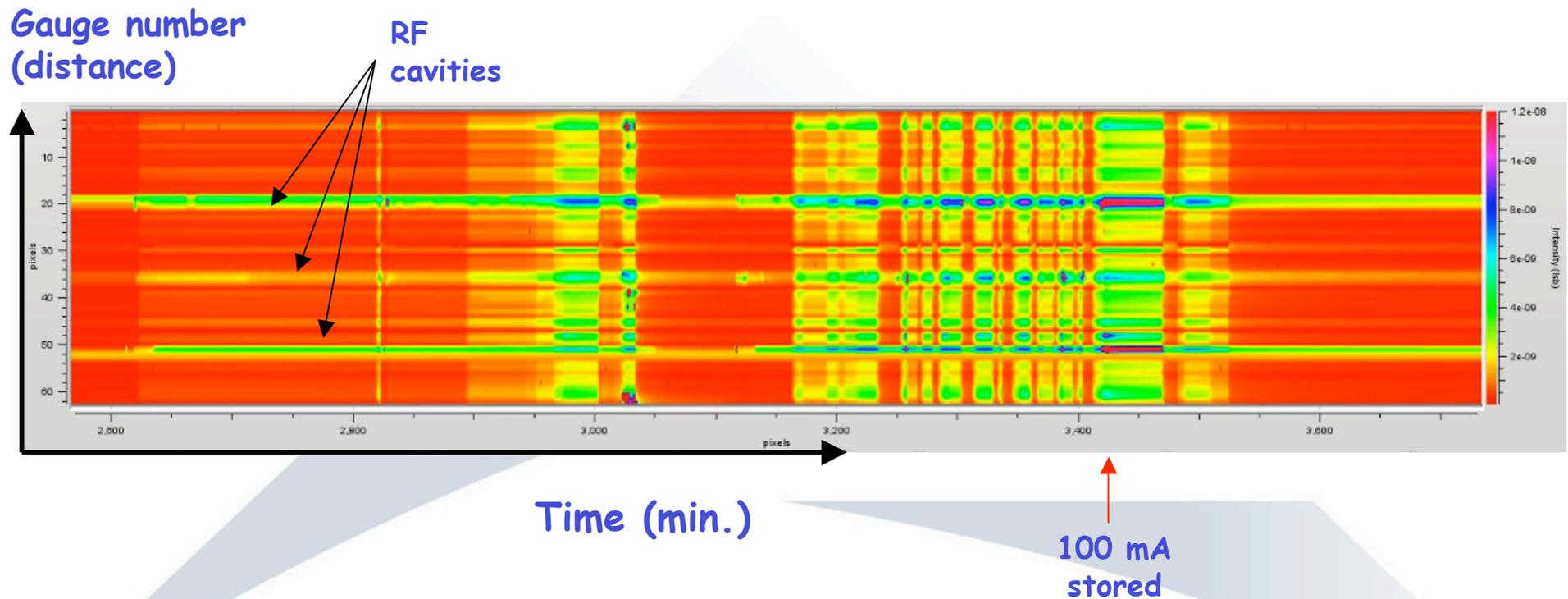
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- Average pressure before injecting the first beam = $4 \cdot 10^{-10}$ mbar, thermal outgassing estimated = $1 \cdot 10^{-11}$ mbar.l/(s.cm²).
- With the first stored beam in the machine (beam current = 0.1 mA), the average pressure increased into $2 \cdot 10^{-8}$ mbar.
- With accumulated beam dose of 4.5 A.h, 80 mA stored beam current, the average pressure of the SR is $8 \cdot 10^{-10}$ mbar.

