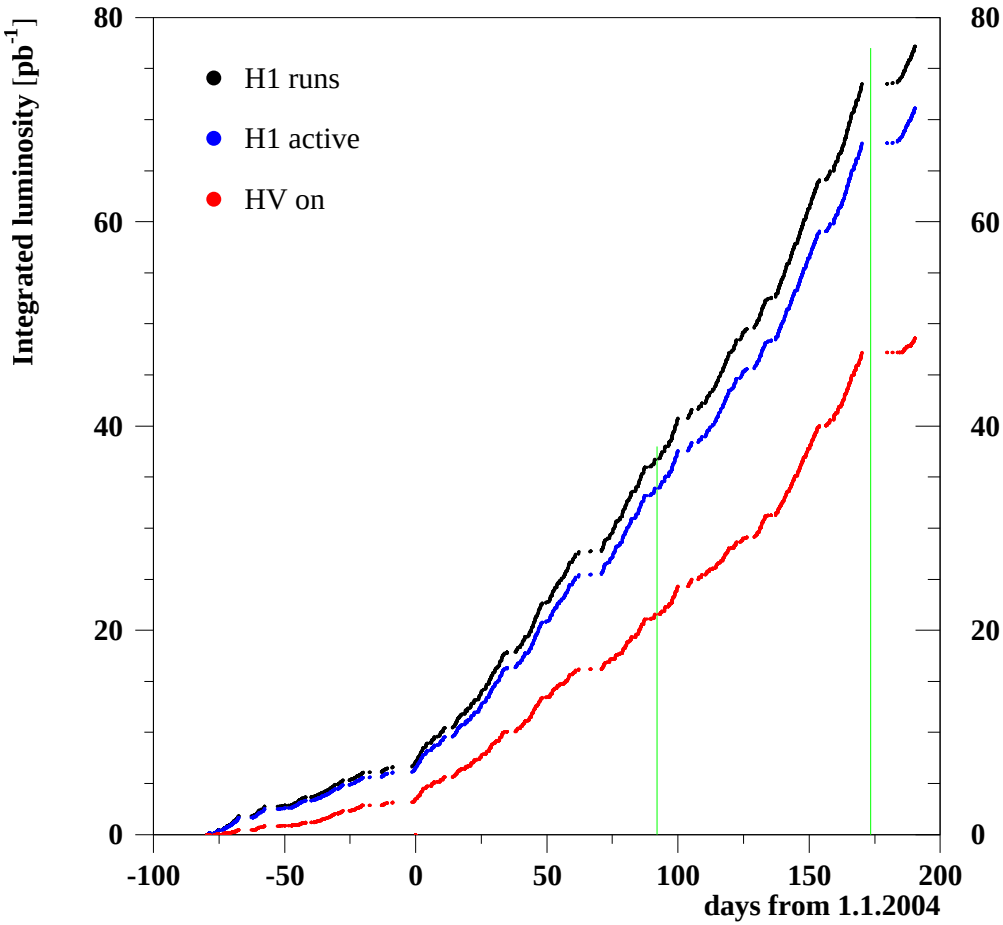
H1 Status

Daniel Pitzl, DESY

HERA coordination meeting, 12.7.2004

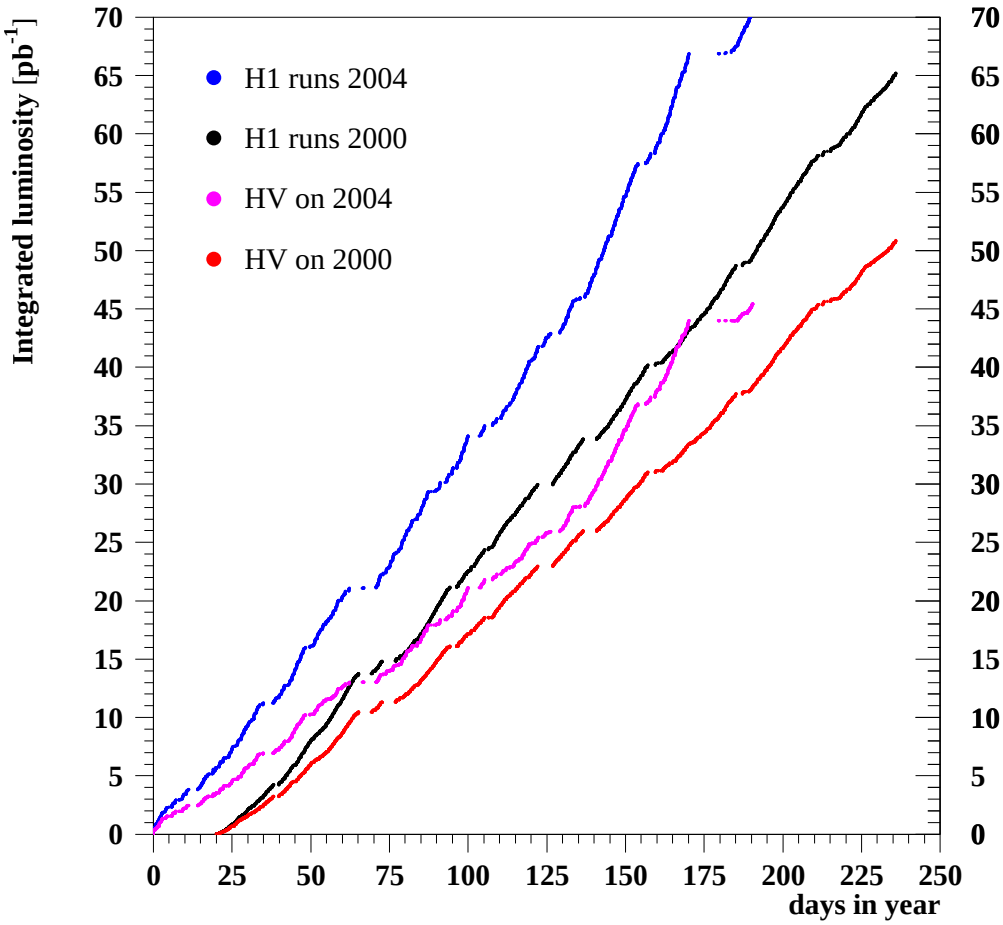
- Luminosity running
- Shutdown planning

