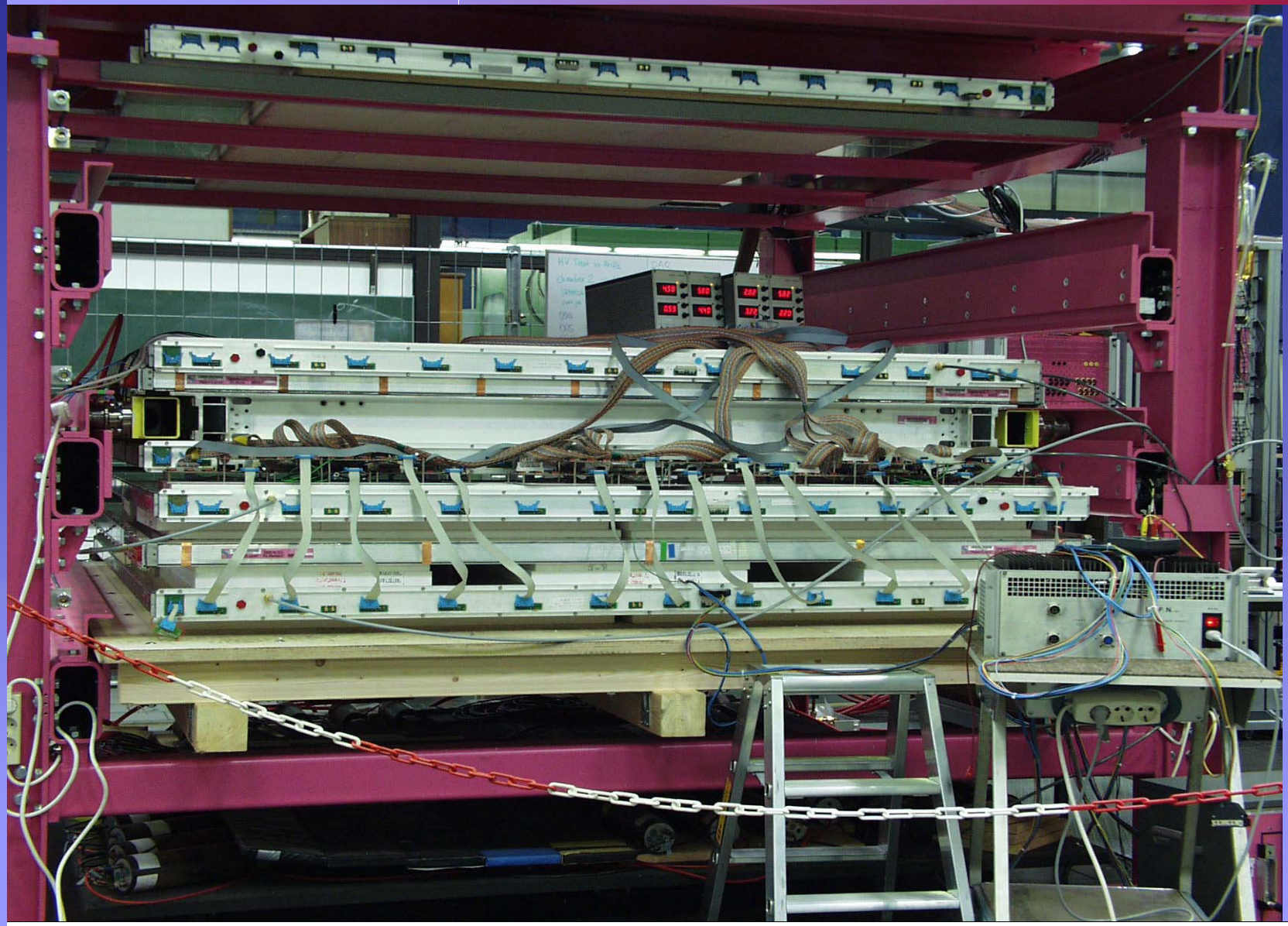
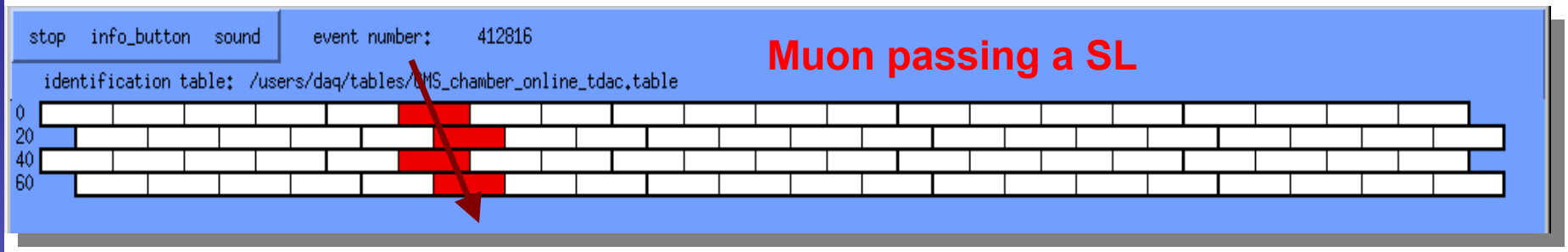
Quality Control at Aachen



Verify the Quality of Produced SL



Quality Control standard checks:

- Wire position → displacement cell-cell ✔
- Wire tension within limits ✔
- Gastightness better than τ >140 min ✔
- HV stability

