

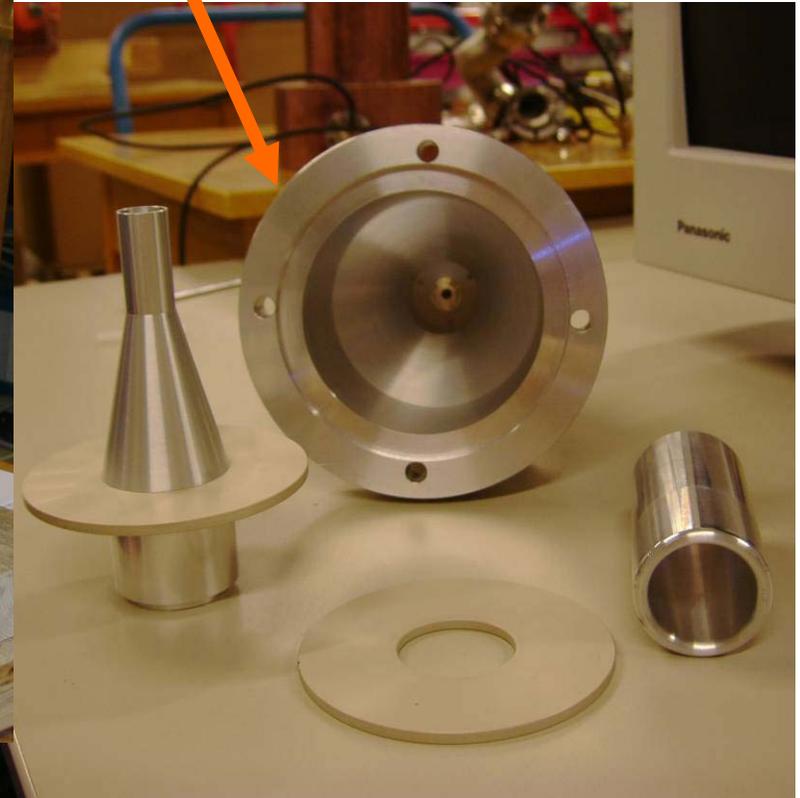
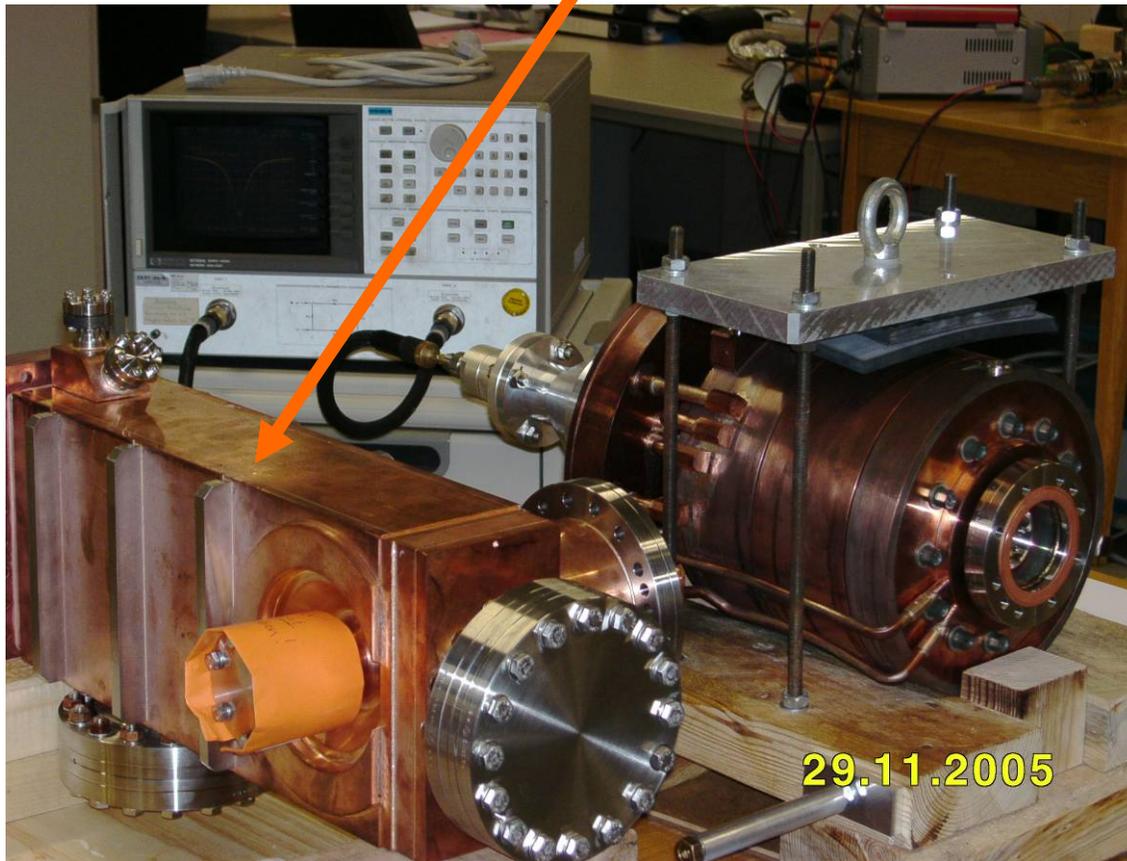
Report from the Tuning of Gun3