Luminosity running 2003 – 2004



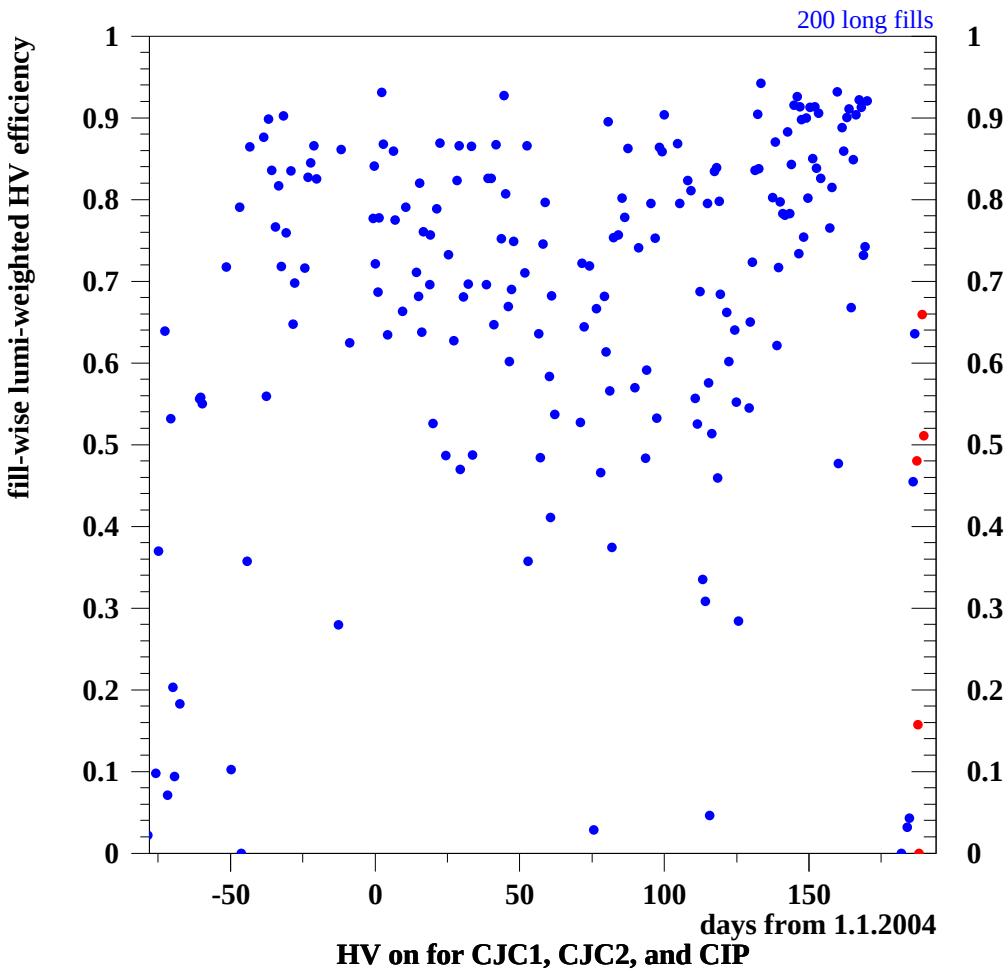
- HERA delivered: $81.6\,\mathrm{pb}^{-1}$
- H1 DAQ running: $77.2\,\mathrm{pb}^{-1}$
  94.5% average DAQ efficiency
- H1 pipeline active: $71.1\,\mathrm{pb}^{-1}$
  8.0% average deadtime.
- CJC1,2 and CIP full HV: $48.6\,\mathrm{pb}^{-1}$
  68% average HV efficiency,
  Reached 85% due to better beam conditions in June 2004.
- Low HV efficiency after vacuum leak NR 11 m on 19.6.2004.
- Two helicity flips.