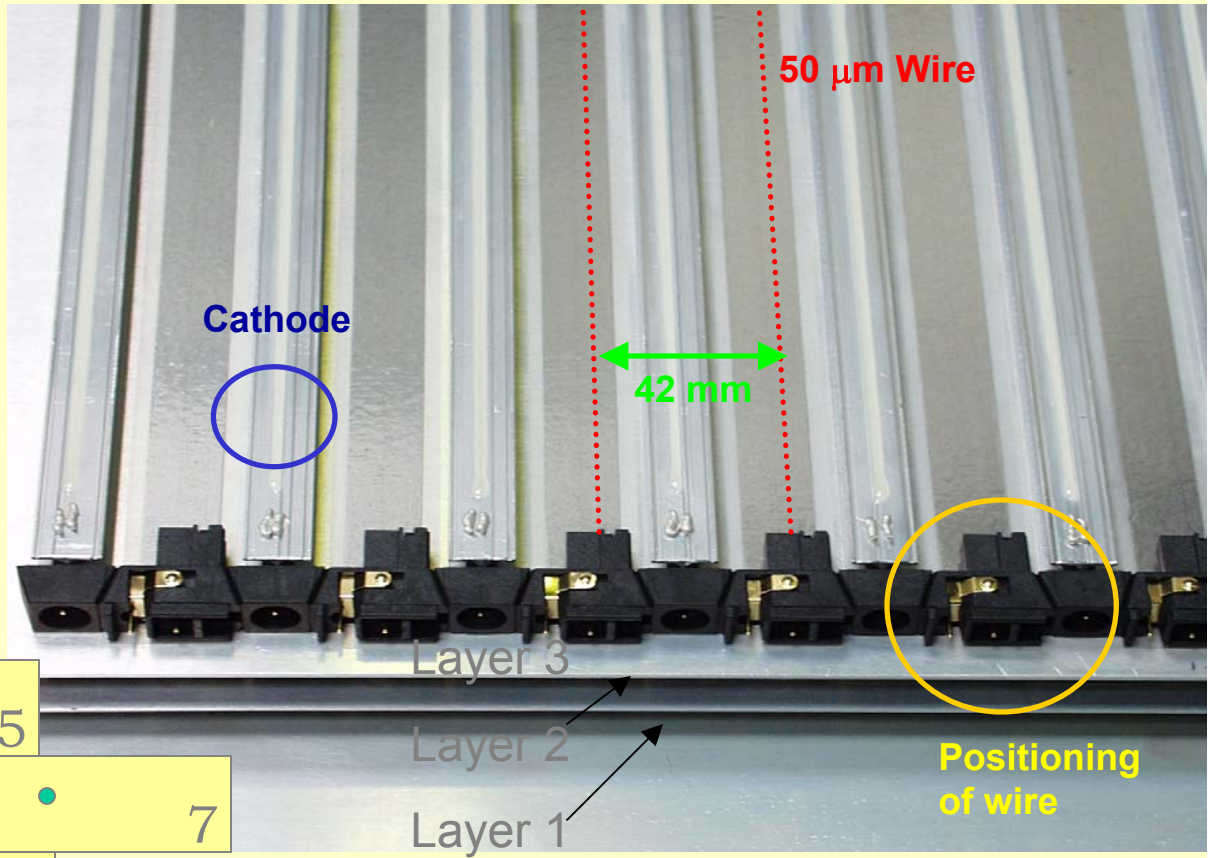
cosmics

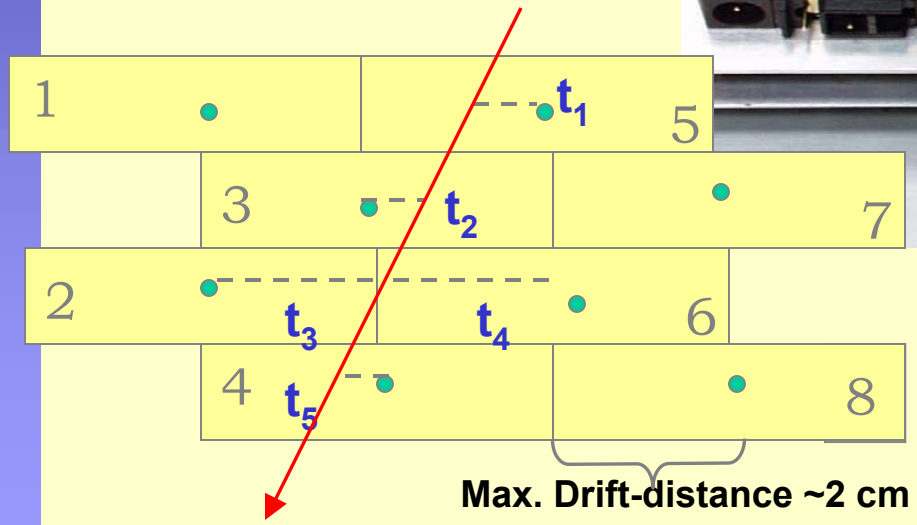
- Shape of TDC spectra to find disconnected electrodes ✔
- Noise per cell, overall noise ✔
- Efficiency and label low efficiency cells ✔
- Dead cells ✔
- Meantime per cell ✔

Results are stored in database(s)

During Mechanical Production

- Measure and verify
- **Wire tension** (within 10%)
- **Wire position** (within 100 μm)

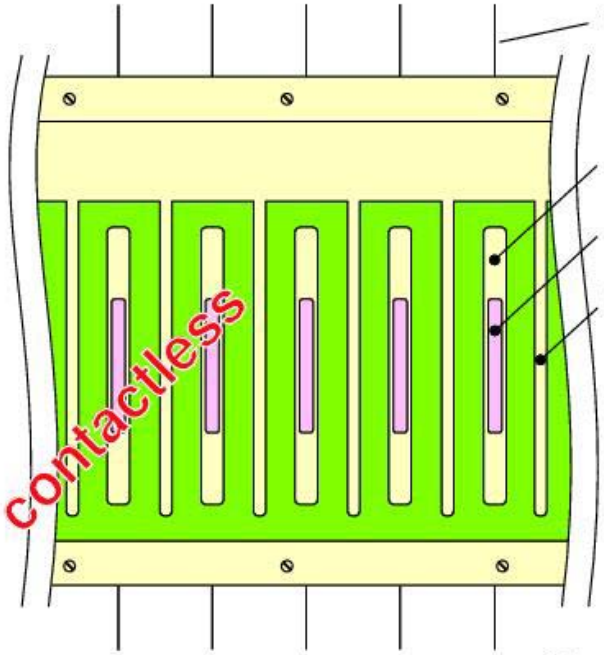




Max. Drift-distance ~2 cm

Max. Drift-time ~380 ns

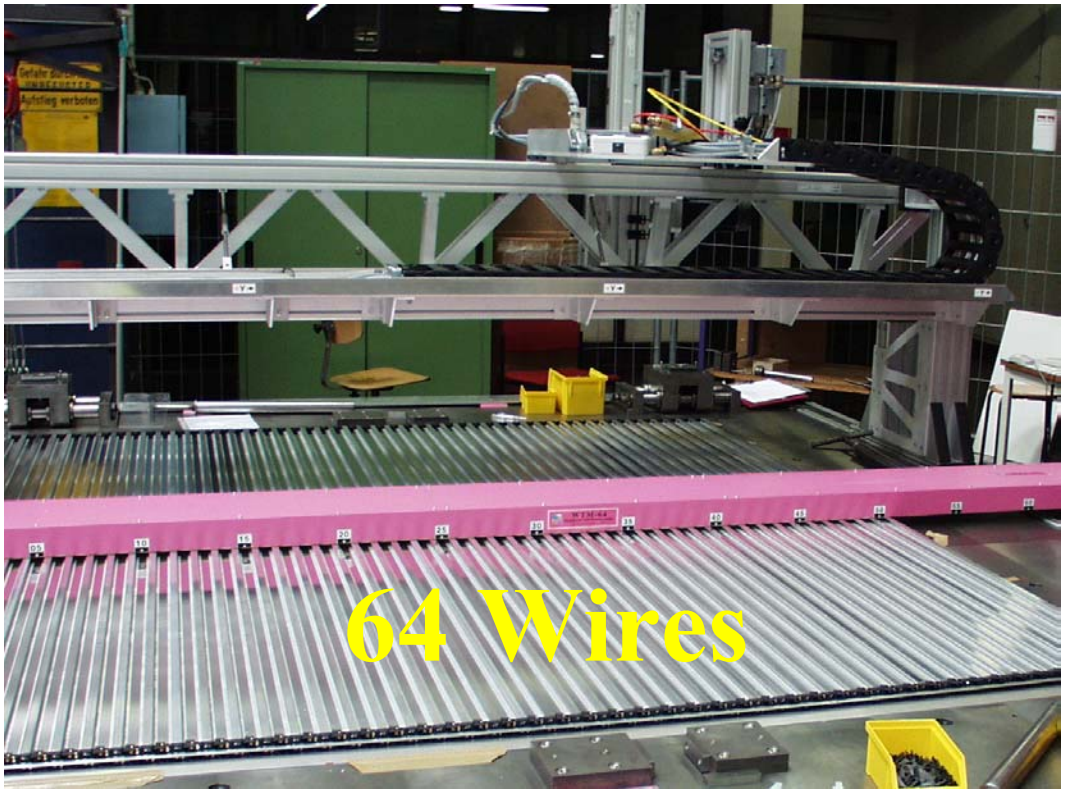
Wire Tension Measurement



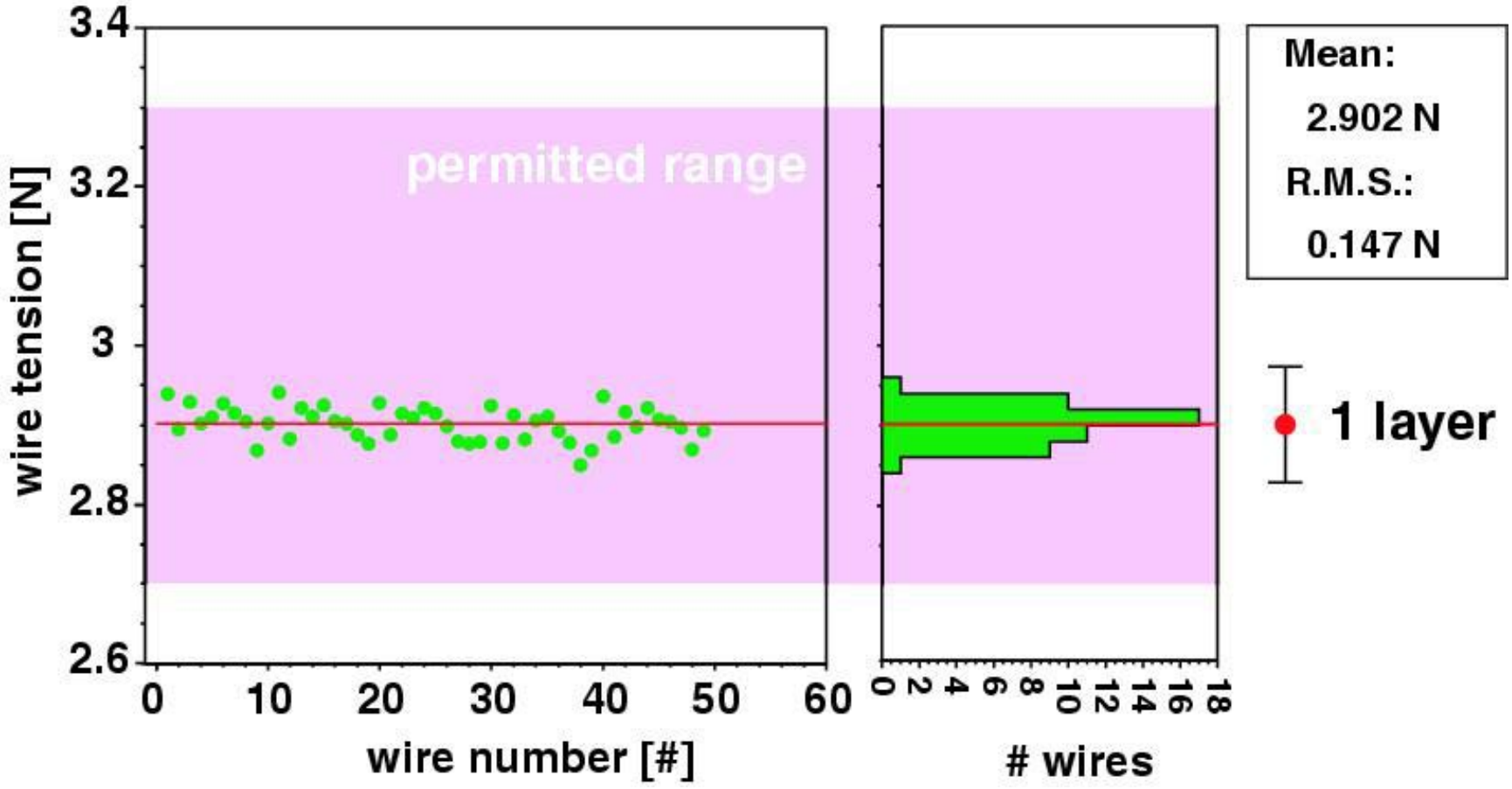
$$F = \mu \cdot \left(\frac{2 \cdot f \cdot l}{n}\right)^2$$

