

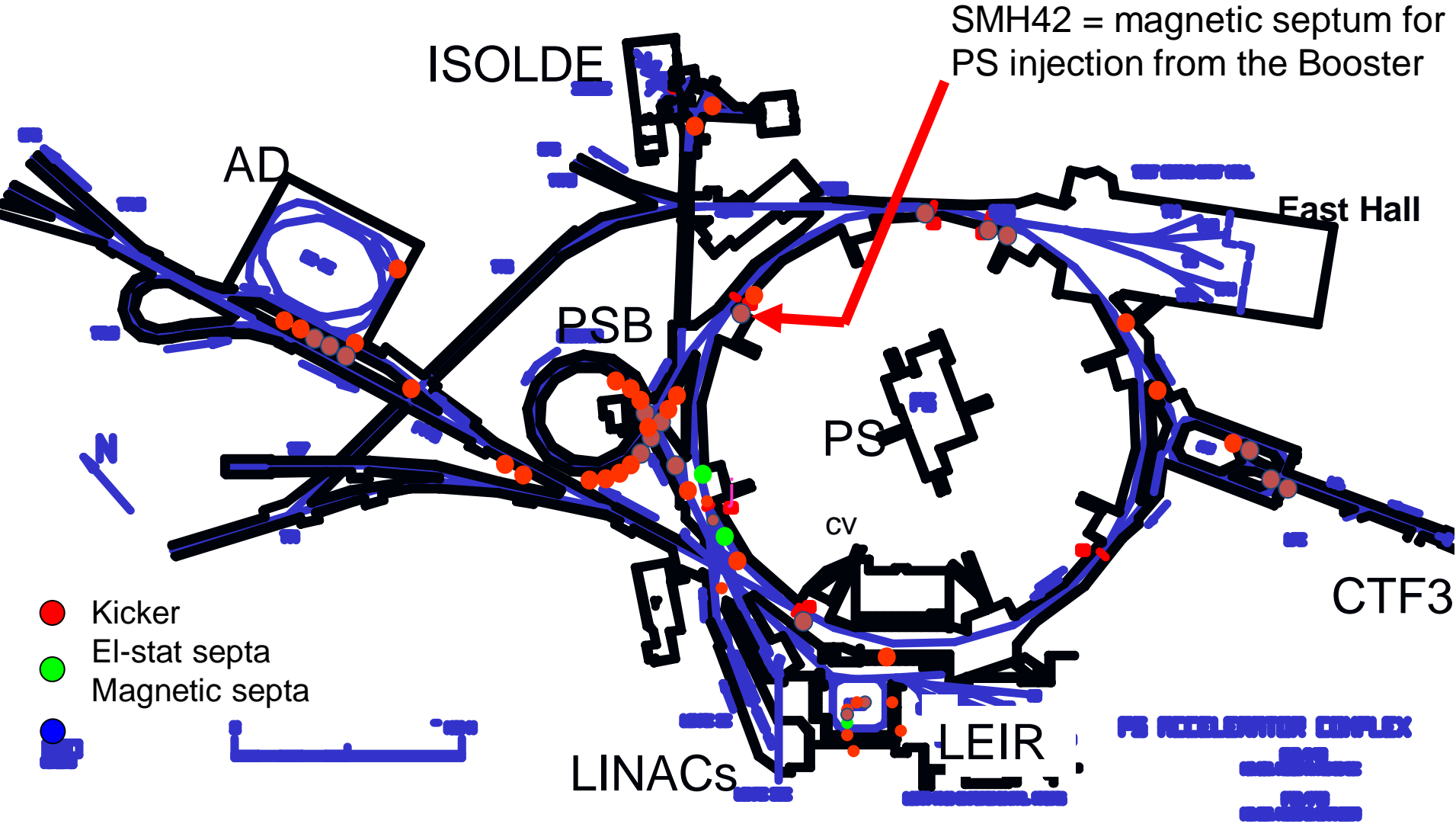
# **Failure of PI.SMH42 on 2 October 2009**

FOM – 6.10.2009

J. Borburgh

Thanks so far for help from TE/VSC, DG/SCR, BE/OP crew, BE/BI, EN/HE, EN/MEF,  
BE/RF...