2004 compared to 2000



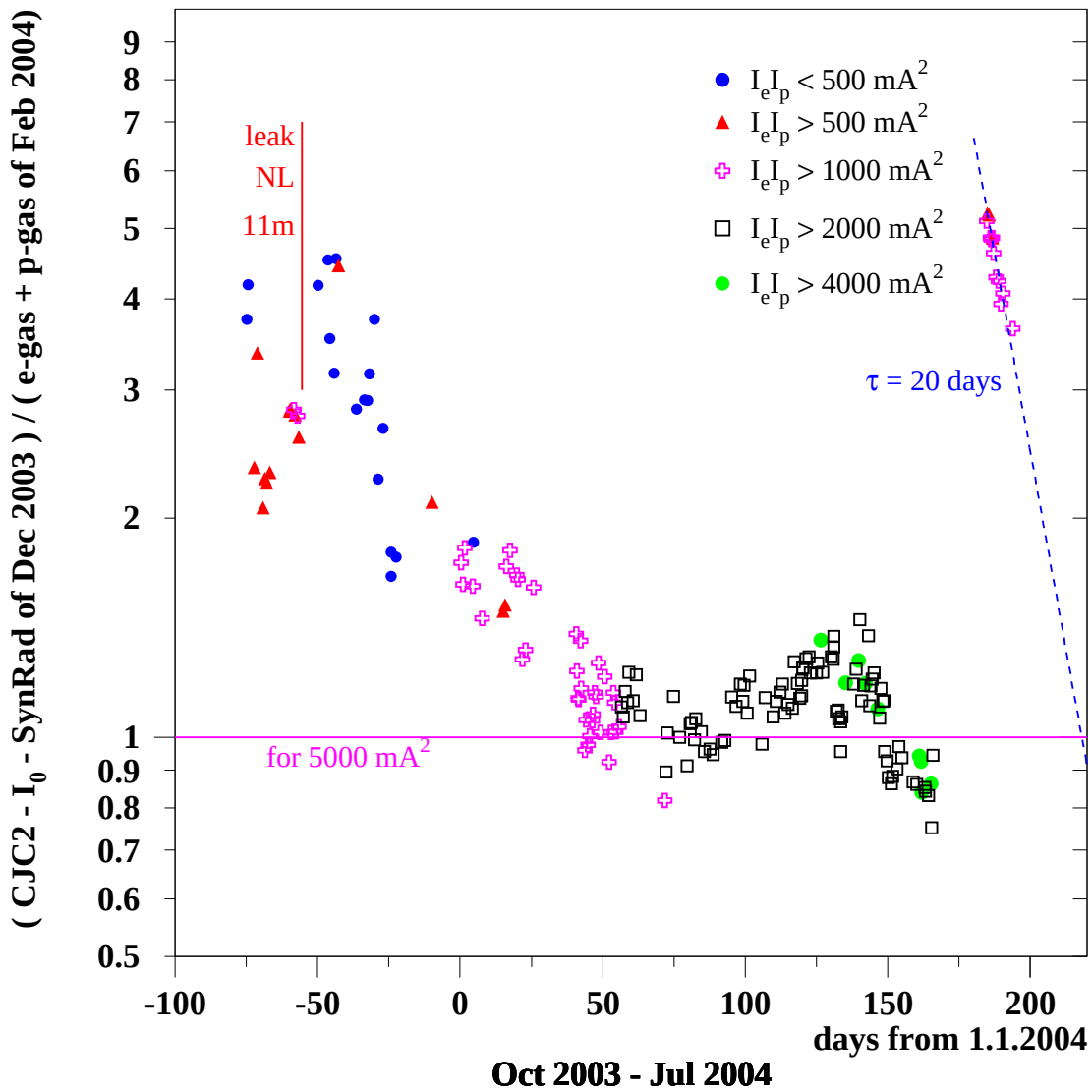
- HERA luminosity production is ahead of 2000, thanks to the early start after Christmas and improving HERA performance.
- H1 HV efficiency is approaching 2000 levels, due to reduced backgrounds and improved beam stability.