(μ linear density; f resonance freq.; l length)

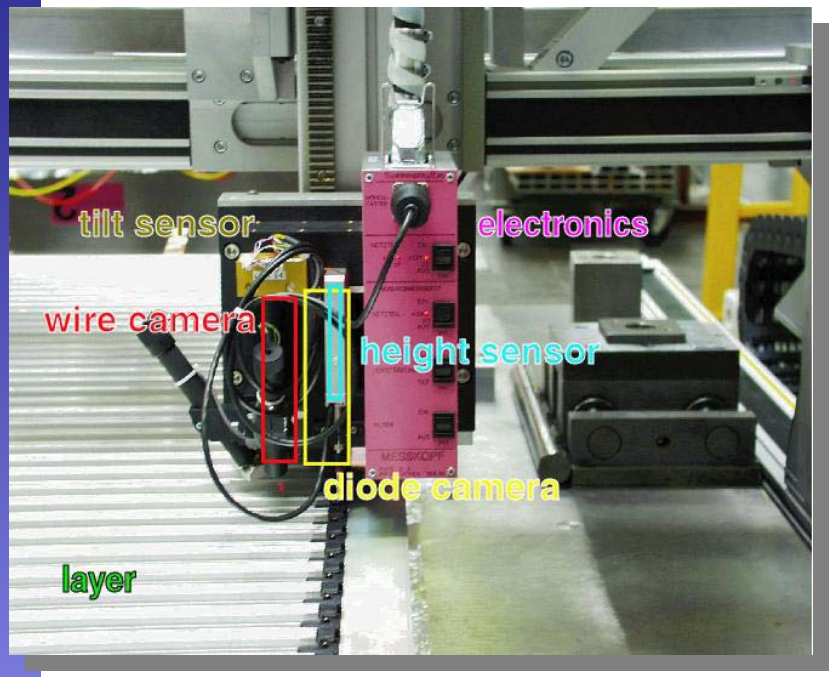
S.Hermann Thesis



Wire Tension Result



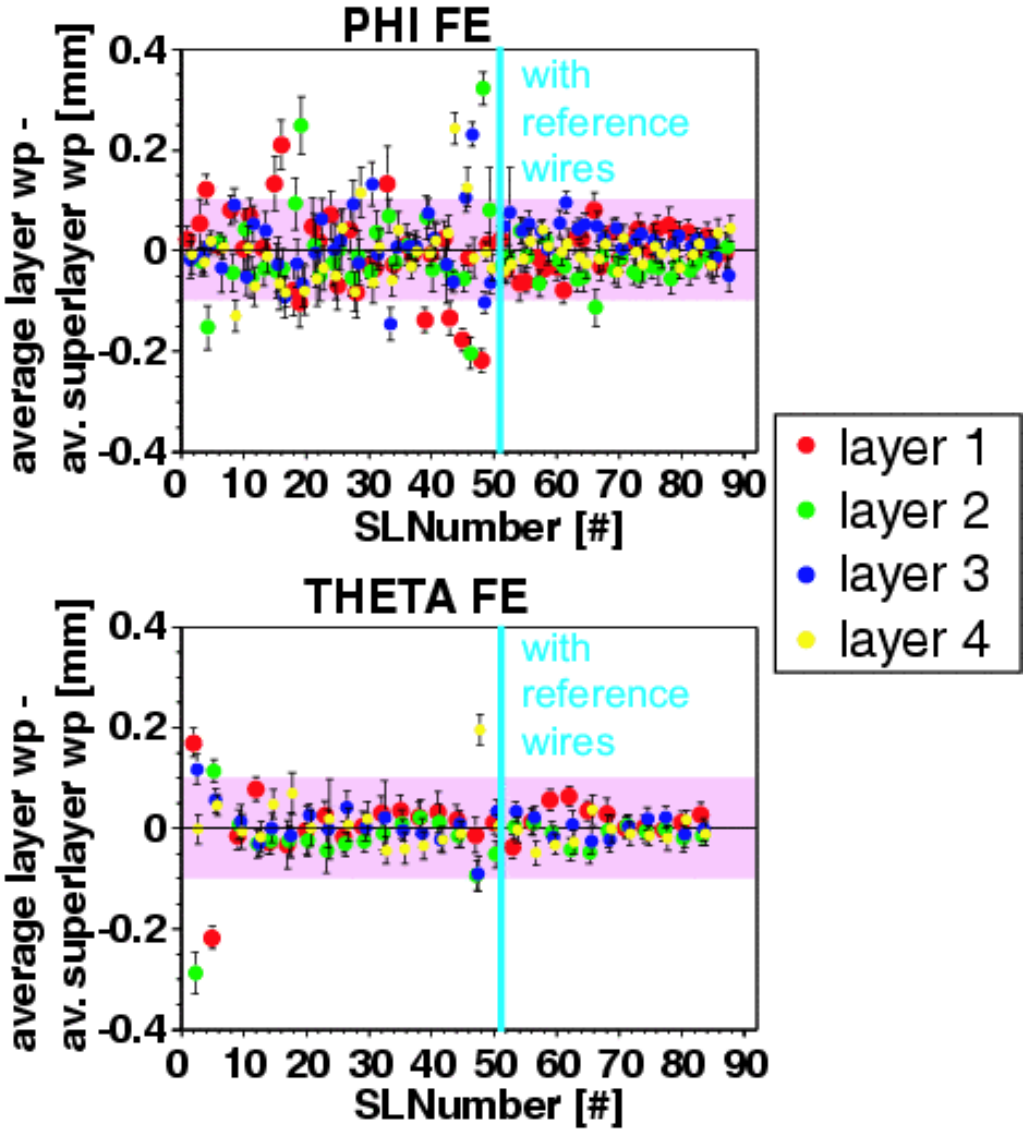
Wire Position



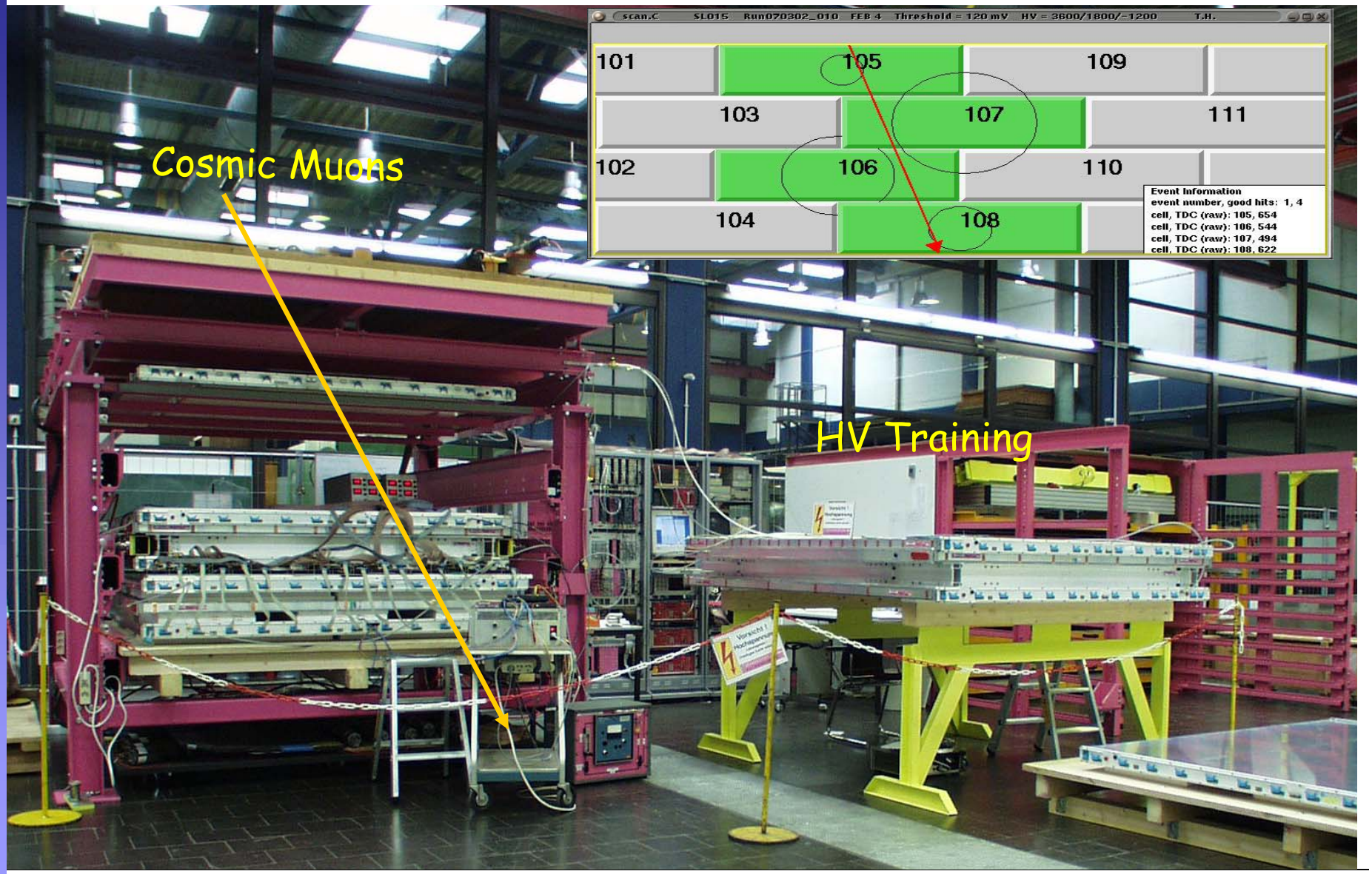
Wire position within QC requirements

(new reference wire system, >SL 050)