DESY Hamburg
28.11.- 5.12.05

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First Gun3 frequency measurements

Comparison of measurement results
from Coupler3 (DESY) and Dummy-Coupler (BESSY)



First Gun3 measurements

Goal (after tuning):

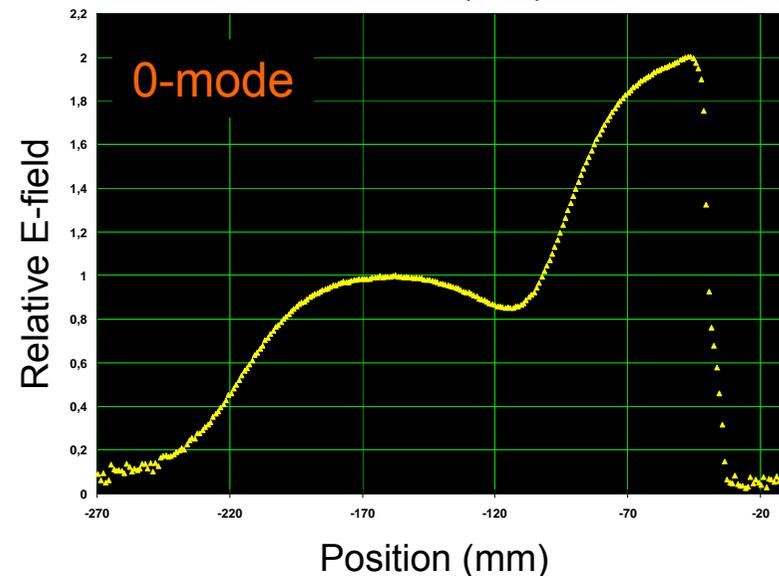
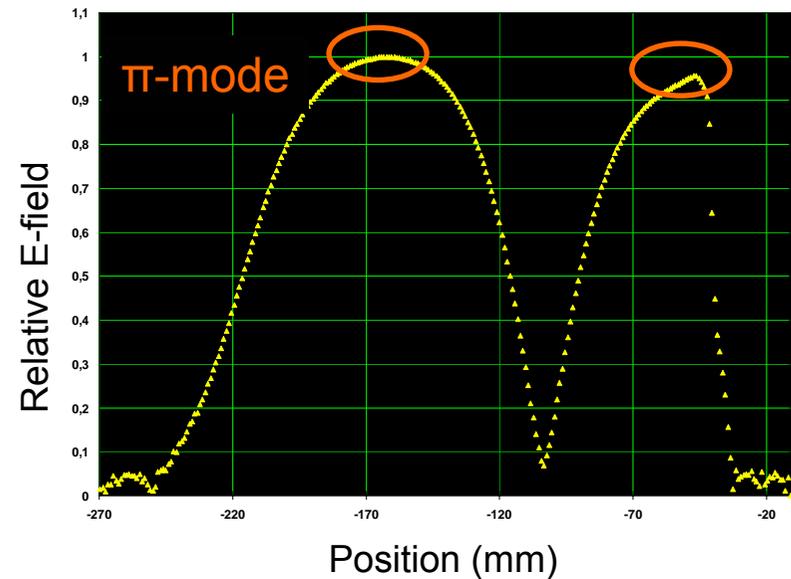
- $f \sim 1.300\,000$ GHz under vacuum
at operation temperature ($\sim 55^\circ\text{C}$)
- i.e. $f \sim 1.300\,380$ GHz in air
at room temperature ($\sim 20^\circ\text{C}$)
- field flatness $E_{\text{half}} / E_{\text{full}} \sim 1.05 \dots 1.10$

Status (before tuning):