High voltage efficiency 2003 – 2004



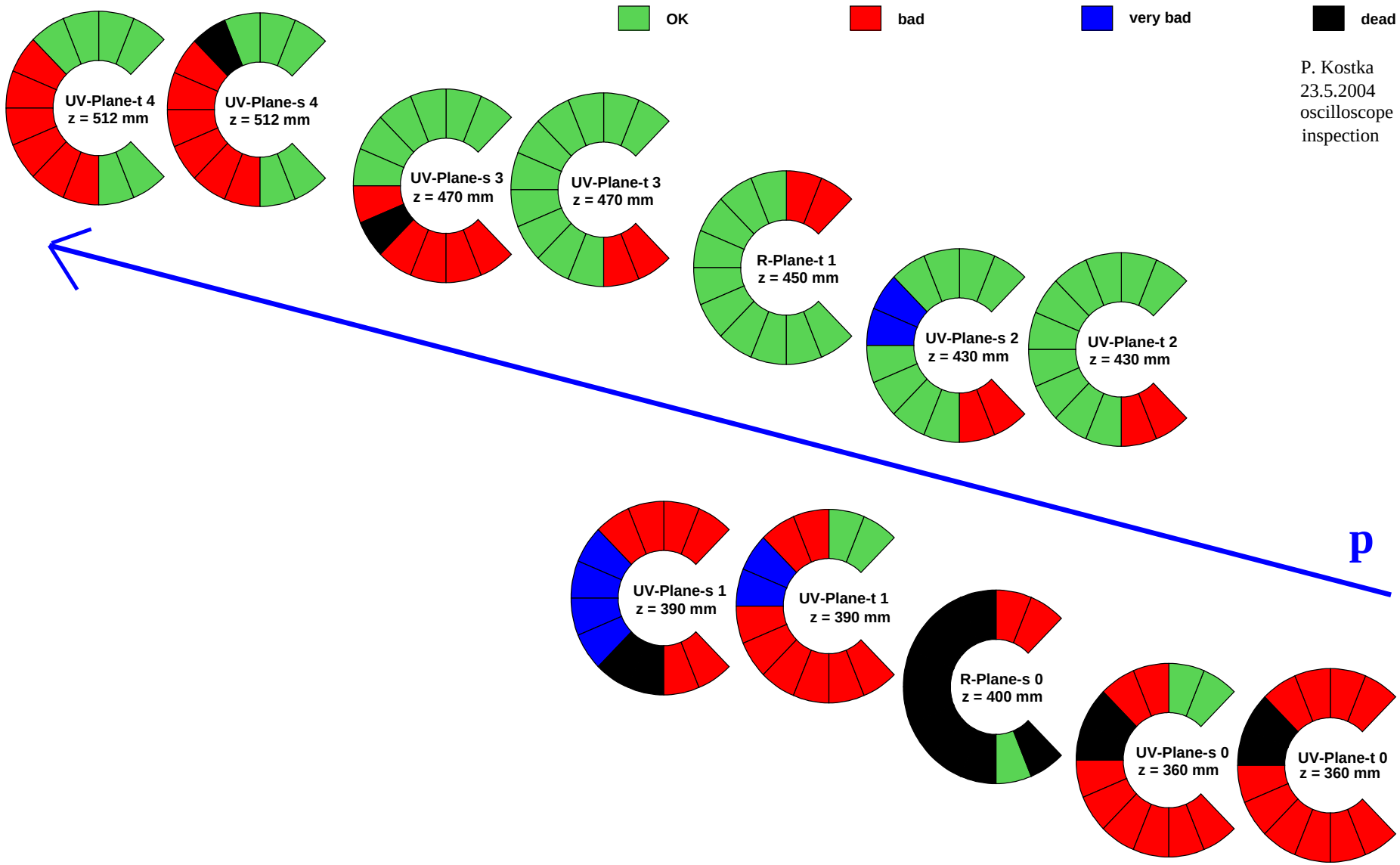
- HV efficiency reached up to 93% thanks to faster and automatic tracker ramp-up procedure.
- Reduced number of background spikes:
  - Improved magnet power supply filtering.
  - Reduced number of main power regulation cycles: voltage tolerance increased from 1% to 2%. This may lead to faster aging of power supplies in H1.
  - A 'spike task force' is in place between HERA, ZEUS, H1.
