



First Experiences in Operating the n.c. HOM-damped Cavity with Beam

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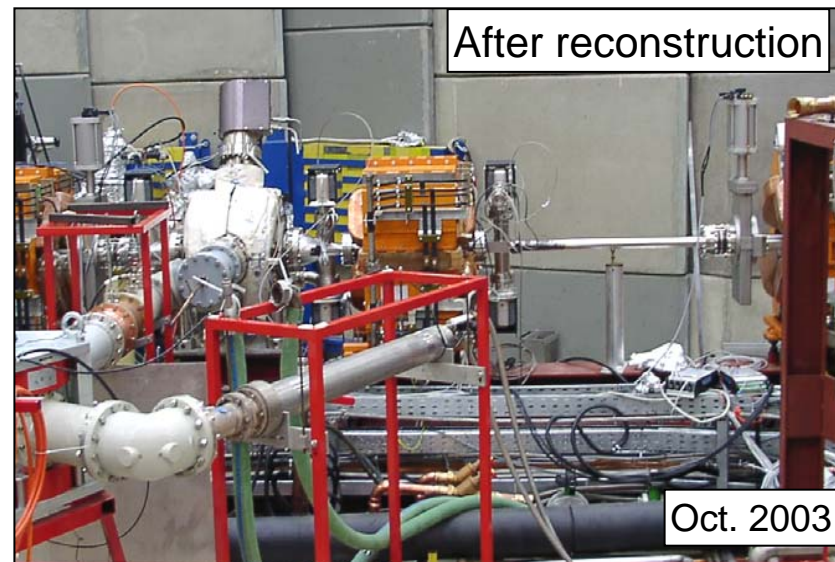
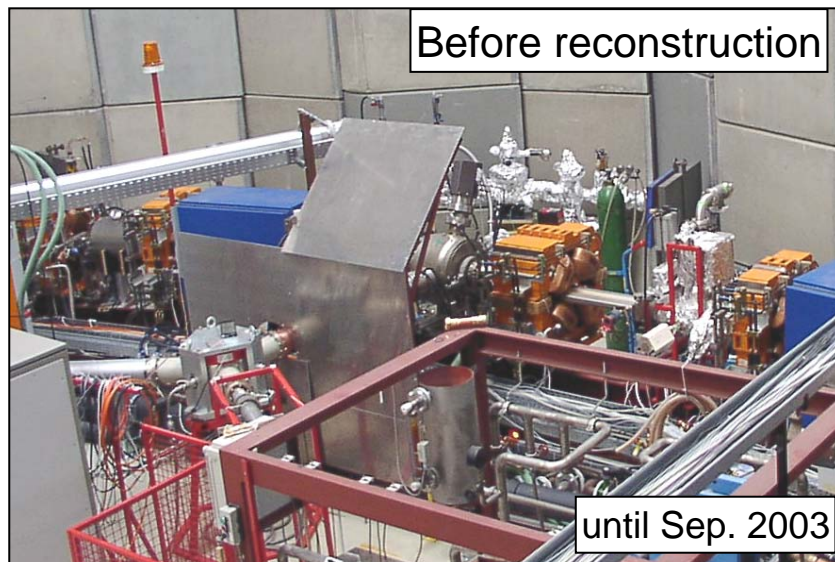
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- Experiences with the cavity & RF-data
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- CBM measurements and estimations
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RF-Section with DORIS-Cavity



Presented at the Karlsruhe meeting

Preparations For A „Small“ Test



The Inserted HOM-damped Cavity



- The cavity was preconditioned up to 30 kW (thermal load, CW) at BESSY and delivered to DELTA (17.May `04).
- Reconditioning within one day (0-30 kW, 5% duty cycle) (02.Jun. `04)
- 28 kW CW were reached the next day.
- Vacuum conditioning at 20 kW CW
- 28.Jun. `04: First beam stored with EU-cavity up to 25 mA
- 29.Jun. `04: Vacuum limited 60 mA stored
- 30.Jun. `04: 100 mA stored.
- 14.Jul. `04: 130 mA stored. (I_{\max} of DELTA)

RF Data

- Shuntimpedance from low power measurements:

$$R_s = 3.1 \text{ M}\Omega \text{ (EPAC04, F.Marhauser, E.Weihreter)}$$

- Shuntimpedance from synchrotron frequency & cavity losses:

$$f_s = 14.872 \text{ kHz}, \quad E = 1.485 \text{ GeV},$$

$$P_{\text{loss}} = 19.862 \text{ kW}, \quad h = 192,$$

$$f_{\text{RF}} = 499.813 \text{ MHz}, \quad \alpha = 0.0053,$$

$$W_0 = 152 \text{ keV (SAW)} \quad I = 95\text{-}120 \text{ mA}$$

$$\Rightarrow U_{\text{RF}} = 335.67 \text{ kV} \Rightarrow R_s = 2.84 \text{ M}\Omega \pm 10\%$$

- Shuntimpedance from quantum lifetime:

$$I = 1 \text{ mA},$$

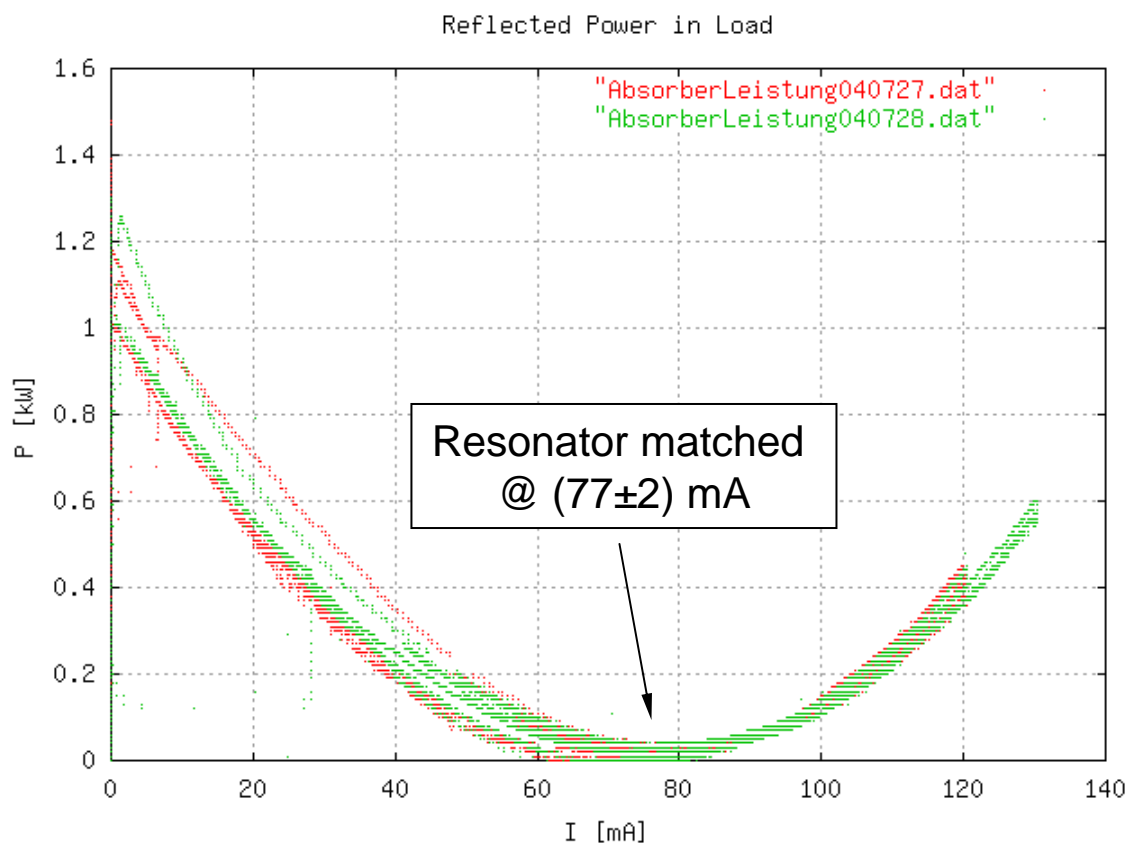
$$P_{\text{loss}} = 4.71 \text{ kW}$$

$$\tau = 1 \text{ s}$$

$$W_0 = 129.4 \text{ keV}$$

$$\Rightarrow U_{\text{RF}} = 167 \text{ kV} \Rightarrow R_s = 2.96 \text{ M}\Omega \pm 10\%$$

RF Data



- Shuntimpedance from reflected power:

$$I = 77 \text{ mA},$$

$$\beta_c = 1.7$$

$$W_0 = 152 \text{ keV (SAW)}$$

$$U_{\text{RF}} = 335.67 \text{ kV}$$

$$\Rightarrow R_s = 3.34 \text{ M}\Omega \pm 10\%$$

RF Data

- Quality factor from low power measurements:

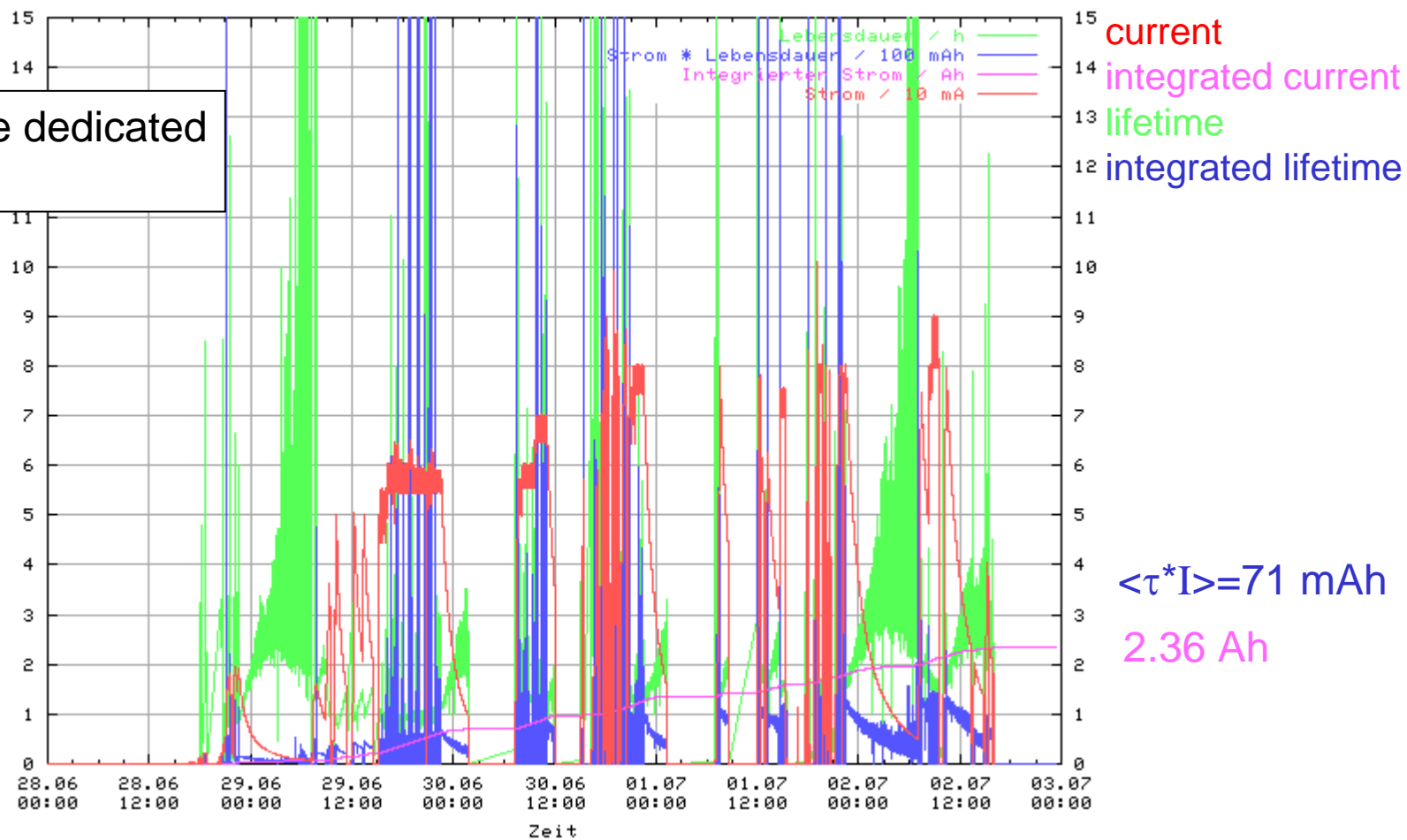
$$Q_L = 9900$$

- Quality factor from high power measurements (@20kW):