- $f = 1.299\,410$ GHz (π -mode)
- $f = 1.294\,230$ GHz (0-mode)
at room temperature ($\sim 20^\circ\text{C}$) in air
- field flatness: 0.95



$\Delta f \sim 970$ kHz



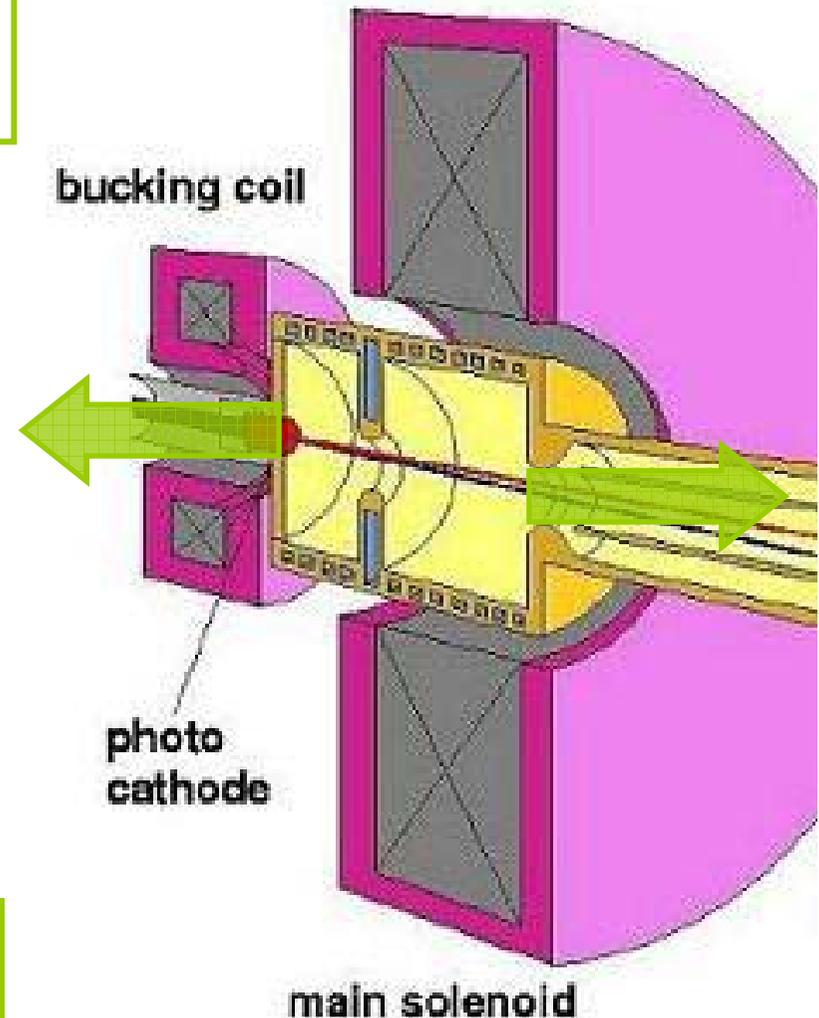
Gun3 tuning

Tuning: deformation of cell walls
in order to change cavity volume

↓
frequency shift with change
of cell length: ~ 1.3 MHz/mm

- increase length of half cell by pushing the cathode plane outwards
- increase length of full cell by pulling the coupler plane outwards