Pressure during one shift

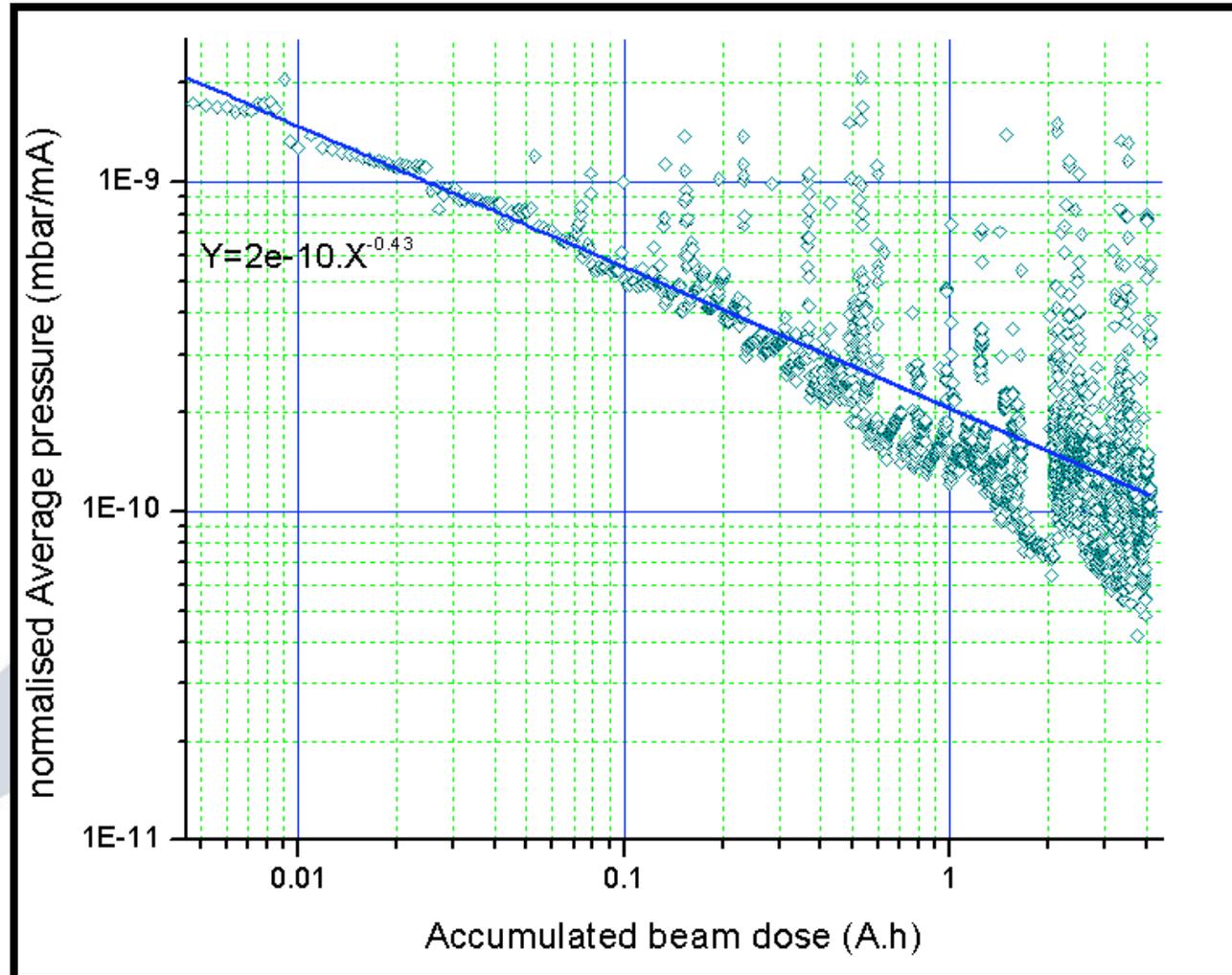
6th June 2011 evening shift, vacuum gauge readings.