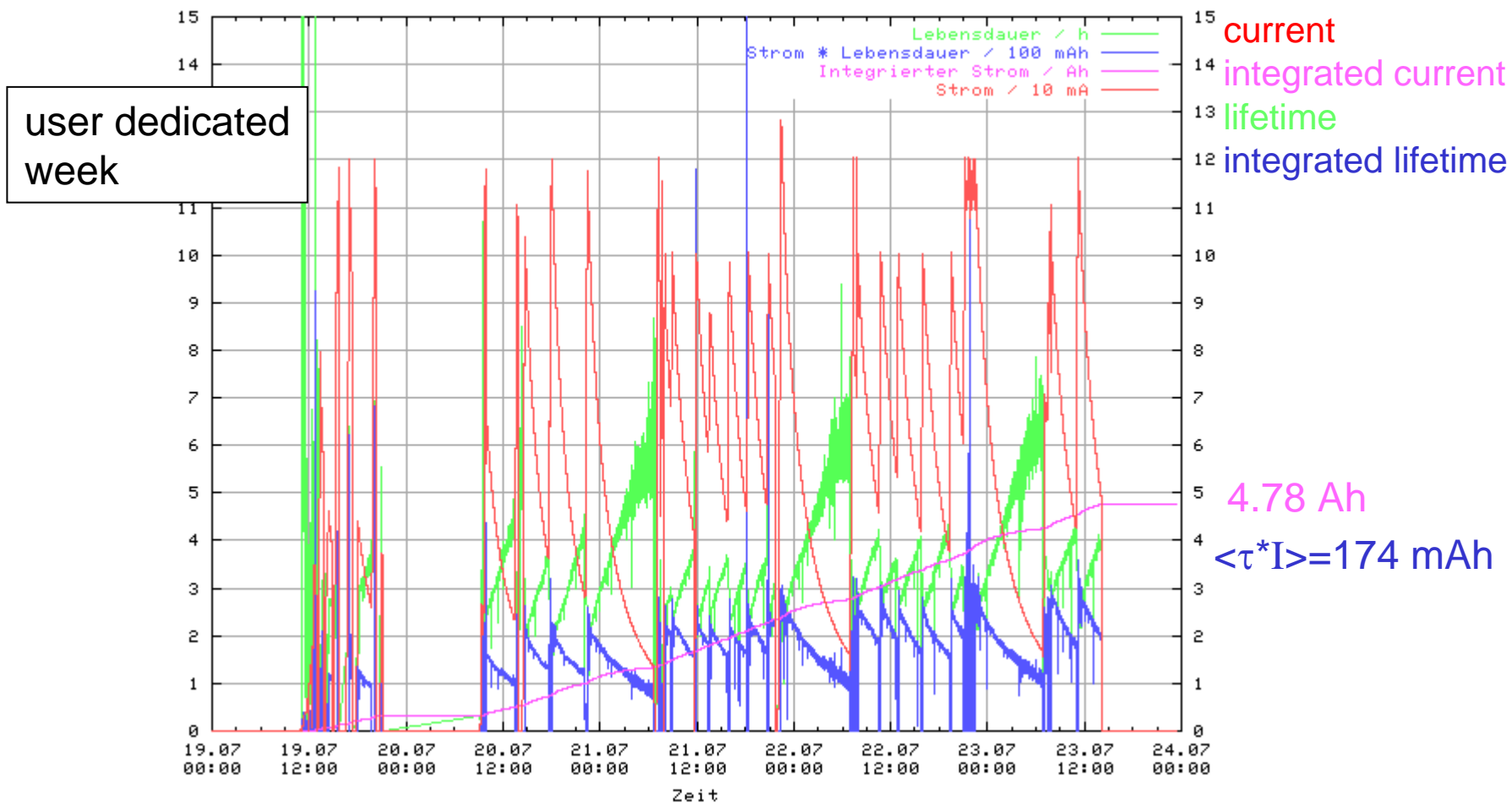
$$Q_L = 9200 \pm 5\%$$

First Weeks of Beam Operation

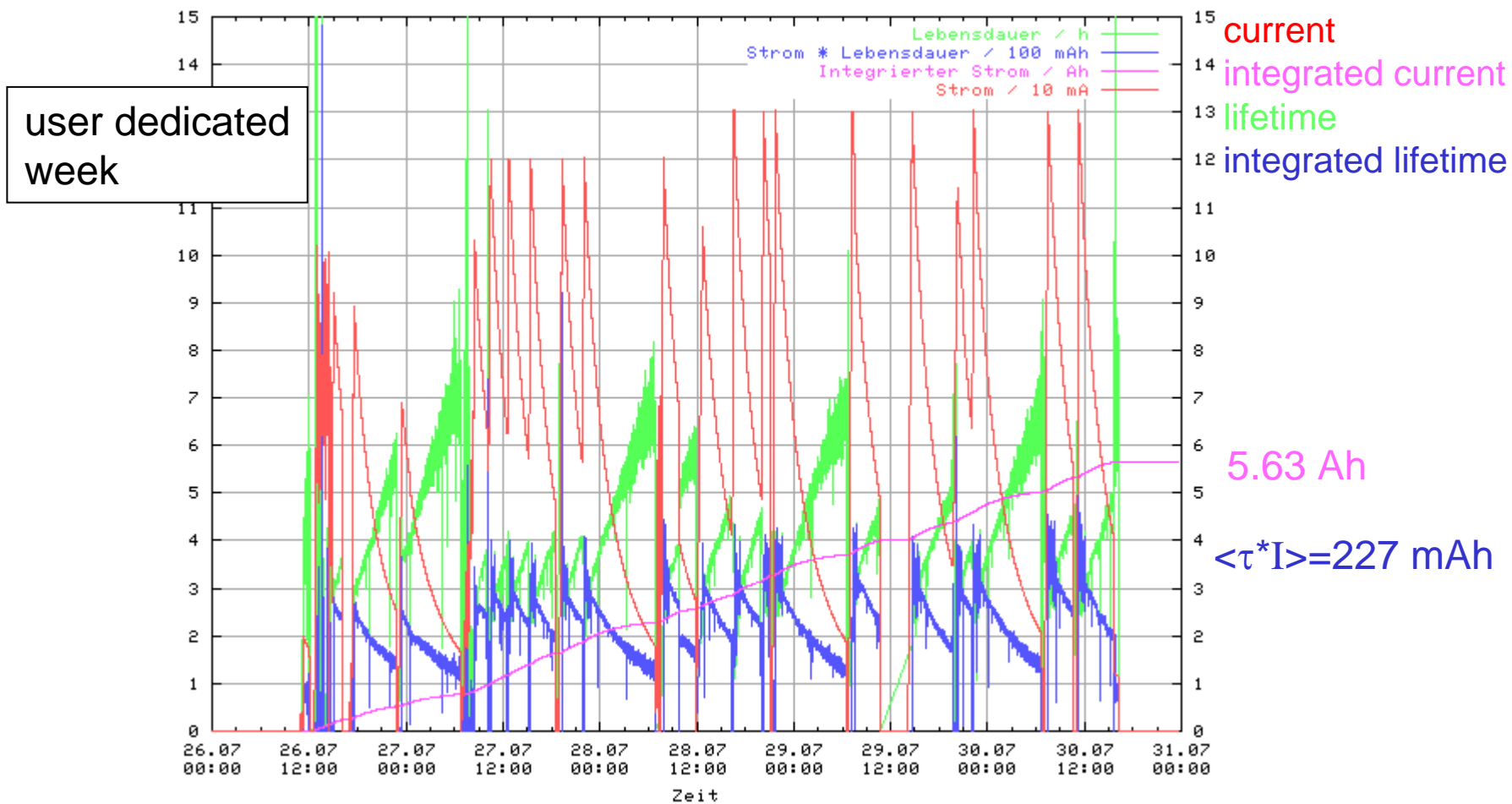
machine dedicated week



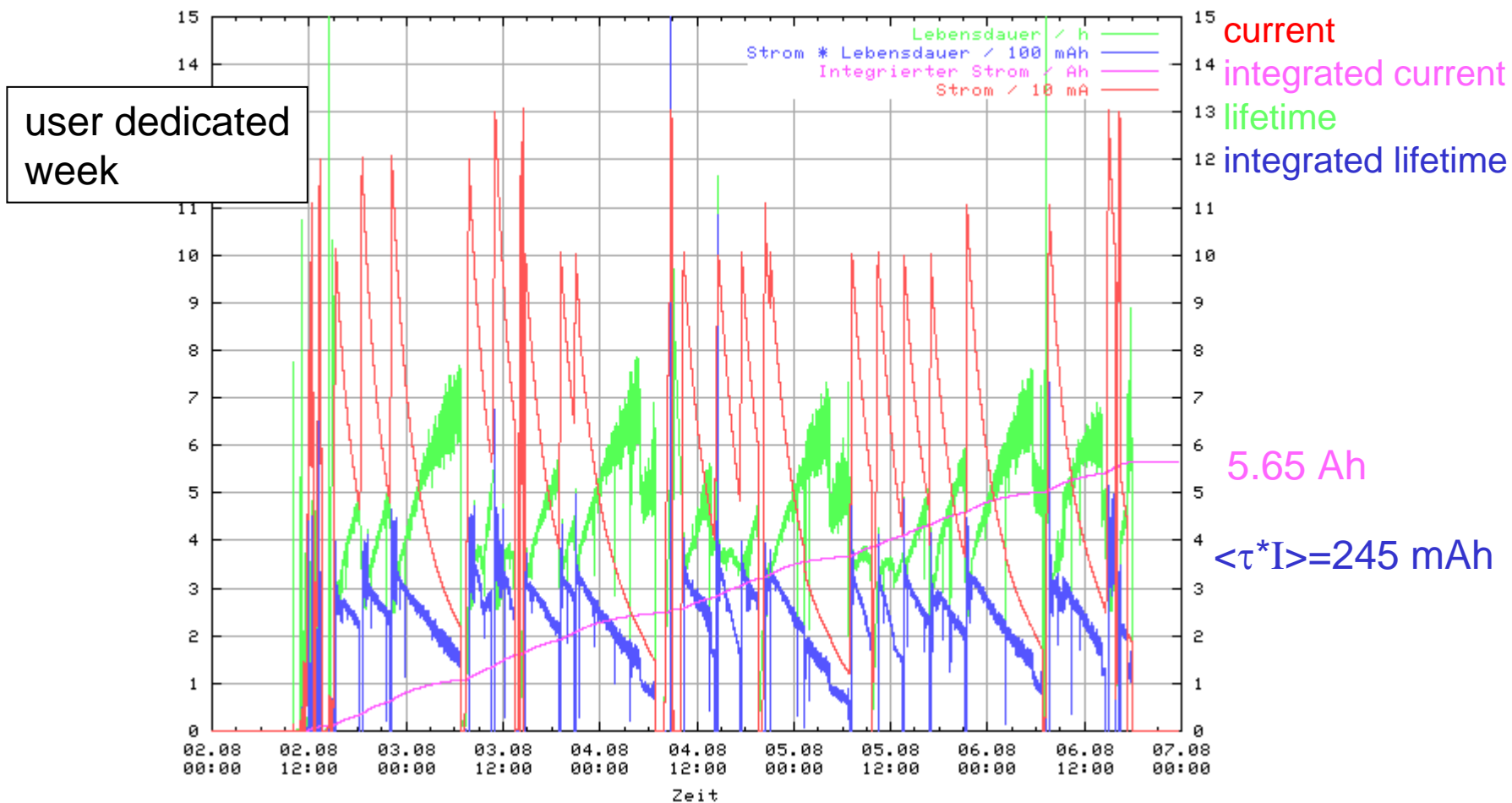
First Weeks of Beam Operation