# ABT equipment distribution – PS complex

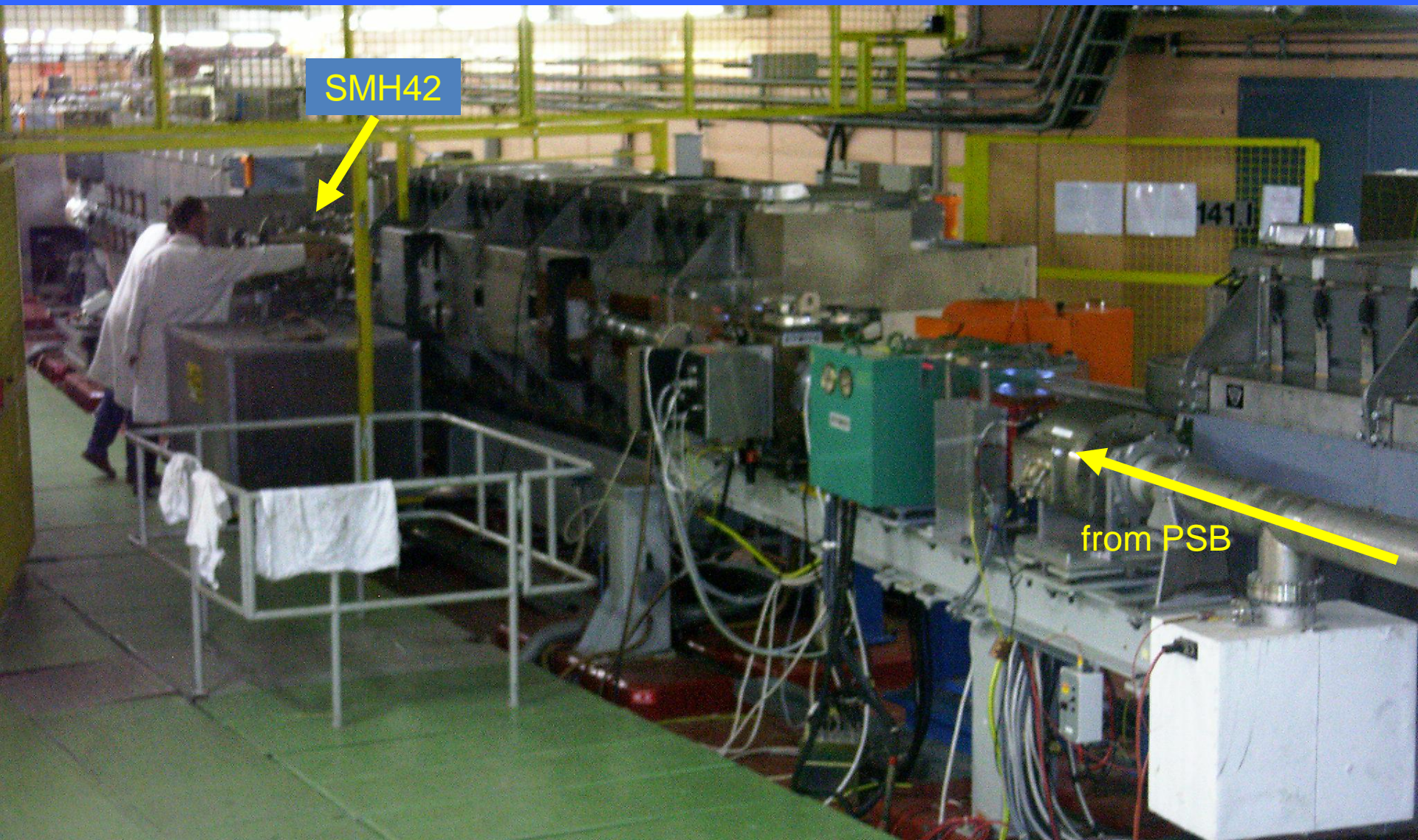


As of Friday, 2.10.2009, ~23:05, repeated vacuum interlocks on PI.SMH42 (6E-6 mbar range).