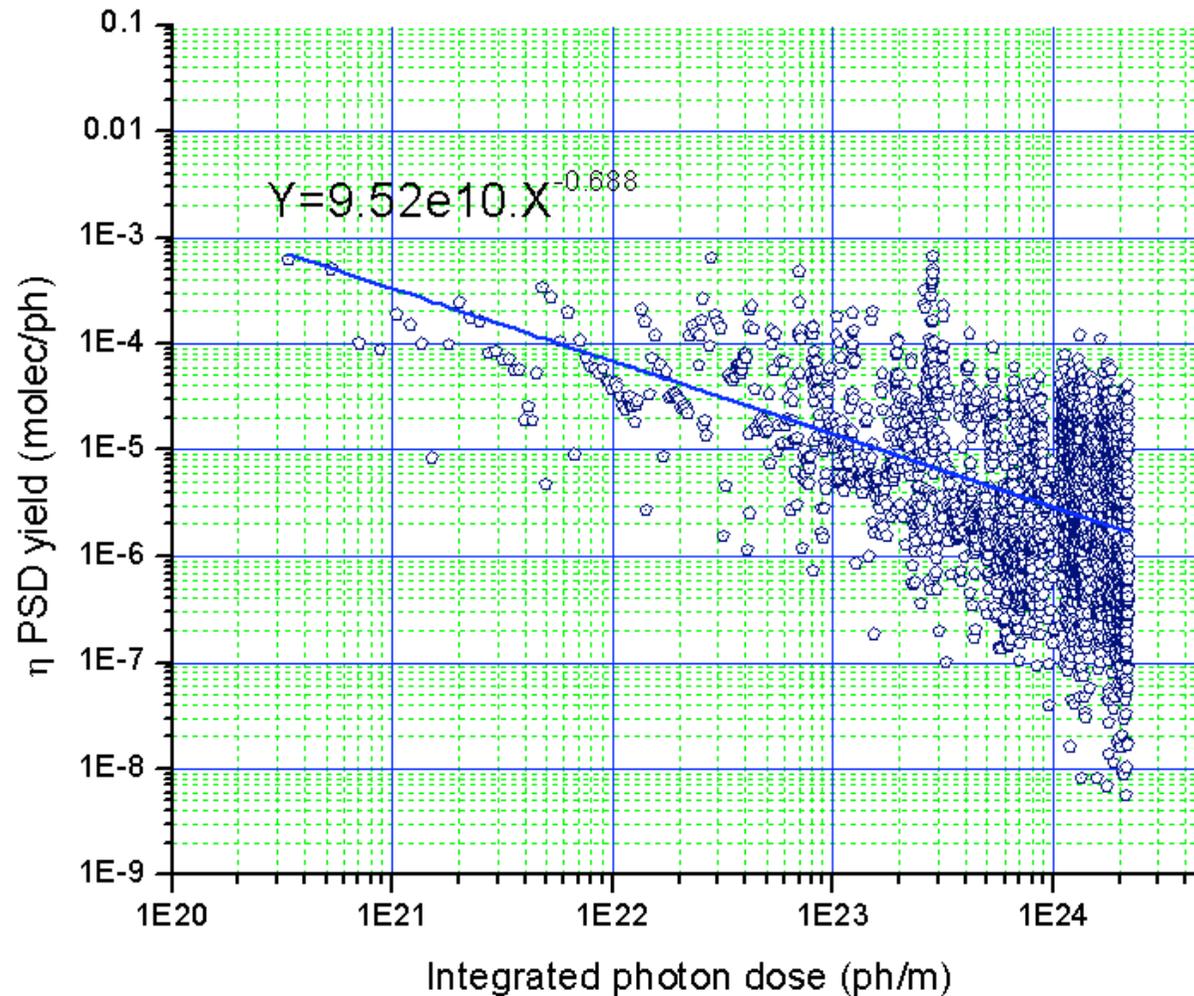
Normalized average pressure

The normalized average pressure of the SR to the beam current over the accumulated beam dose.