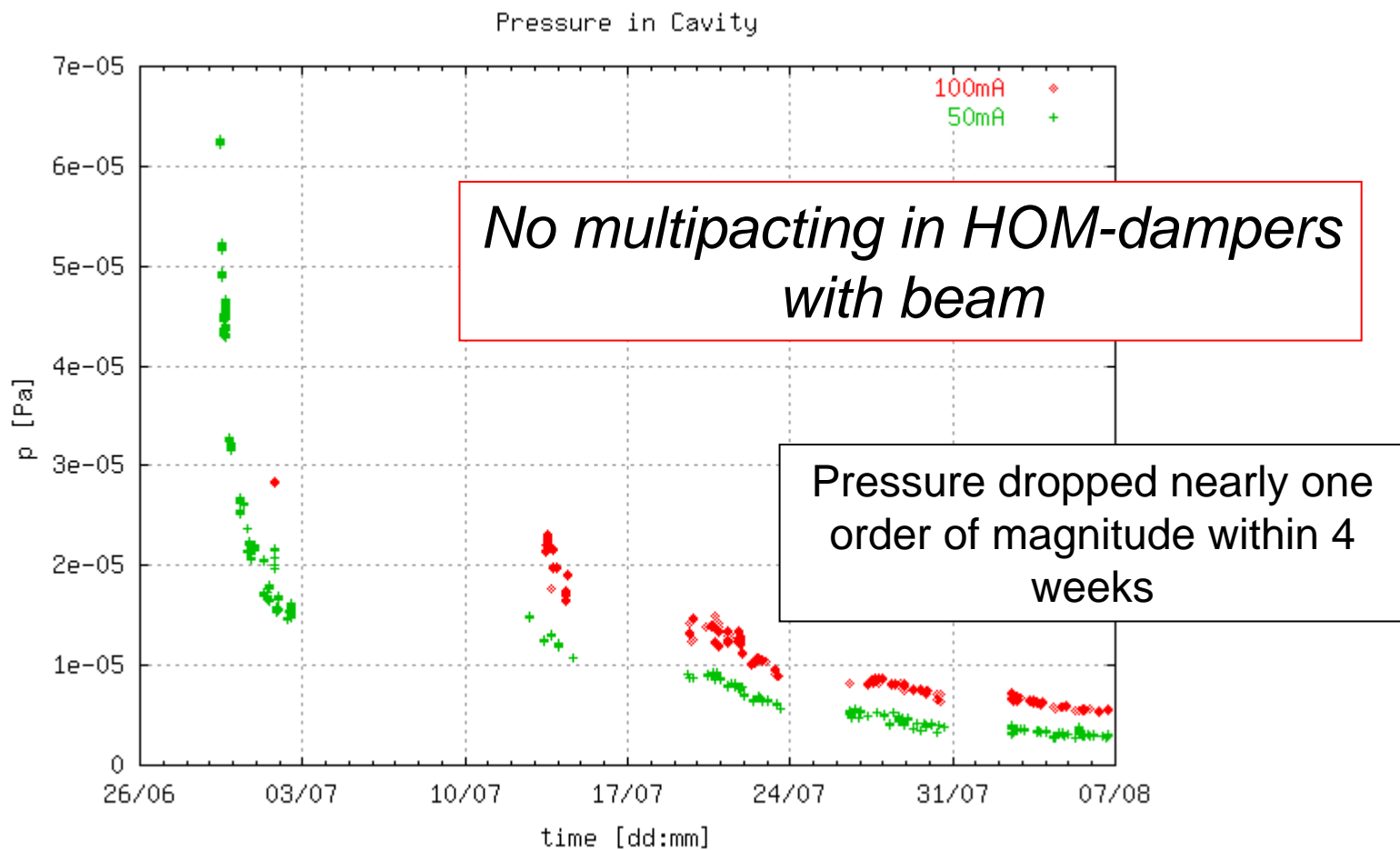
First Weeks of Beam Operation



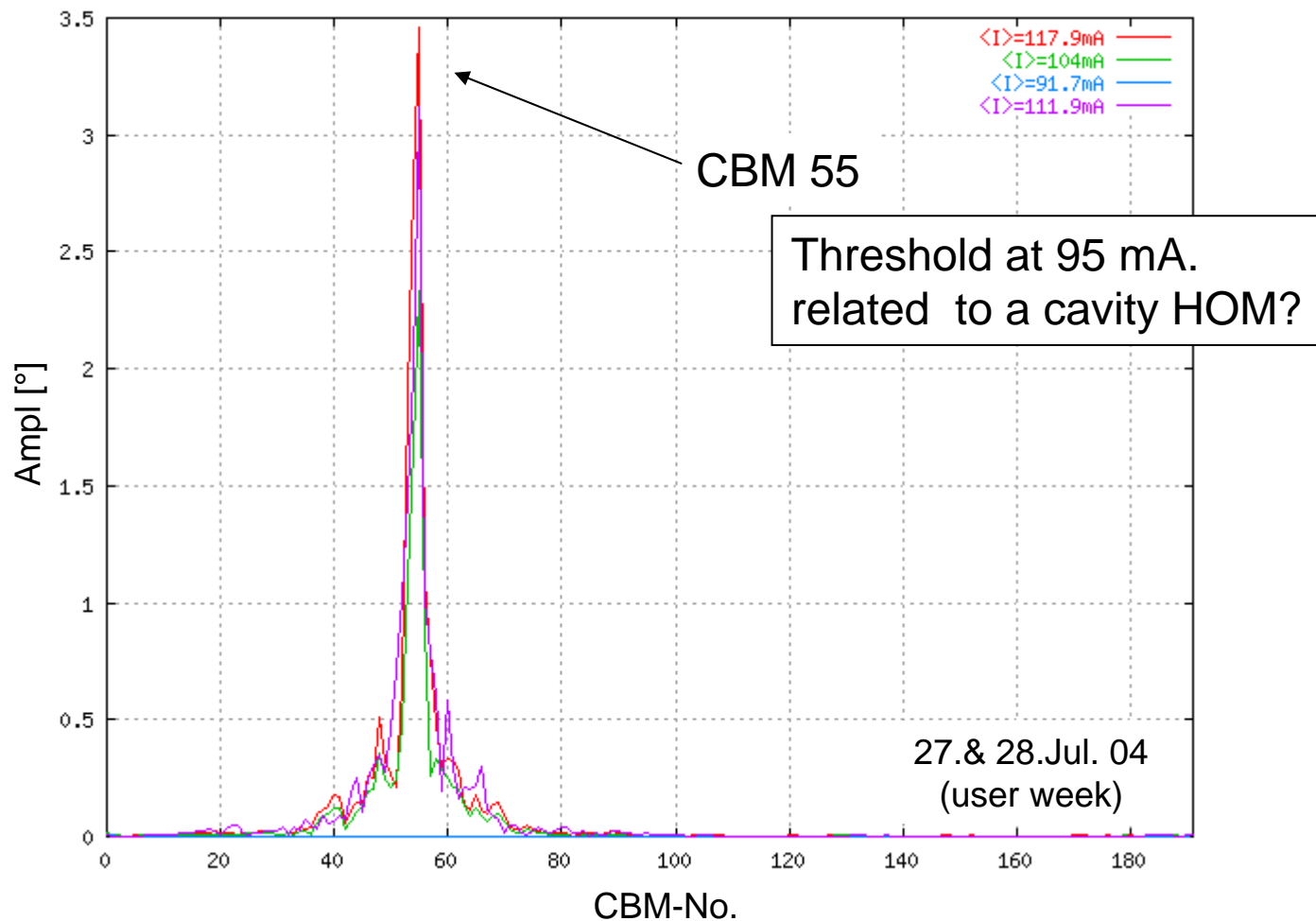
First Weeks of Beam Operation



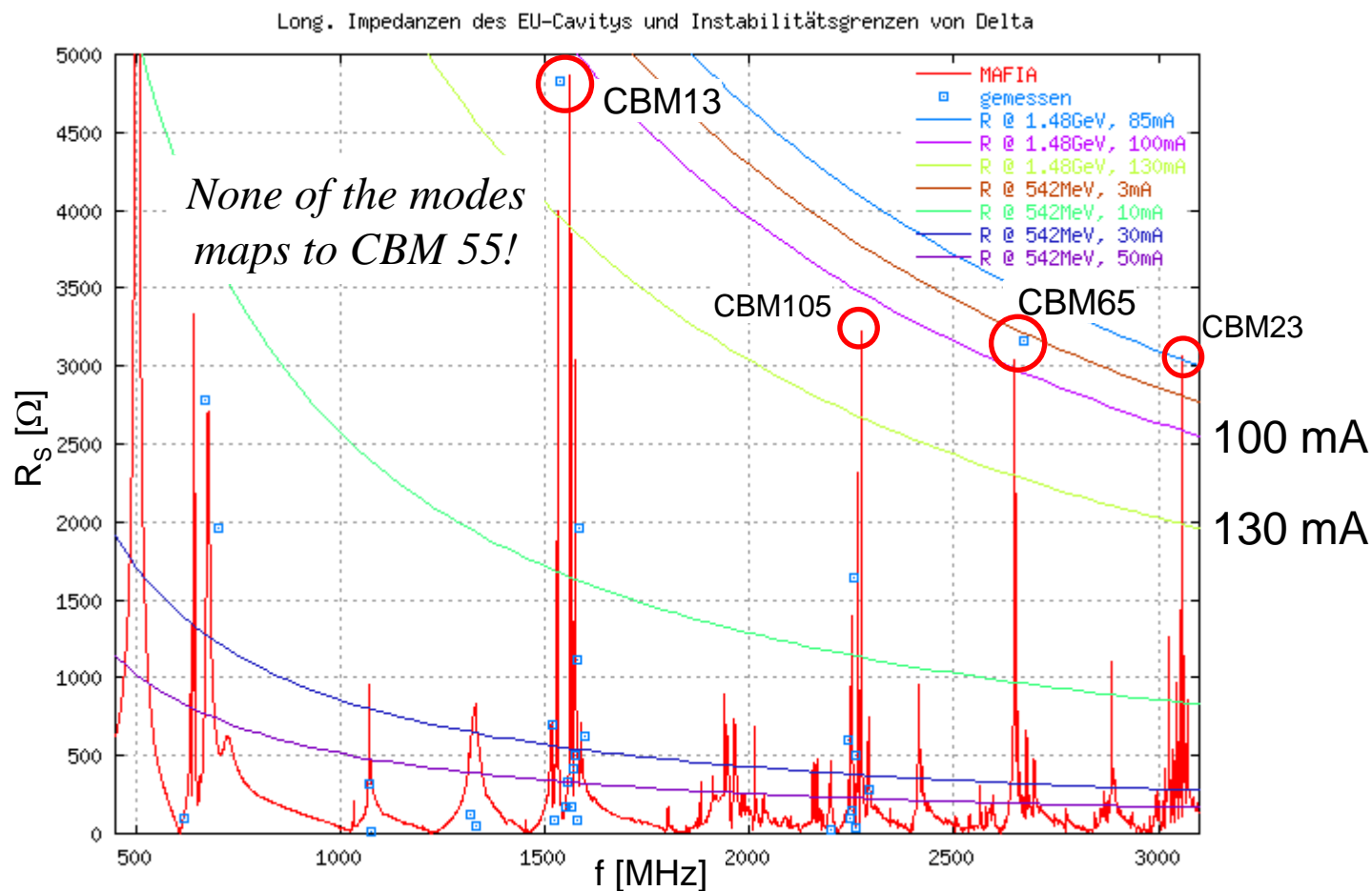
Pressure Evolution During Operation



First Measurements with the EU-Cavity