S.Hermann Thesis

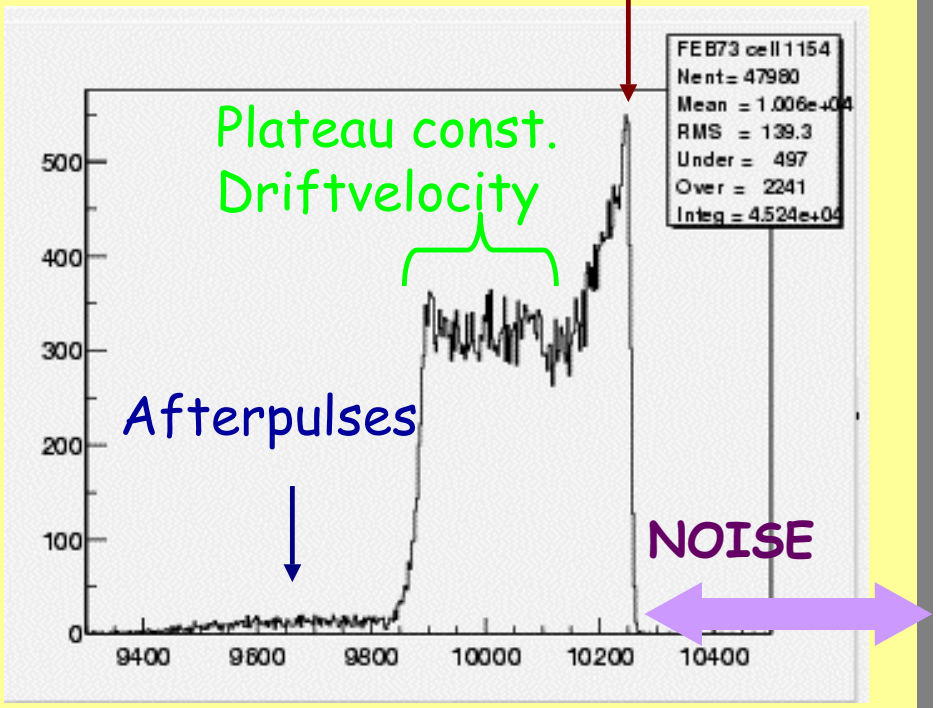


Quality Control with Cosmics



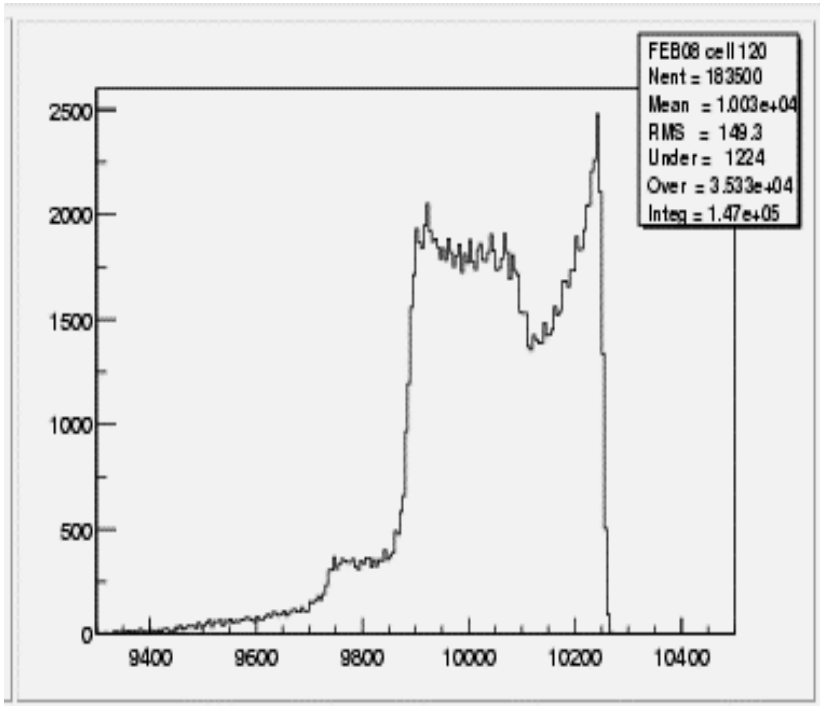
Quality of TDC Spectrum

Good TDC spectrum

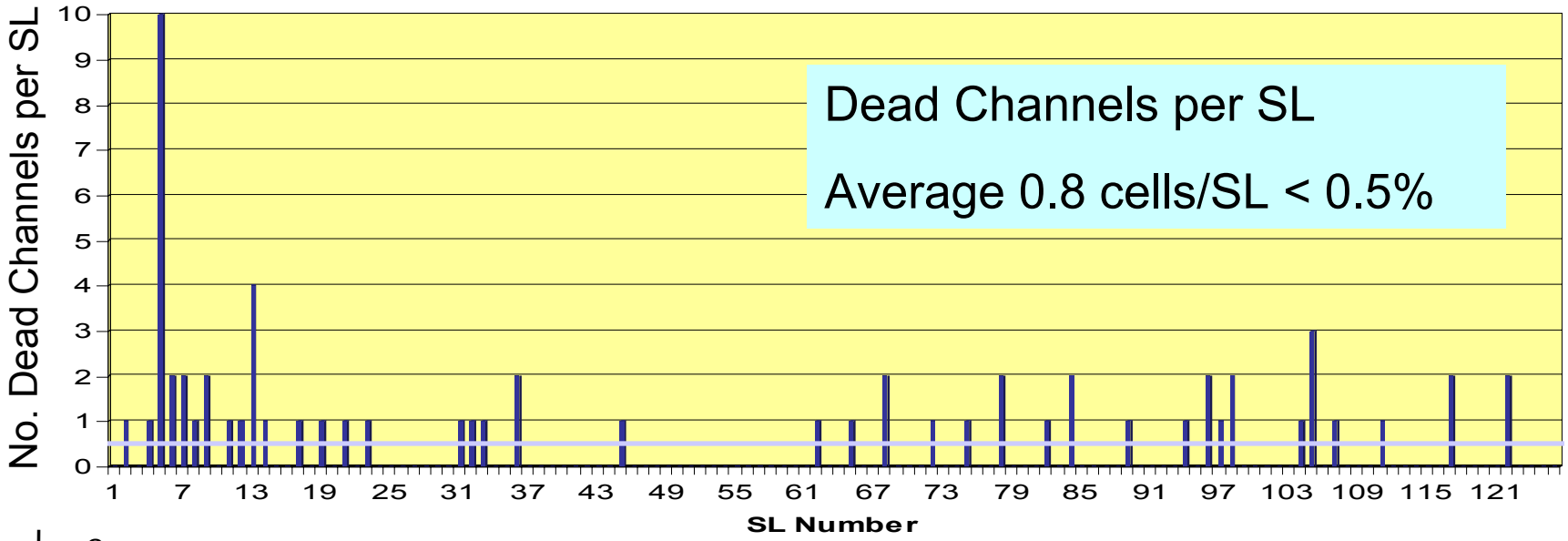


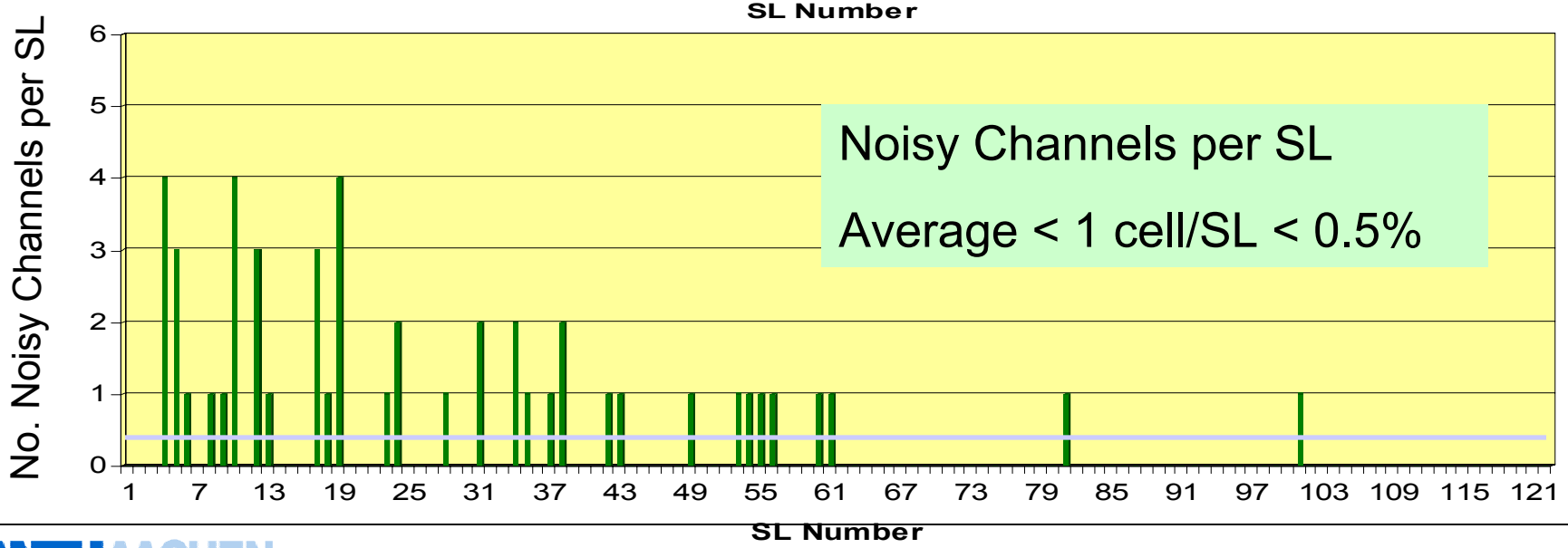
10 µs .... 55 µs

Distorted spectrum
Bad electrical contact

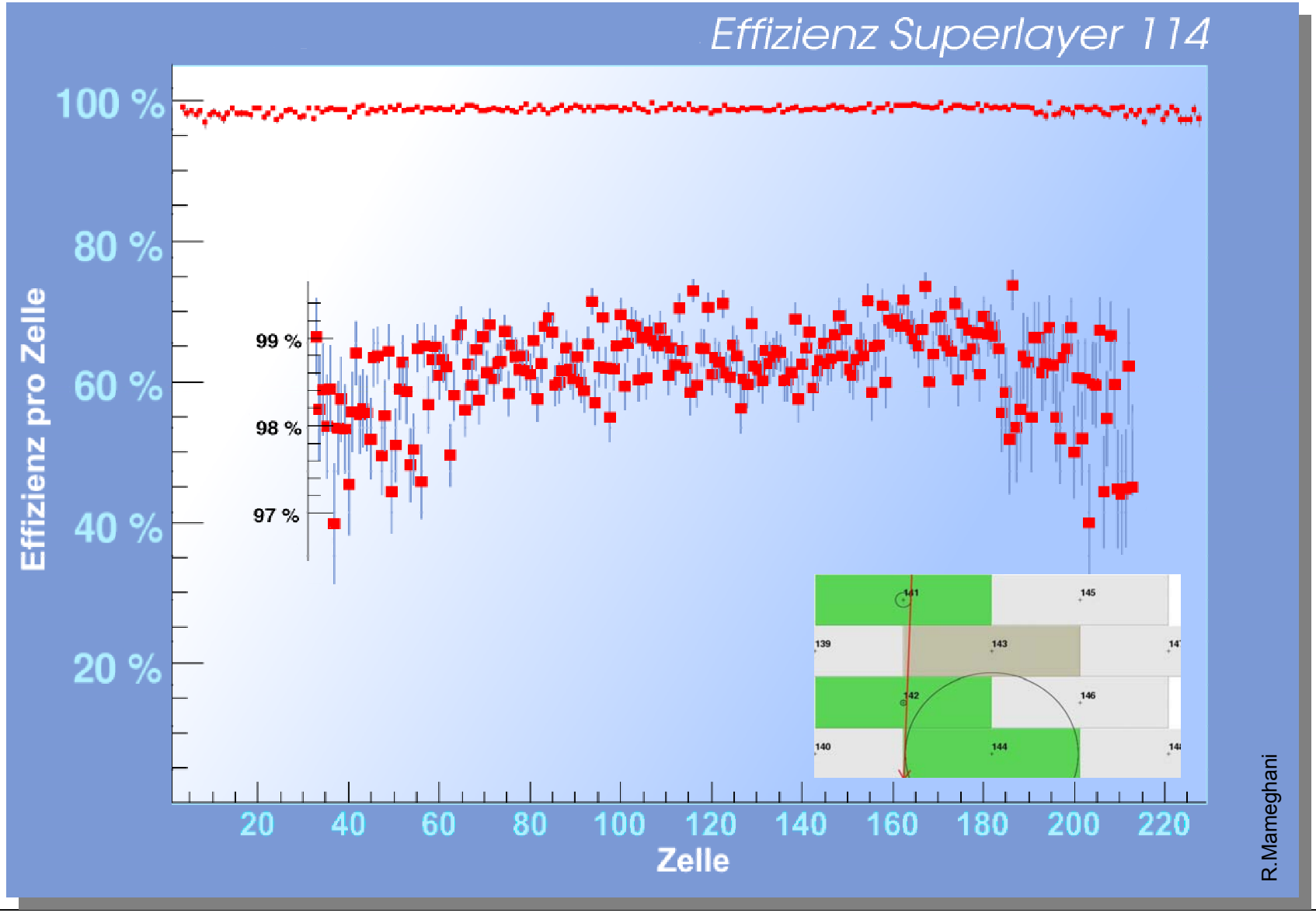