- Low efficiency fills in July 2004 are due to high backgrounds after the vacuum leak NR 11 m.

CJC current history 2003 – 2004



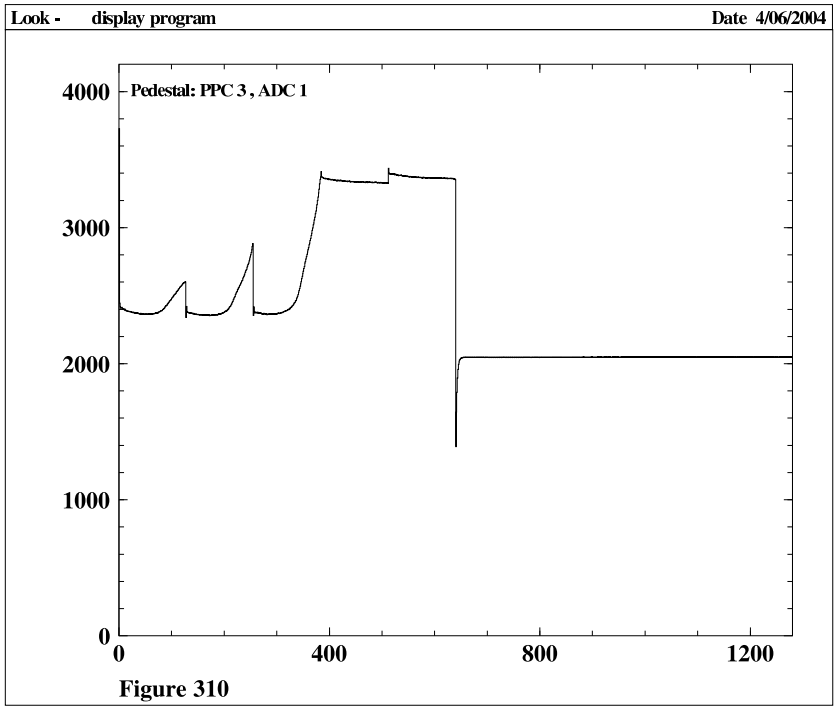
- Safe CJC operation at $I_e \times I_p = 45 \times 100\,\mathrm{mA}^2$.
- Flange leak NR 11 m on 19.6.2004.
- 1 week of e^+ bakeout
- GO/GG warmup cycle, NEG pump activation on 1.7.
- Recovery time constant: 20 days since 2.7.
- Need factor 5 reduction.