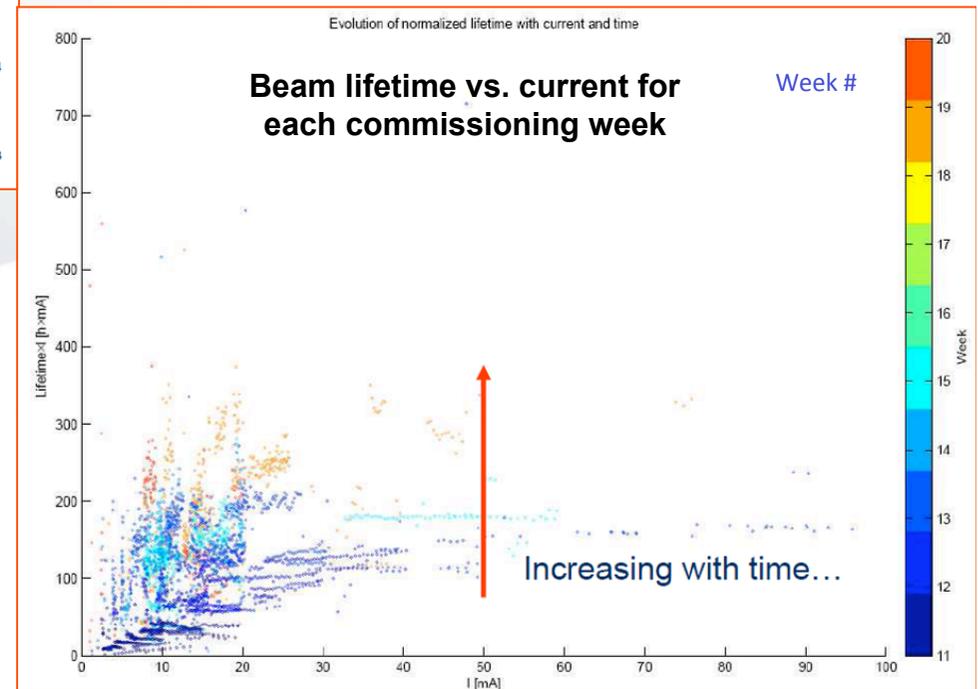
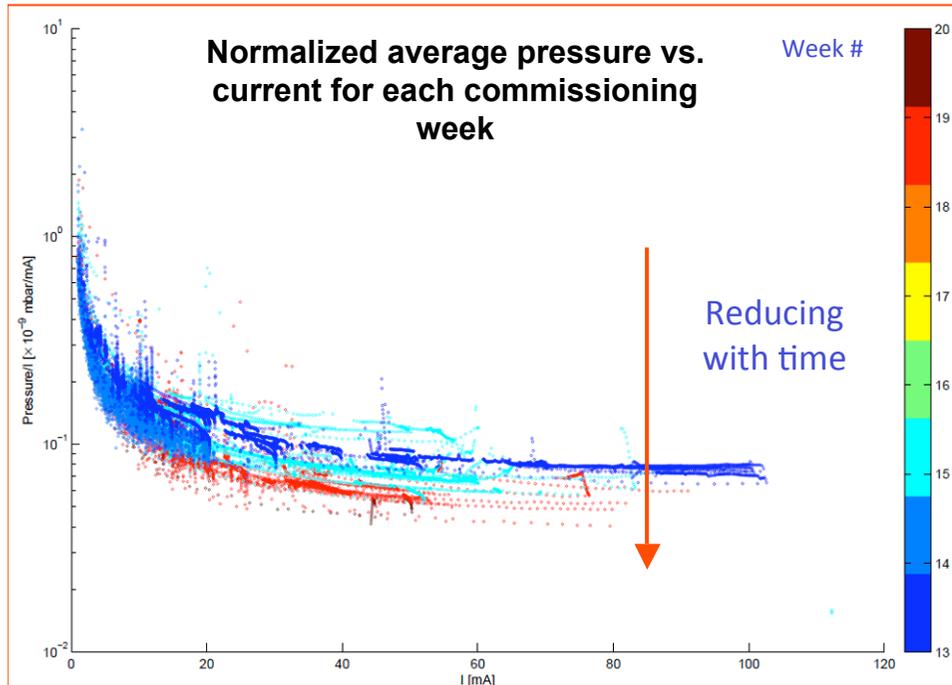
(measurements from CCG gauges)