Dead & Noisy Channels



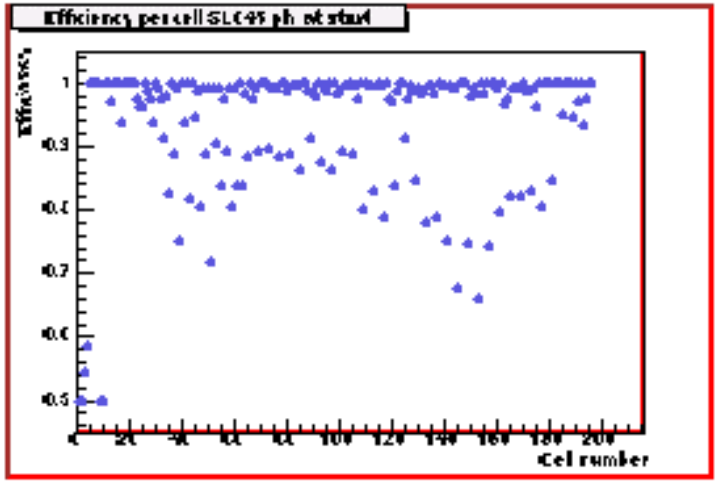


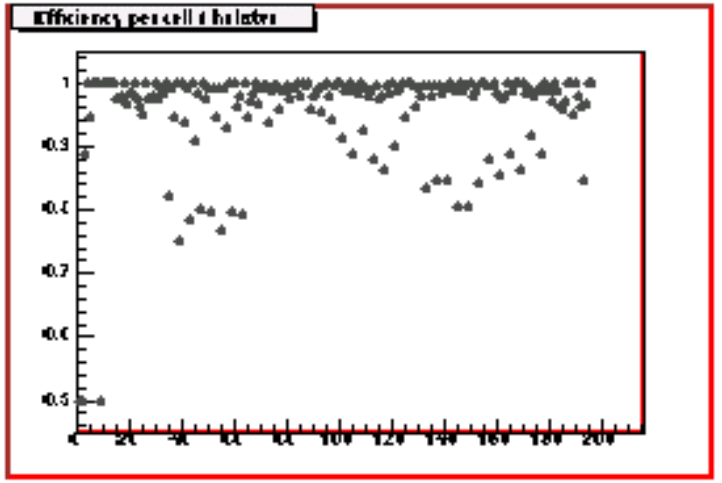
Efficiency per Cell

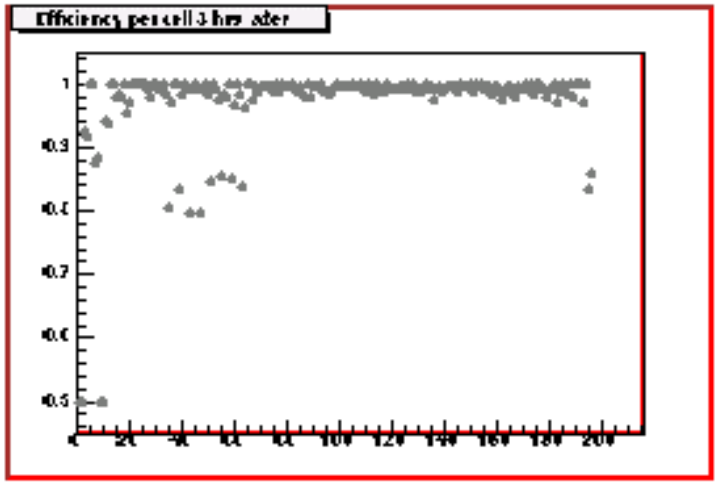


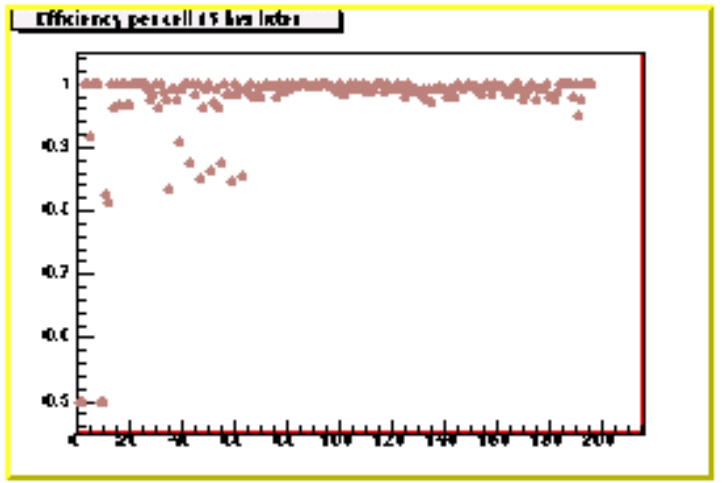
Time development of Efficiency

- Efficiency obviously depends on gas distribution, Oxygen-meter measures just overall O_2-content