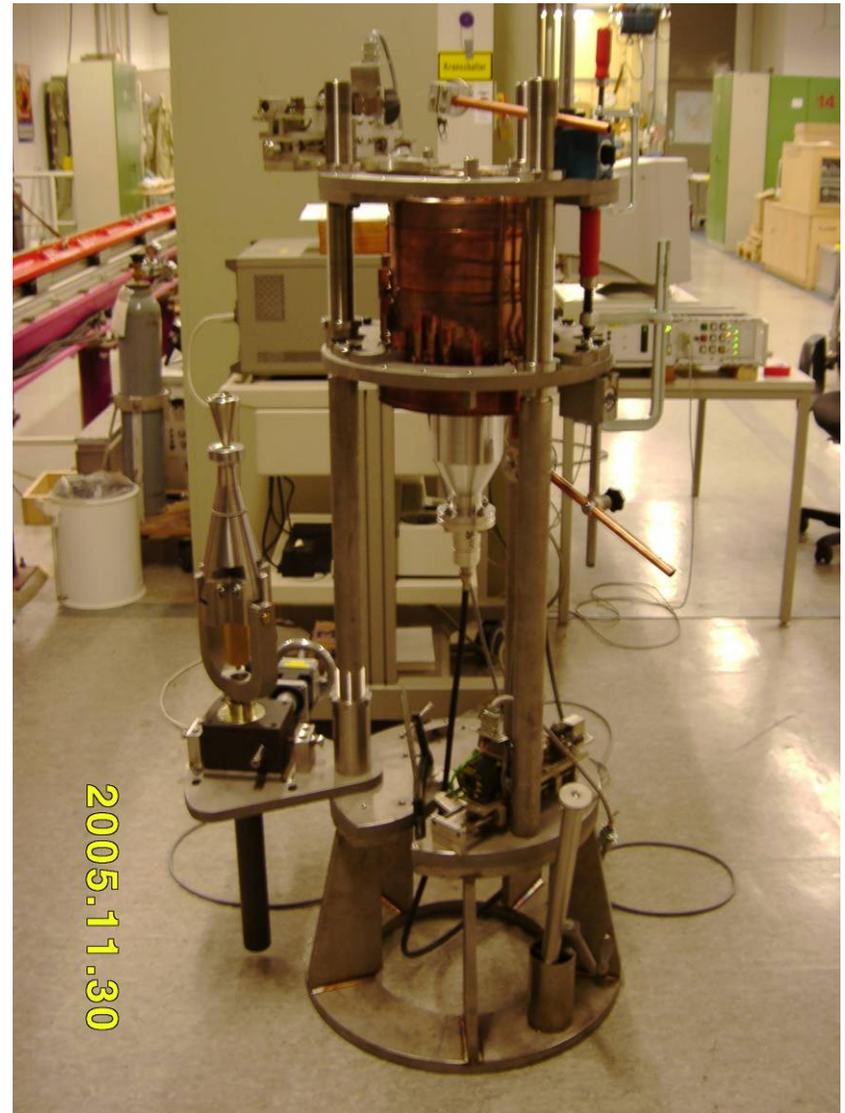
→ special tuning device needed



The tuning device

- designed and built in HH (ZM)
- consists of a stable rack and two special tuning tools:

tuning stamp and tuning forceps

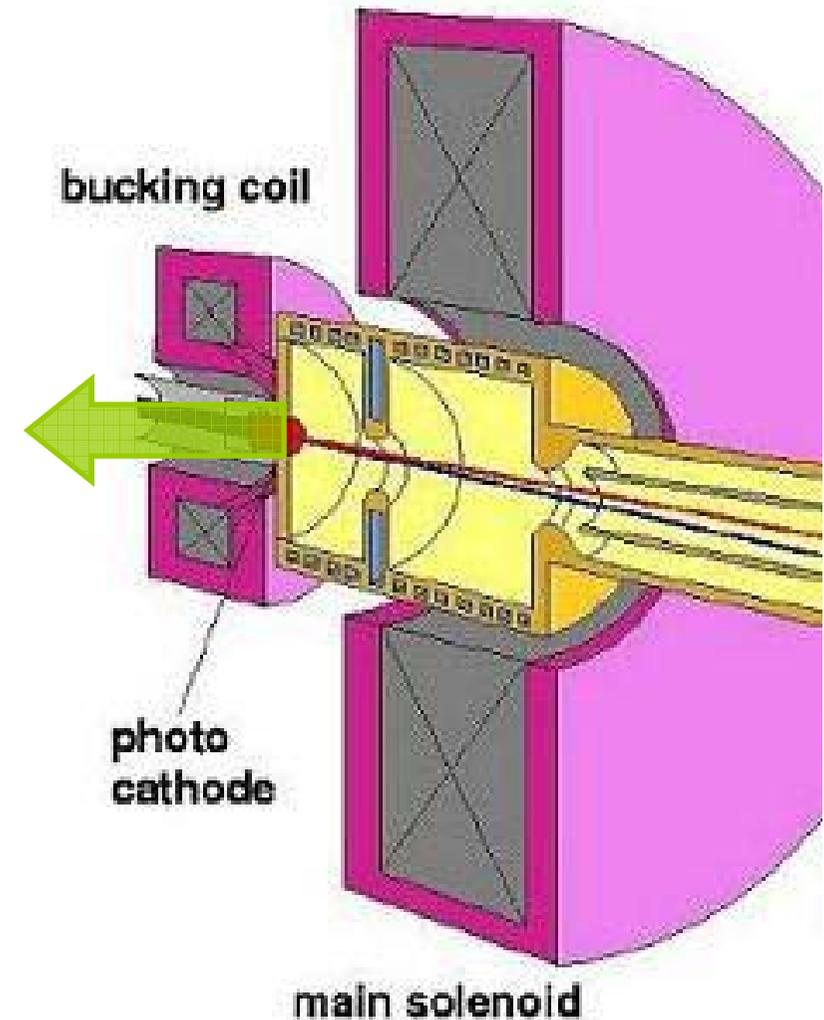


Using the tuning device

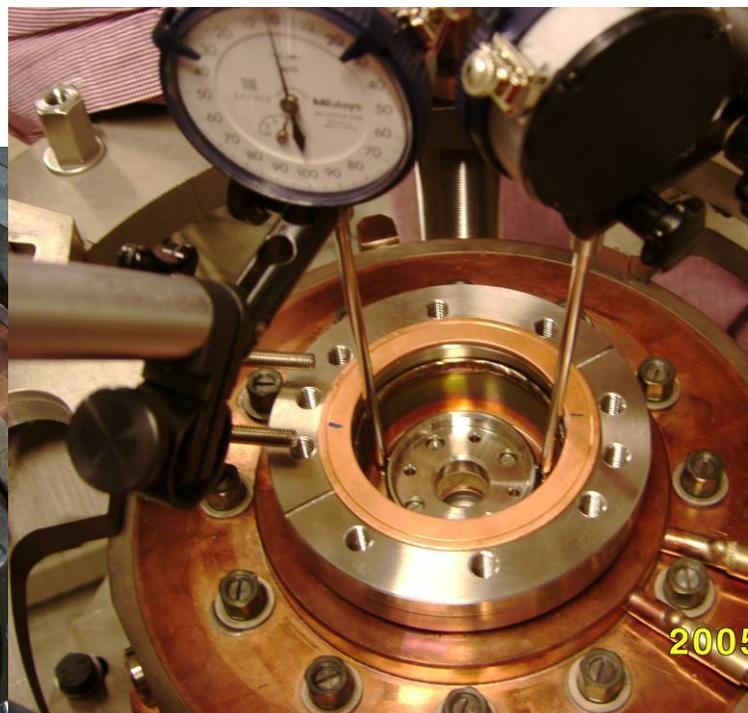