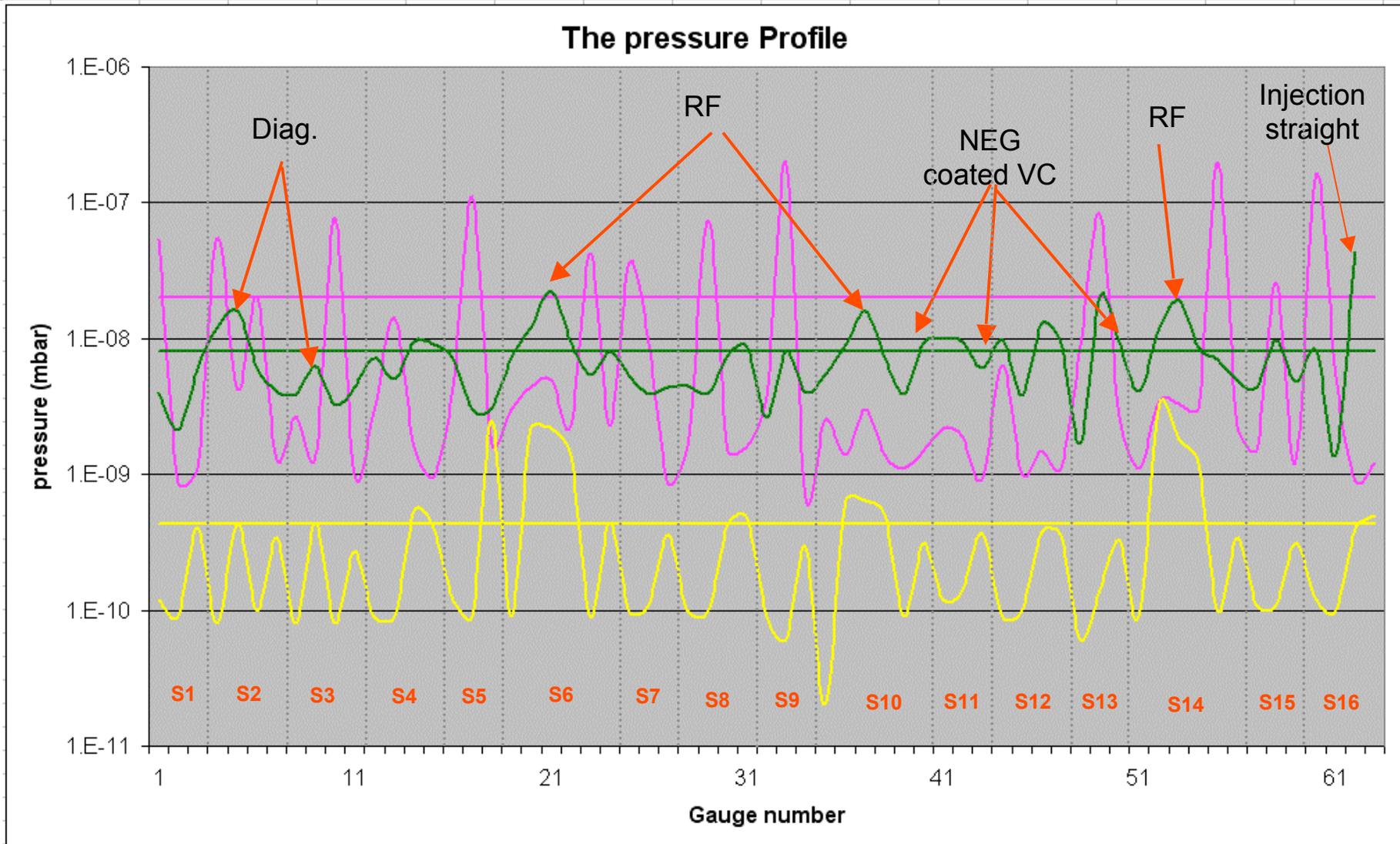
The estimated PSD yield (η) (molecules/photon) as a function of the integrated photon flux, the slope of the conditioning is 0.69.



Pressure evolution and beamlife time.