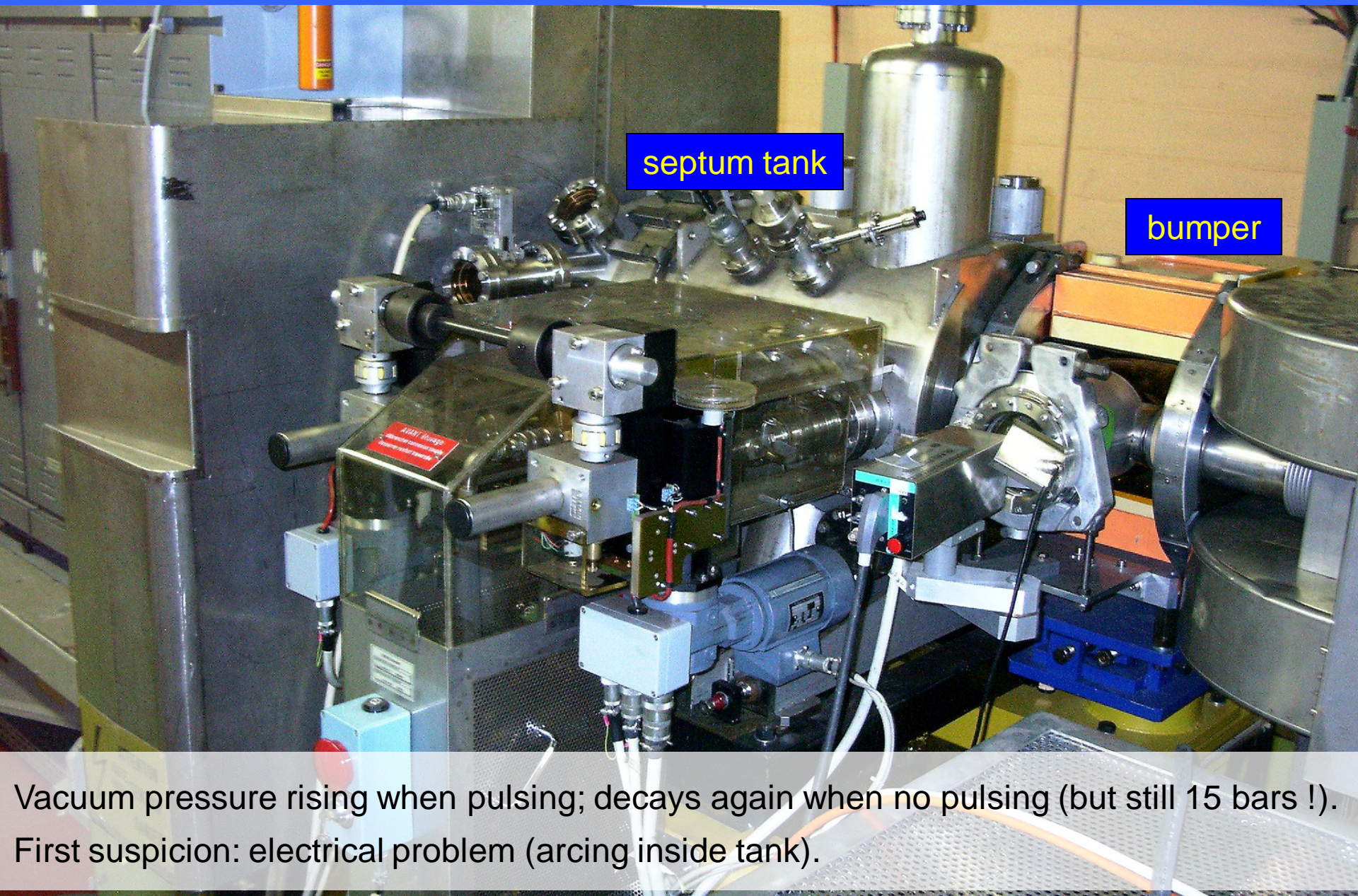
First check by SE specialist → stop, switch off, radiation cool-down overnight.



# PS 42 region (picture from 2006 intervention)



First RP check Saturday ~7:00: still 4.8 mSv/h – closer look scheduled for ~15:00