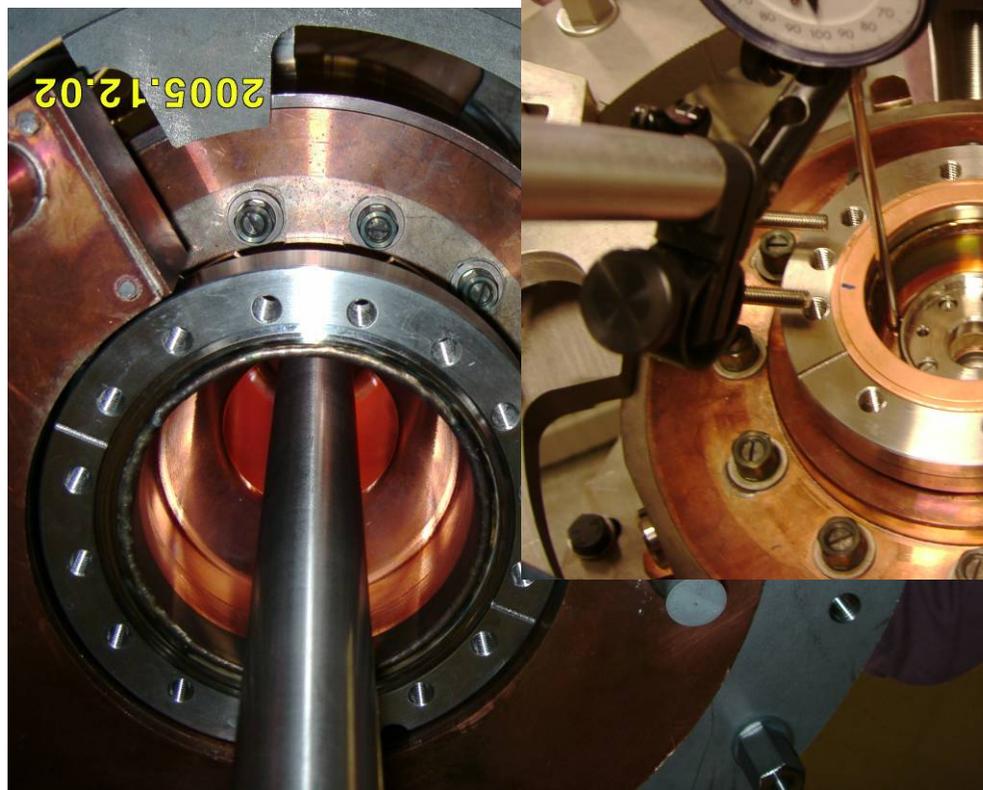
For tuning the **half cell**:
→ push the cathode plane
with the **tuning stamp**