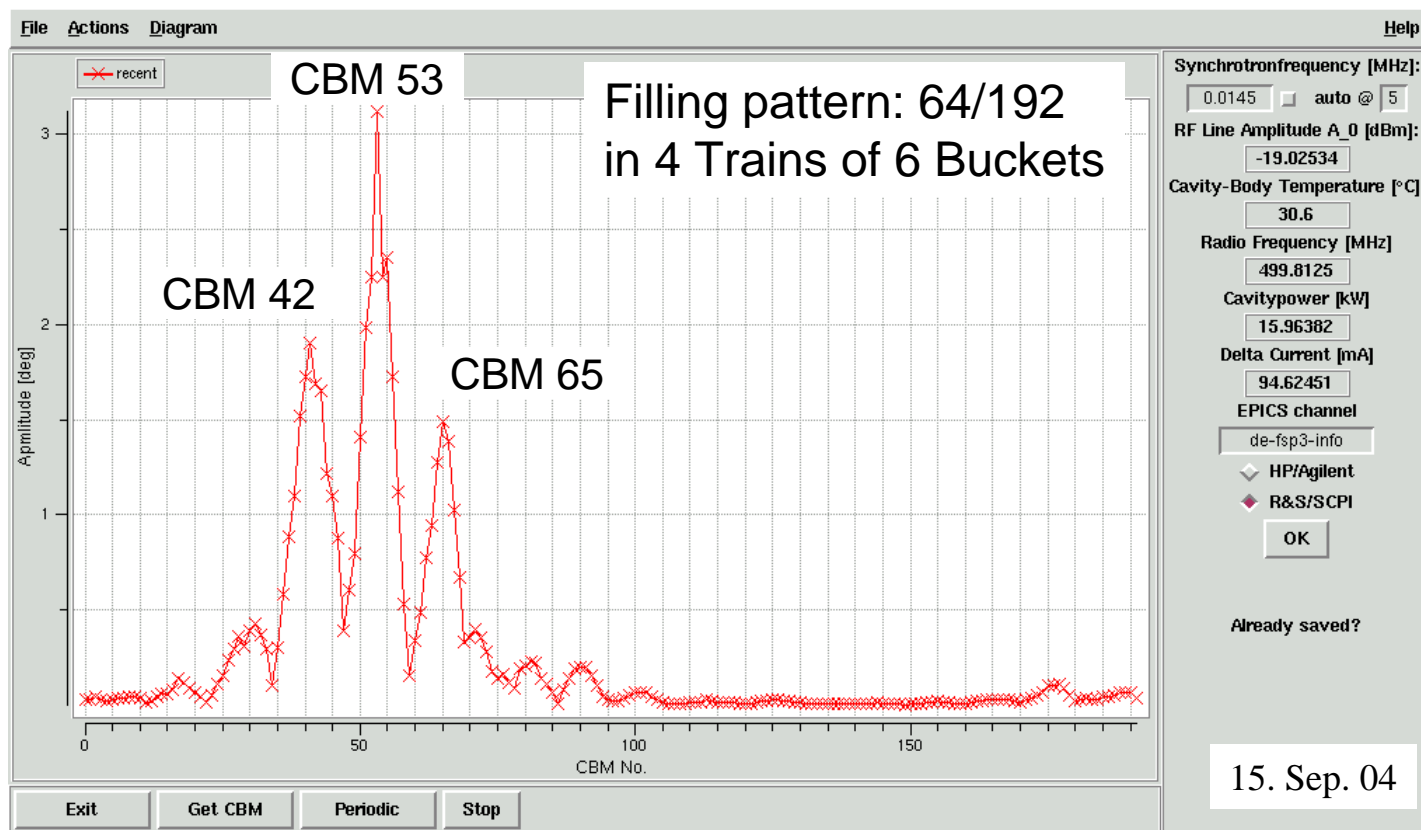


Impedance Thresholds of the HOM-damped Cavity in DELTA

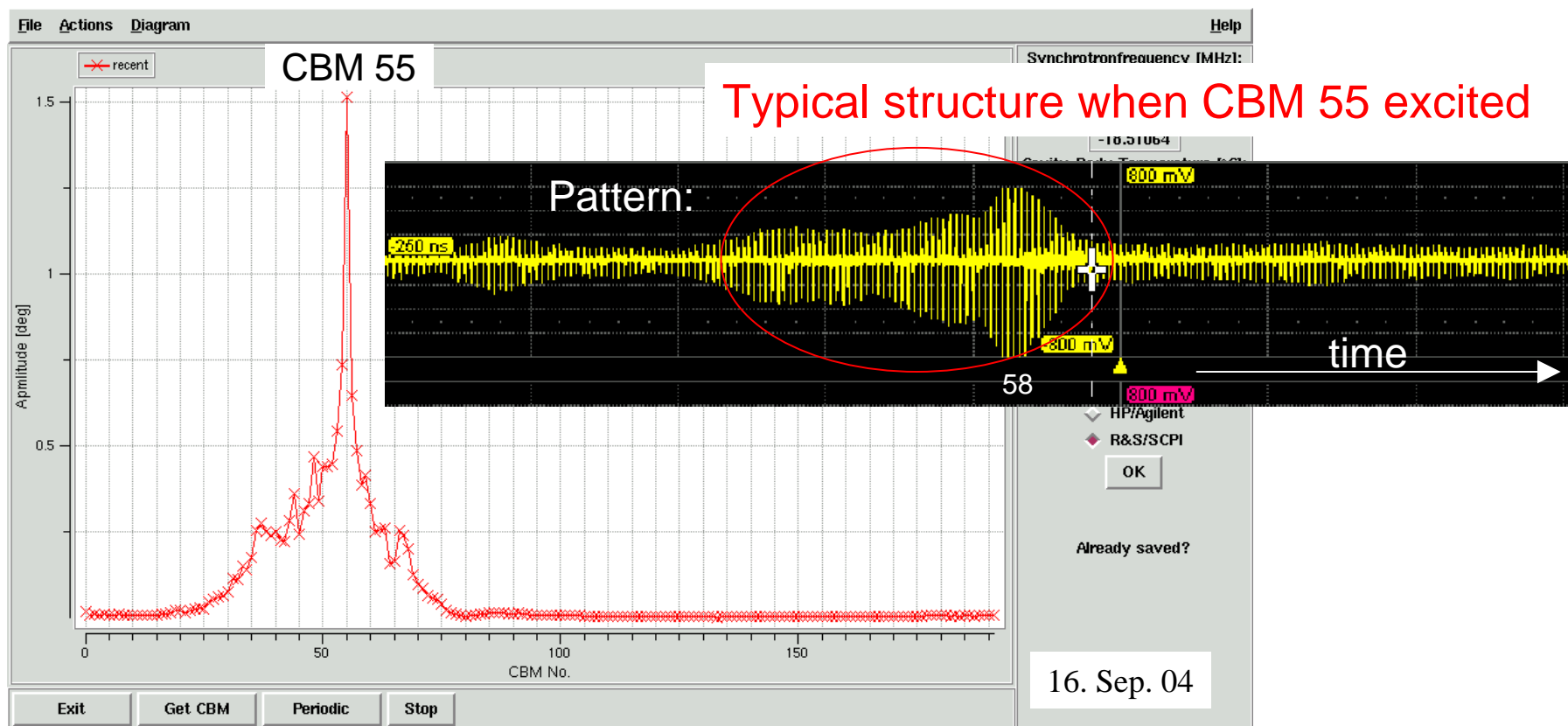


MAFIA simulation and mode measurement: F. Marhauser

CBM-Measurements with DORIS-Cavity (w. Damper)