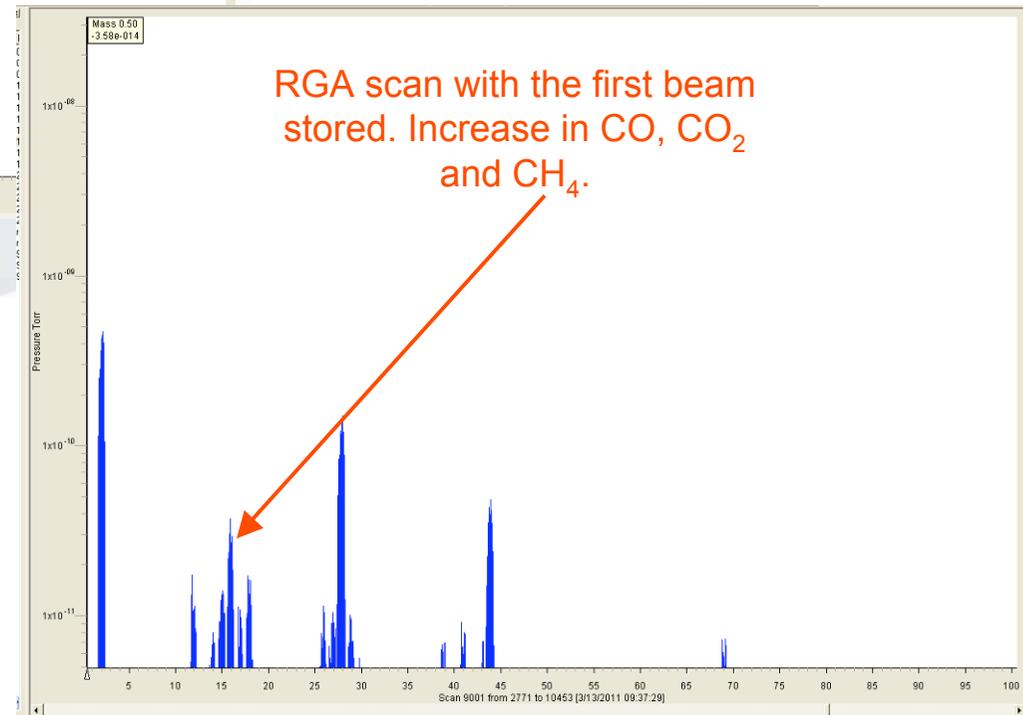
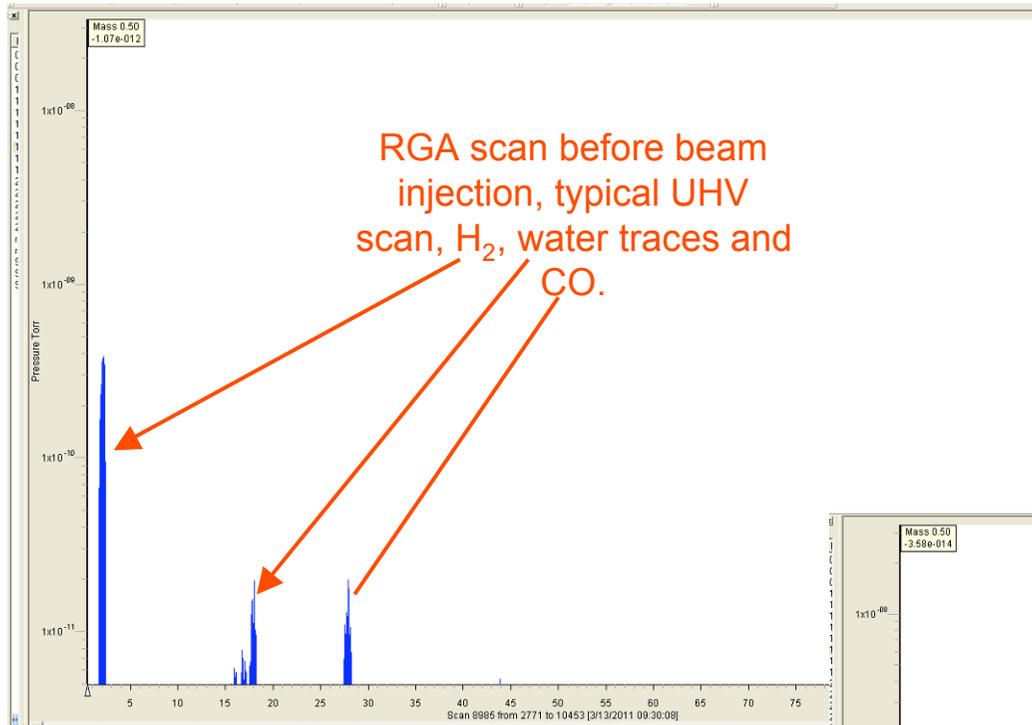
The pressure profile



Yellow= base pressure.

Cyan= First stored beam

Green= first stored 100 mA.



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problem	diagnostic	solution
Pressure reading oscillation in the Pirani and the cold cathode gauges in the booster during magnets ramping.	Reading oscillation in the CCG and Pirani	No solution: we grounded all the gauges and there was a small change in the oscillation, for the CCG the oscillation is small, we live with it!
Failures in the power supplies of the ion pumps.	Error messages in the controller, and no power supplied to ion pump, increase in the pressure.	Solution is still under work with the supplier. Possible cause lose connectors.
Inlet and outlet water tubes are swapped (no flow of water in the absorber)	Thermocouple placed in the water return cooling tube of the absorber is showing high temperature.	Correct the water connection
SR hit the vacuum chamber	Thermocouple placed close to the area where the beam hit shows high readings.	Place a copper insert in the crotch absorber which shadows the vacuum chamber.
Low water flow in the absorbers before the RF cavities	Thermocouples placed in the VC above the absorbers show high temp. water flow checked and it was half the required value.	Increase the water flow.
Leak in the pick up loop of the RF cavities due to sparks.	RGA scans show Ar. And the pressure in the cavities increased and has not recovered when the cavities are off.	Replace the leaky pick up loop

SR hit the vacuum chamber.



Inside the chamber

Leaks in pick up loops of the RF cavities.