A.Oppelt

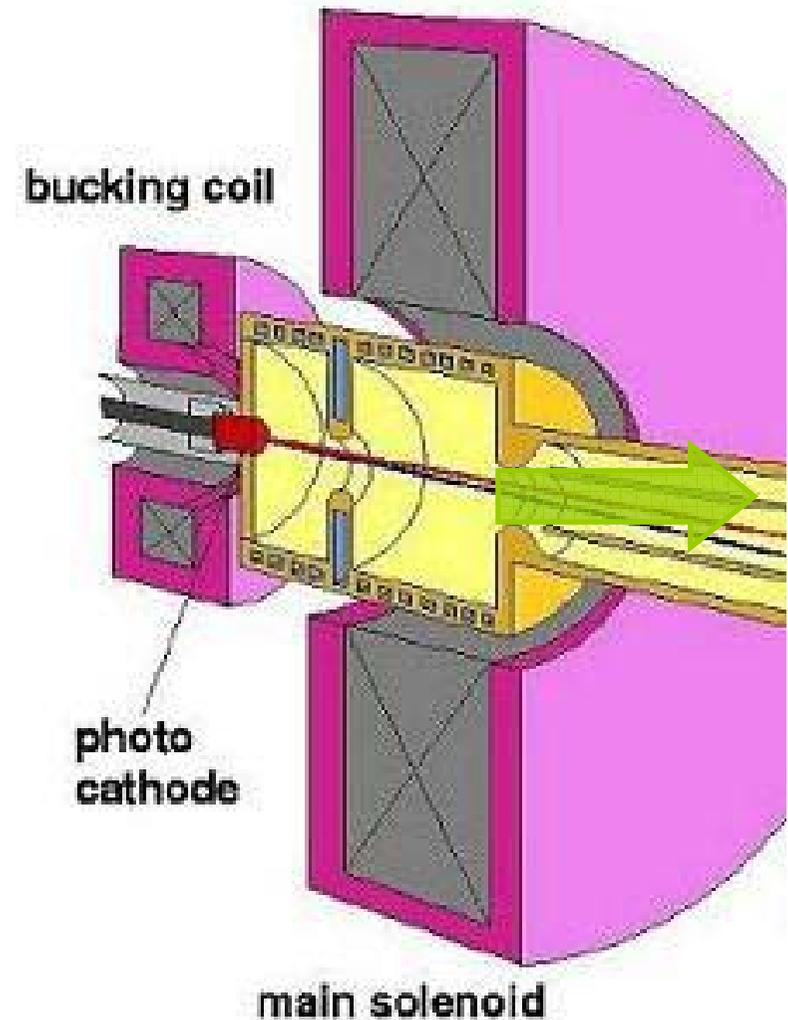


Tuning of the half cell

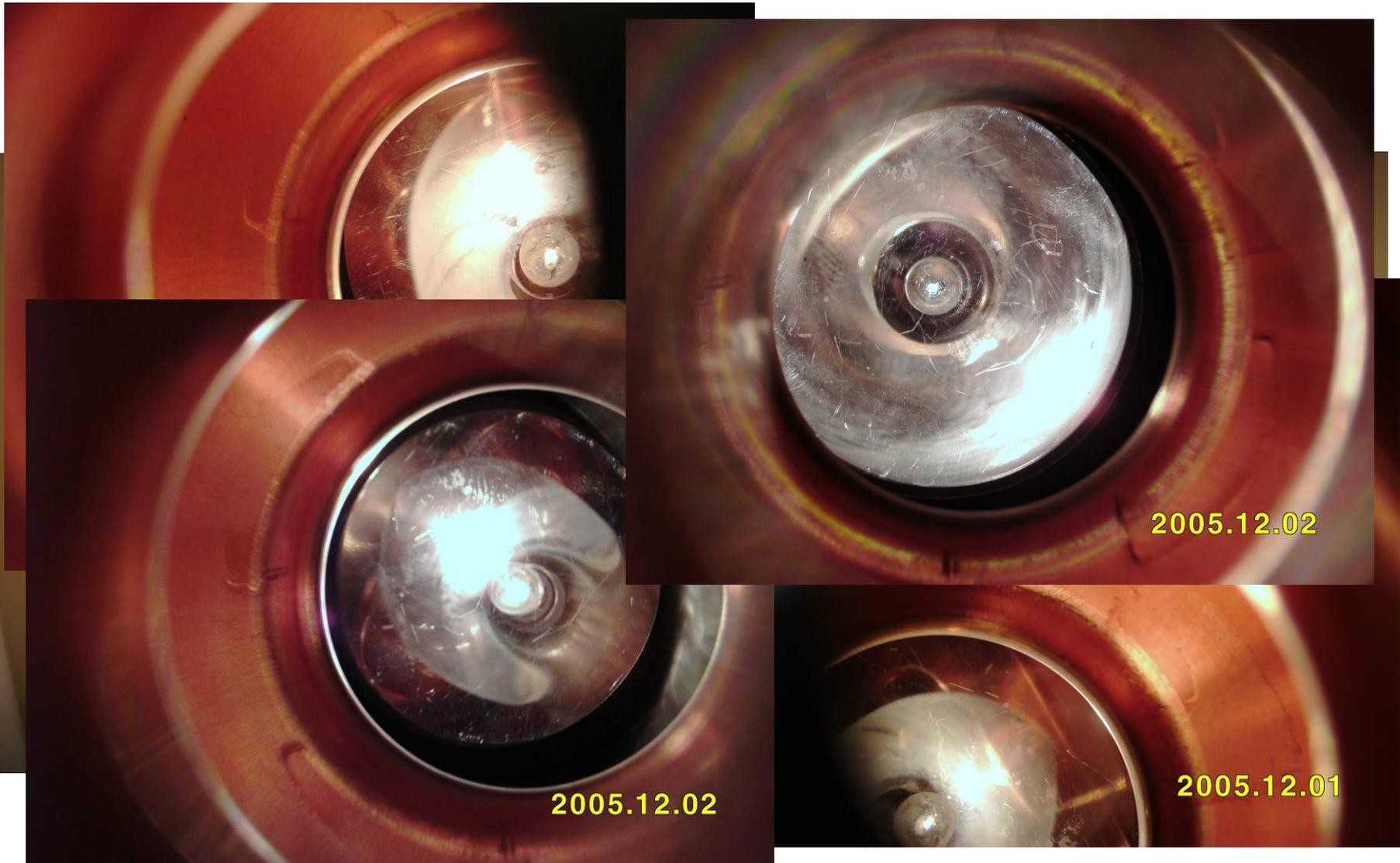


Using the tuning device

For tuning the **full cell**:
→ pull the coupler plane
with the **tuning forceps**