CBM-Measurements with DORIS-Cavity (w. Damper)



Typical structure when CBM 55 excited

Same CBM excited as with EU-Cavity \Rightarrow Pattern induced!



Summary

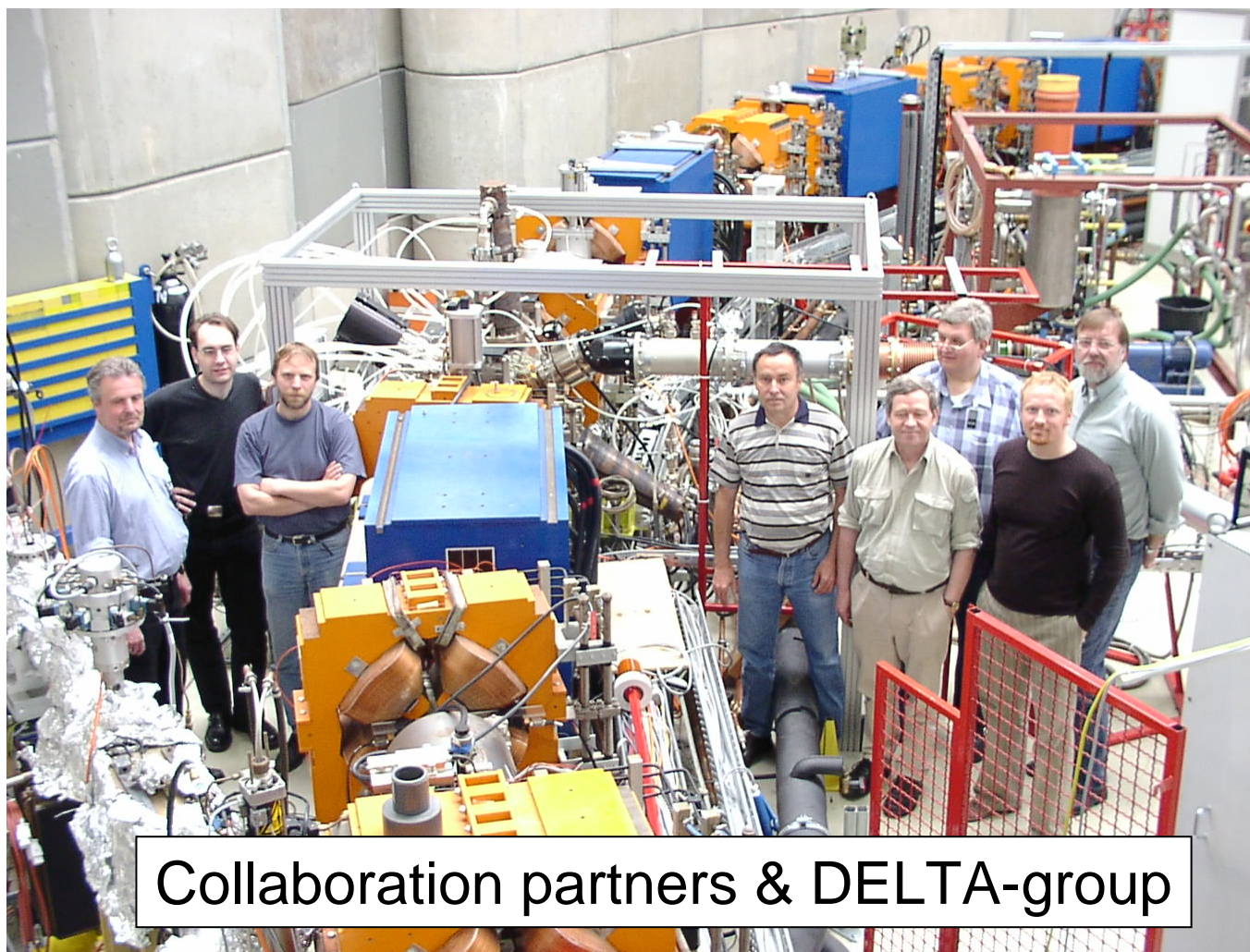
- Successful test with beam @ 1.5 GeV up to 130mA (nominal DELTA current)
- No cavity induced collective mode found
- Straight forward RF recommissioning @ DELTA
- Reasonable development of vacuum pressure
- No multipacting in HOM-dampers during beam operation
- Due to removal of cavity no low energy test by now



Outlook

- All HOM-dampers sent to Zanon for revision
- Strong interest for a second beam test period @ DELTA
- No final decision by committees yet

Thanks to



Collaboration partners & DELTA-group



END.