Forward Silicon damage map 23.5.2004



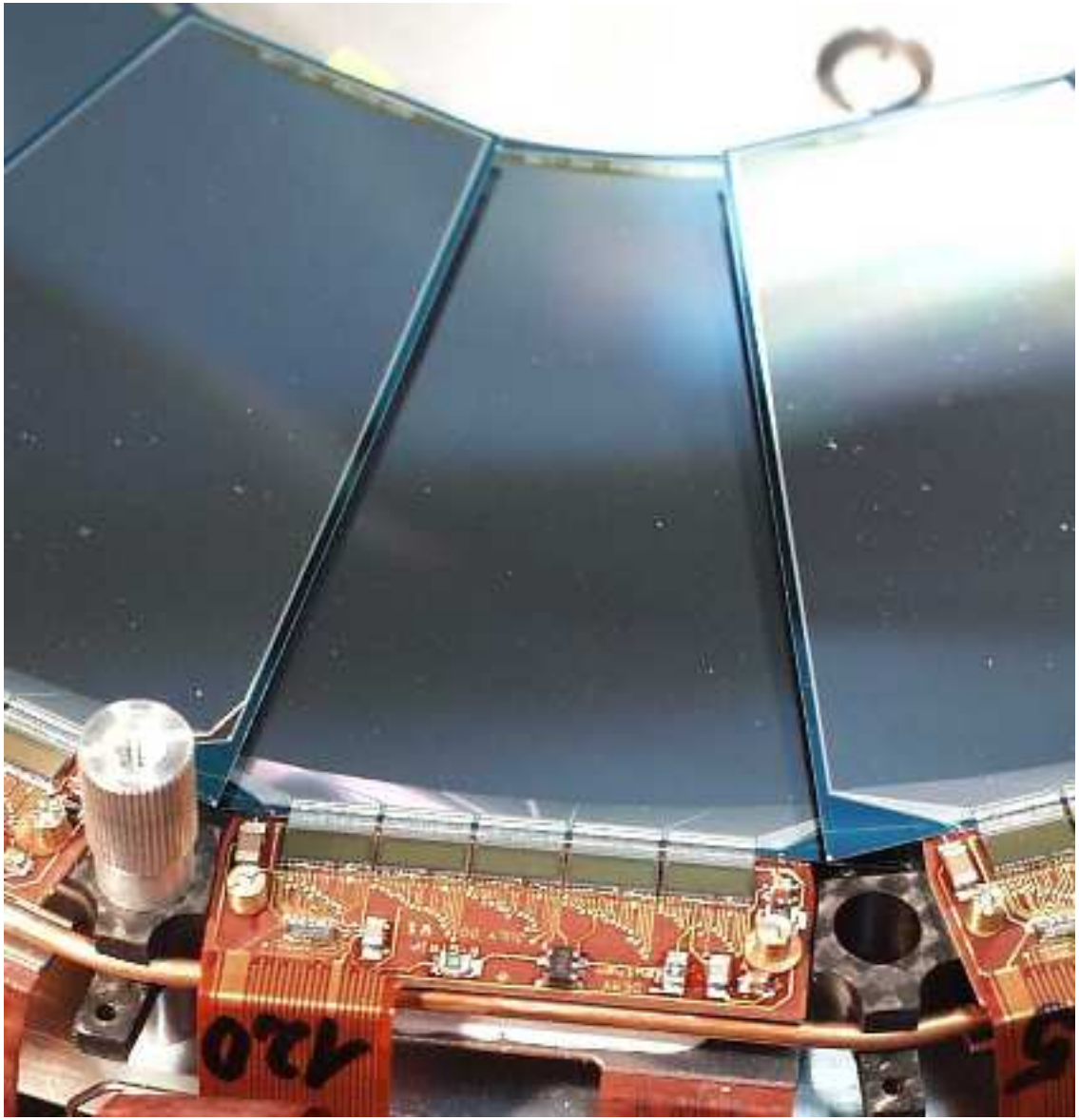
FST damage

Example pedestals for 1280 channels:



- The FST has 144 silicon modules with 720 readout chips for 92 160 channels, opertaed since 2001.
- Hit maps were normal on Thu 13.5.2004, with S/N ≈ 35.
- 18 proton fills aborted due to coasting beam and RF problems 13.–17.5.2004
- 40% dead FST sectors on Mon 17.5.2004. Others still had S/N ≈ 35.
- By Fri 21.5. about 60% were dead.
- Dead sectors have flat pedestals, attributed to internal leakage currents on the frontend chips due to radiation damage.

FST repair



- Remove FST, damage assessment in Zeuthen.
- Silicon sensor damage is unlikely: re-use.
- Most likely: damaged front-end chips. Replace by rad-hard version like in CST.
- Delicate removal and re-bonding: 92 k channels.
- Replace repeater with rad-hard components: clock receivers and drivers, voltage regulators.
- Goal: re-install in late summer 2005.
- BST to be decided, fine so far.

Silicon access

Silicon installation with raised GG magnet in 2003.

- Remove Spacals and BPC.
- Break vacuum, remove GG transition with C5B and IGP.
- Blind flange H1 beam pipe, pump.
- Raise GG magnet.
- The vacuum will be broken anyhow if the modified absorber 4 gets installed.
- The same procedure will be required next year.

Roman pots upgrade

- NL 61, 80/81, and 90 m.
- New pots and moving systems.