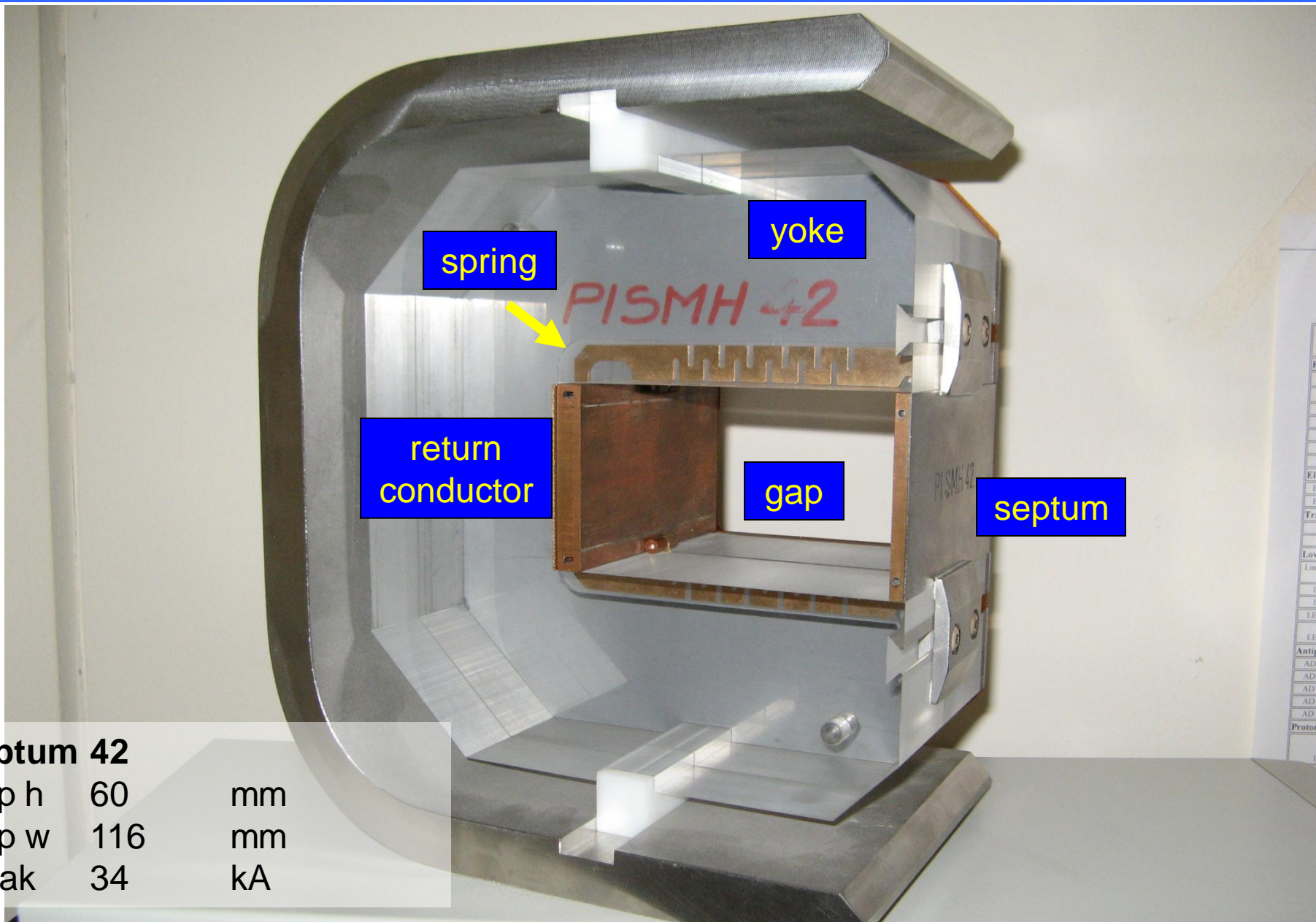
Vacuum pressure rising when pulsing; decays again when no pulsing (but still 15 bars !).  
First suspicion: electrical problem (arcing inside tank).

# PI.SMH42 (picture taken a few years ago)



Water circuit emptied, and He injected → leak found

Decision to replace septum on Monday – delicate operation + area still hot



## Septum 42

Gap h	60	mm
Gap w	116	mm
I <sub>peak</sub>	34	kA

# SMH42 failure history / spare situation / tent. intervention planning

SMH42 is one of the most stressed septa ( $I = 34 \text{ kA}$ )

Present type of septum first installed in 1995: “42.1” (with “42.2” as spare)

1998: ½-retention spring dropped provoking short circuit (2 weeks before end of run)  
“42.2” installed; mechanical fixation introduced to prevent re-occurrence  
“42.1” fixed thereafter

2006: Arcing between spring and rear conductor, jumping insulation ( $\sim 1\text{E}-5$  vacuum)  
“42.1” installed (Al<sub>2</sub>O<sub>3</sub> coating on screw worn off – design improved)  
“42.2” repaired in 2006 (new yoke/coil, tank/feedthrough retained)

2007/08: Construction of an additional spare “42.3” (consolidation program)  
new tank/coil/feedthrough, re-using yoke from “42.2” (recuperated in 2006)

SD 2007/08: “42.2” preventatively re-installed in anticipation of LHC running  
“42.1” kept so far as “2<sup>nd</sup> choice spare” (radioactive, not yet refurbished)

2009: water leak (to be seen whether it can be exactly located later – not expected on coil ...)  
install “42.3” (after feedthrough work by BI on the integrated SEM grid)



8:00 hrs work started on installation of SEM wires feedthrough on spare septum 42.3

13:30 hrs: spare left from building 169 for PS ring. Venting of sector 50 started, together with disconnection of electrical cables on the septum

14:30 hrs: septum removed from ring

16:00 hrs: Installation finished, first attempt to pump down sector.

17:30 hrs: rough leak test indicates leak on down stream flange. Sector vented and new attempt undertaken seal flanges.

18:50 hrs: pumping of sector restarted

21:30 hrs: leak tests shows no leaks bigger than  $1 \cdot 10^{-8}$  mbar, due to poor vacuum ( $10^{-3}$  mbar range) a more sensitive leak test is postponed to 6/10/2009.

- 6/10 : start bake out of septum
- 7/10 : reach 200C on yoke, stay at this temperature for ~ 24 hrs
- 8/10 : stop bake out of septum, cool down
- 9/10? : increase cool down time, by reconnecting stripline and compressed air in cooling circuit
- 10/10? : system re-start

# Bake out in Laboratory, August 2009