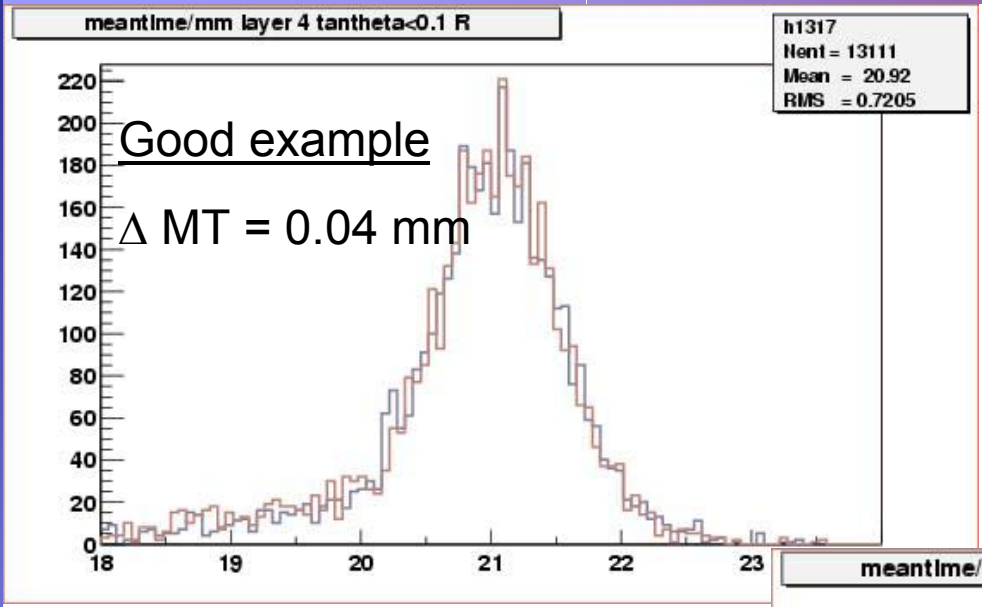


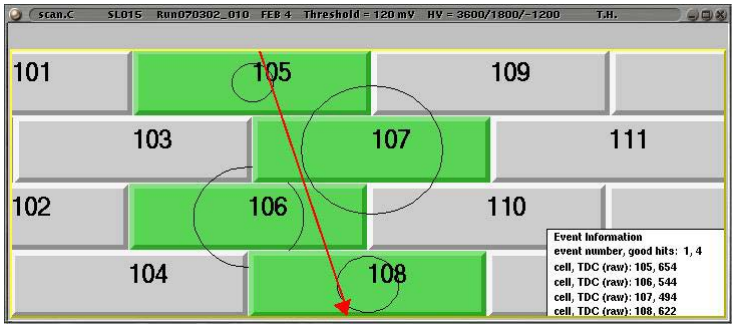






Meantime as Shift-Indicator





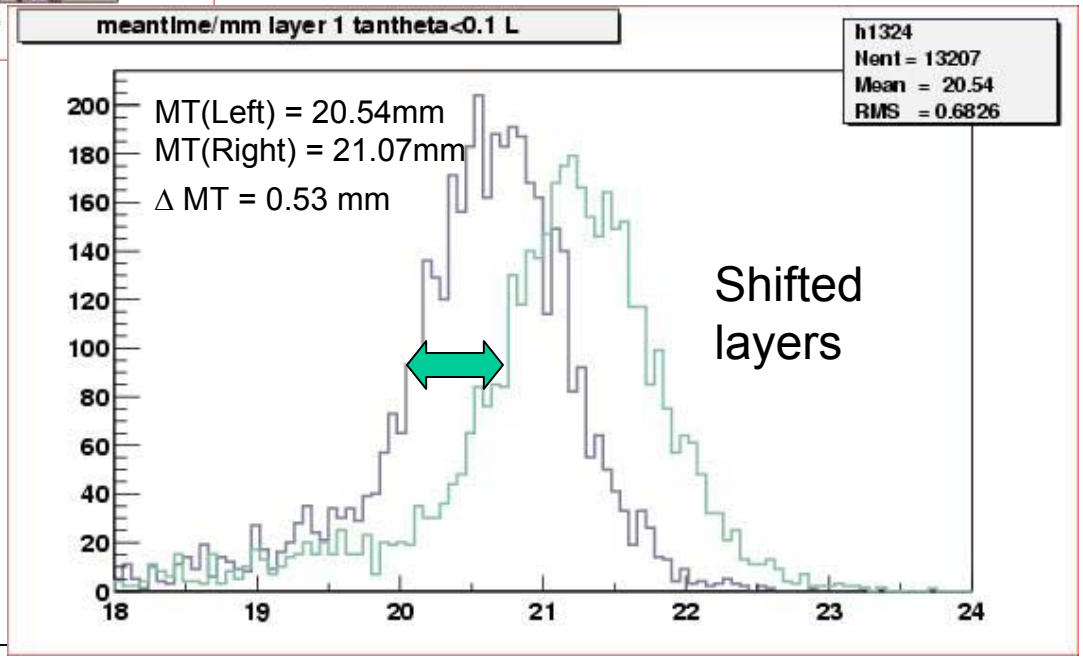
$$\text{Meantime} = \frac{1}{2}\left[dist(1) + dist(3)\right] + dist(2)$$

For 130 SL:

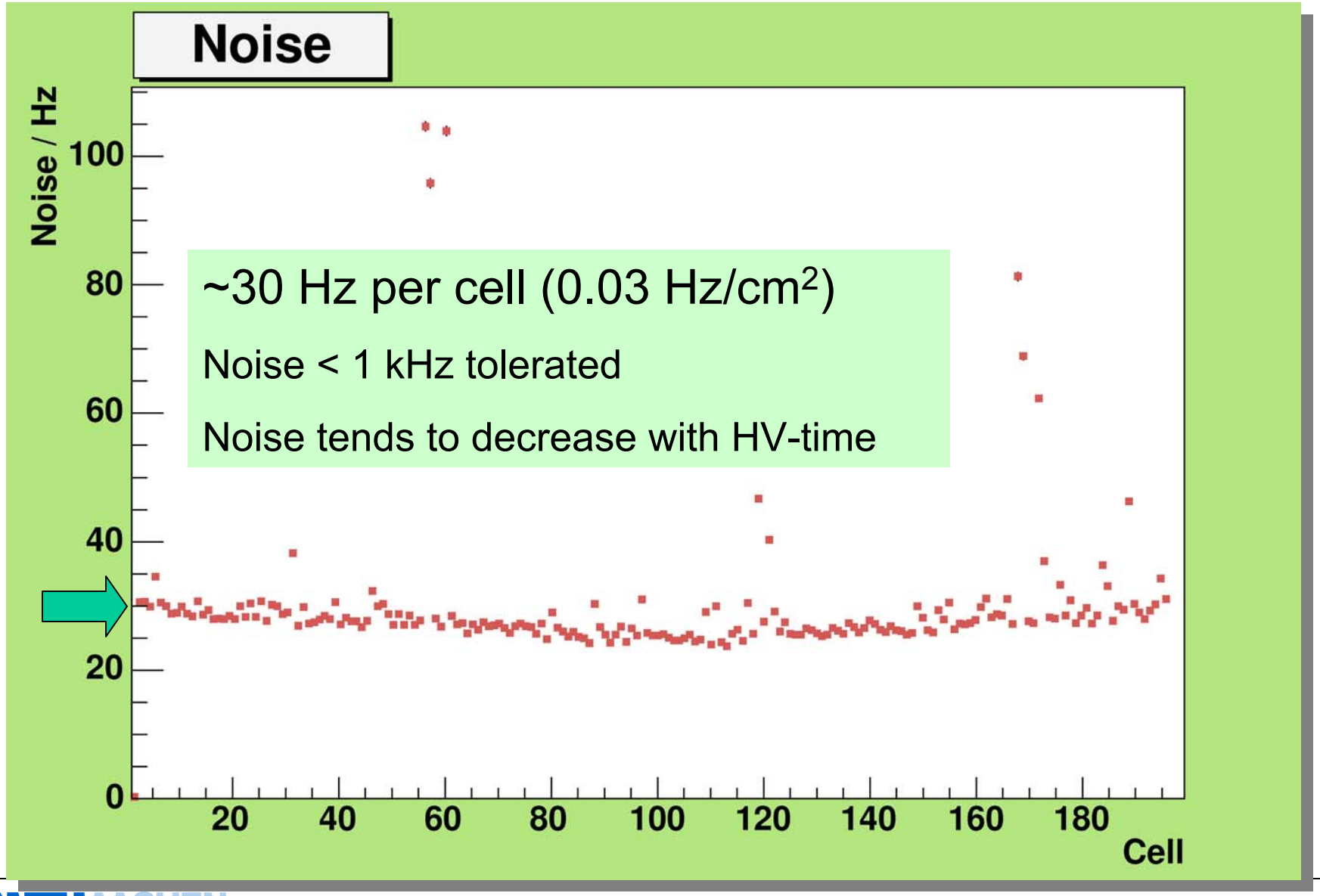
max.shift 0.53 mm [1 SL],

~10 SL with a

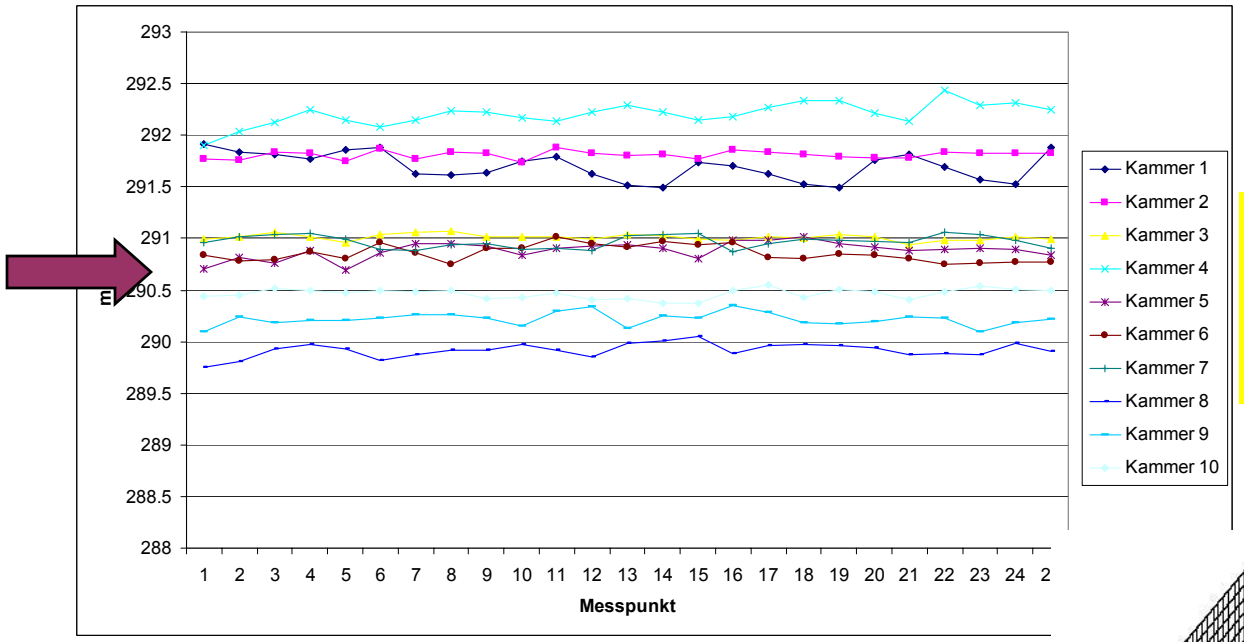
0.1 mm<shift<0.2 mm



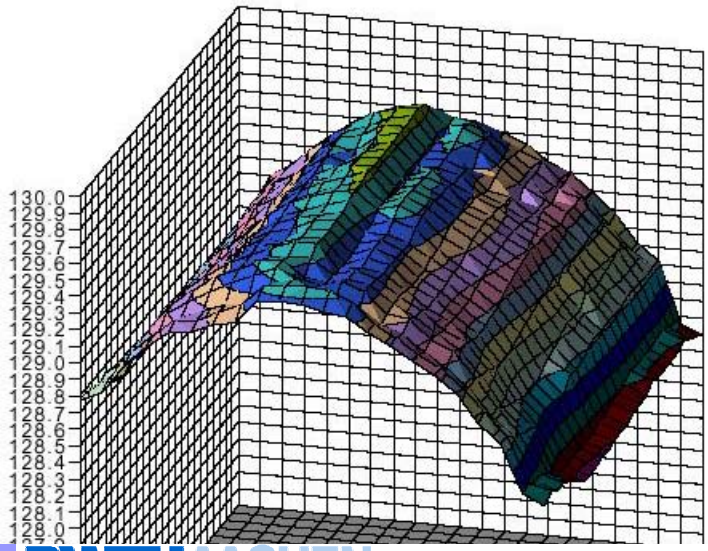
Typical Noise per Cell Distribution

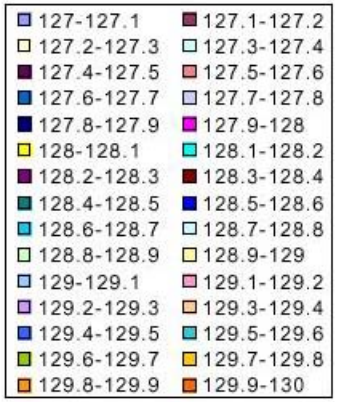


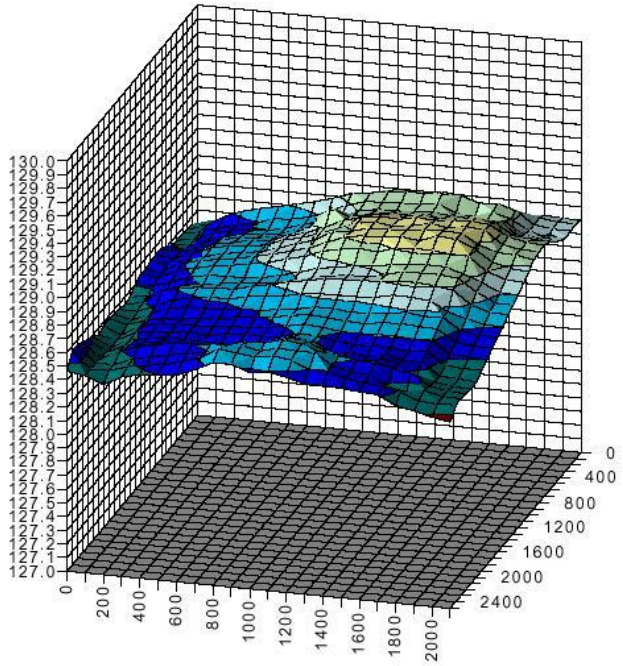
Planarity of Chambers



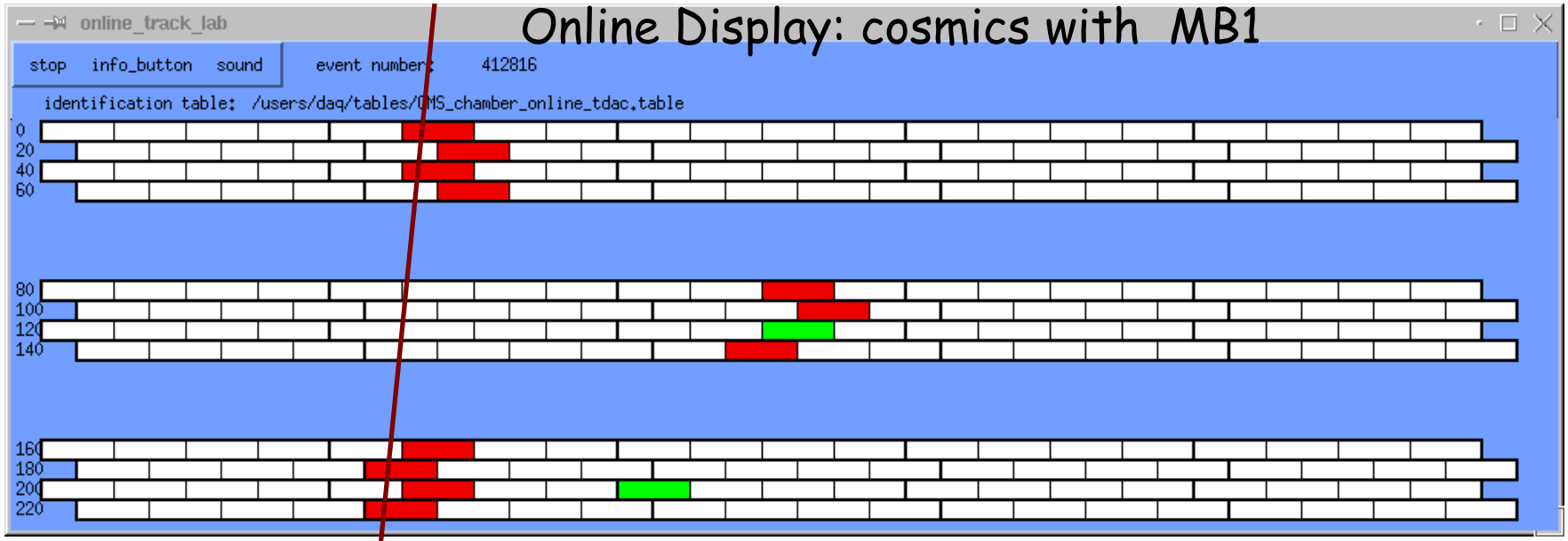
Honeycomb Planarity deviates by ~1 mm





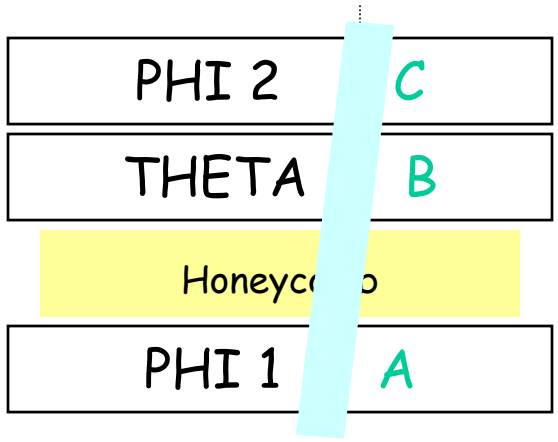


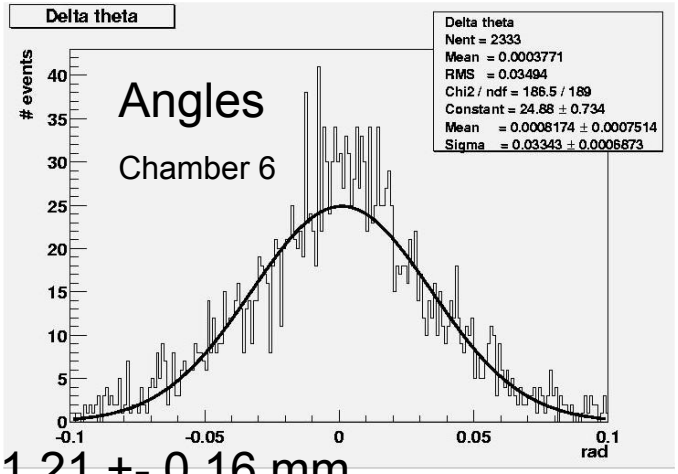
Data Taking with Full MB1



Online Display: cosmics with MB1

M.Bontenackels, B.Fehr





Coordinate Δx = 21.21 +- 0.16 mm

Chambers at CERN

Storage and testing of CMS barrel muon chambers at ISR.

>50% of total production in 04/04

Chamber Repair at ISR

36 MB1 chambers at ISR, assembled with signal and cables etc., different HV system for more chambers: **tested again with cosmics**

Problems found [28 chambers end 2003]:

1. HV problems after a few months of operation. Traced to a weakness in the HVB design. → New design HVB_F. Exchange all HVB (1800).
2. Missing testpulses → Understood & fixed for groups
3. Bad cathode contacts → Now contacts on both sides for new chambers.
4. Low efficiency cells → FEB problem, fixed.
5. New dead cells → Disconnection, other sources?

→ Repair done for 11 chambers, will be ongoing

→ Main „repair“ activity is exchange of HVB.