- Vacuum conditioning in progress.
- Ready for installation.
- p vacuum NL broken anyhow for BU coil exchange.
- Work evening shifts.

H1 Shutdown schedule: 8 weeks

- End lumi run 15.8.2004
- Open shells Mon 16.8.
- Remove HD Spacal Tue 17.8.
- Remove EM Spacal Wed/Thu 18./19.8.
- Remove BPC Fri 20.8.
- Raise GG magnet Mon 23.8.
- Remove BST Mon 23.8.
- Remove CST Tue 24.8.
- Remove FST Wed 25.8.
- 11 days for work on CST and CIP.

- Exchange Roman pots NL 61–90 m 5 weeks
- Install and test CST Mon/Tue 6.-7.9.
- Install and test BST Wed-Fri 8.-10.9.
- Lower GG magnet Mon 13.9.
- Install and test BPC Tue-Thu 14.-16.9.
- Install and test EM Spacal Fri-Thu 17.-23.9.
- Install and test HD Spacal Thu-Tue 23.-28.9.
- Close H1 Wed-Thu 29.-30.9.
  Interlock test shifted by 2 days.
- Cosmic run Mon-Fri 4-8.10.

Summary

- H1 was taking data efficiently, operating safely at $45 \cdot 100\,\mathrm{mA}^2$.
- It will take a few more week to recover from the vacuum leak NR 11 m.
  A beam pipe arrangement with higher operational safety is needed here!
  A coated absorber 4 to reduce backscattering is of secondary importance.
- The FST is lost due to radiation damage. It will be removed in September, requiring a shutdown extension by 2 days.
- An FST with radiation hard electronics can be ready within one year.
- Installation of a new FST requires an 8 week shutdown in late summer 2005.