Tuning of the full cell



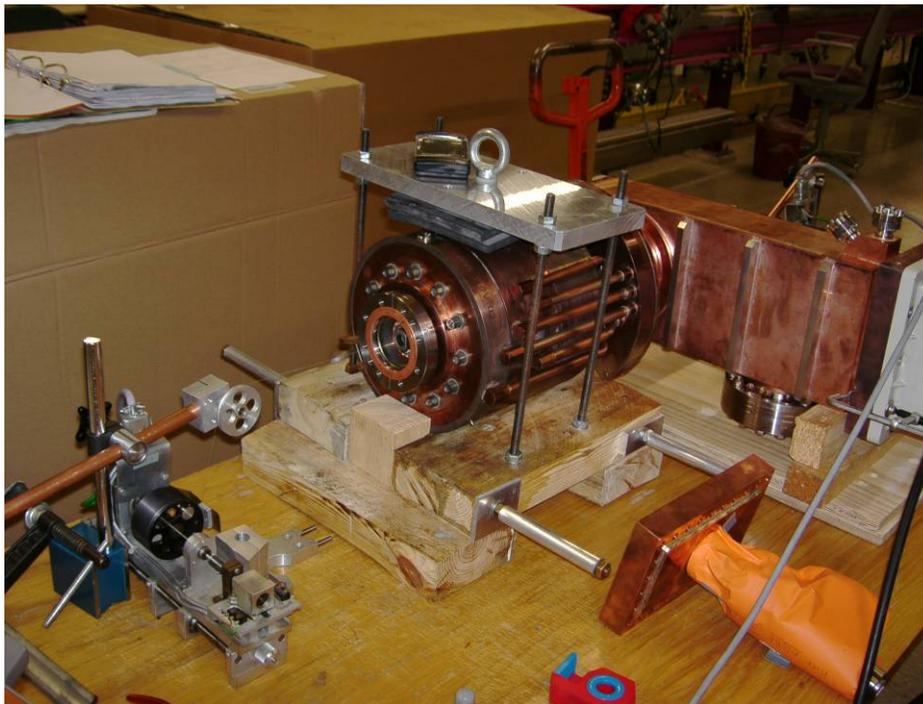
Tuning steps

1. push **half cell** from inside with stamp ~ 45 μm
2. push **half cell** from inside with stamp ~ 52.5 μm
3. pull **full cell** with forceps ~ 53 μm
4. push **half cell** from inside with stamp ~ 50 μm
5. pull **full cell** with forceps ~ 170 μm
6. push **half cell** from inside with stamp ~ 55 μm
7. push **half cell** from inside with stamp ~ 45 μm
8. pull **full cell** with forceps ~ 45 μm
9. pull **full cell** with forceps ~ 28 μm
10. push **half cell** from inside with stamp ~ 29 μm
11. correct **half cell** from outside ~ 25 μm

Frequency and field measurements

... before / between / after
the tuning steps

... using **NWA** and
bead-pull-technique



Results of the tuning of Gun3

$f = 1.300\ 325\ \text{GHz}$ (π -mode)

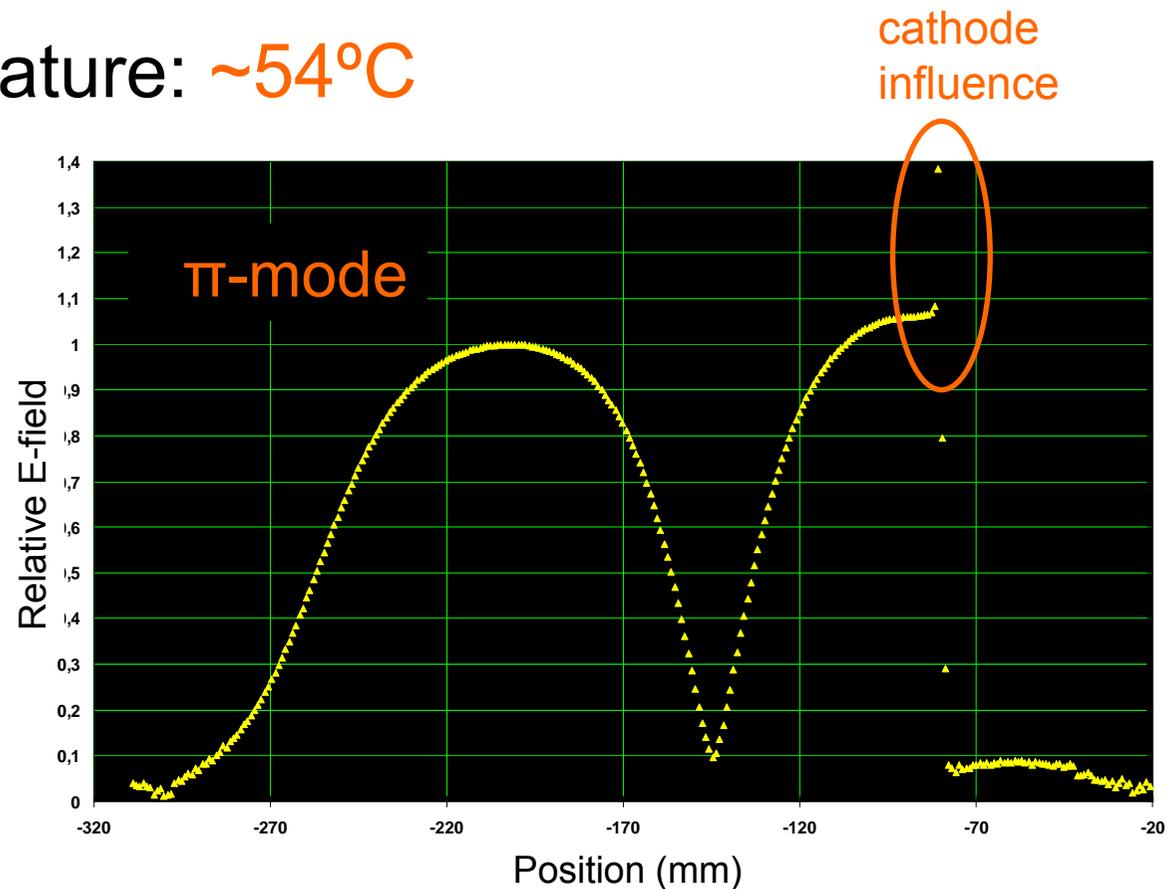
(in air, 22°C)

$f = 1.295\ 300\ \text{GHz}$ (0-mode)

→ operation temperature: $\sim 54^\circ\text{C}$

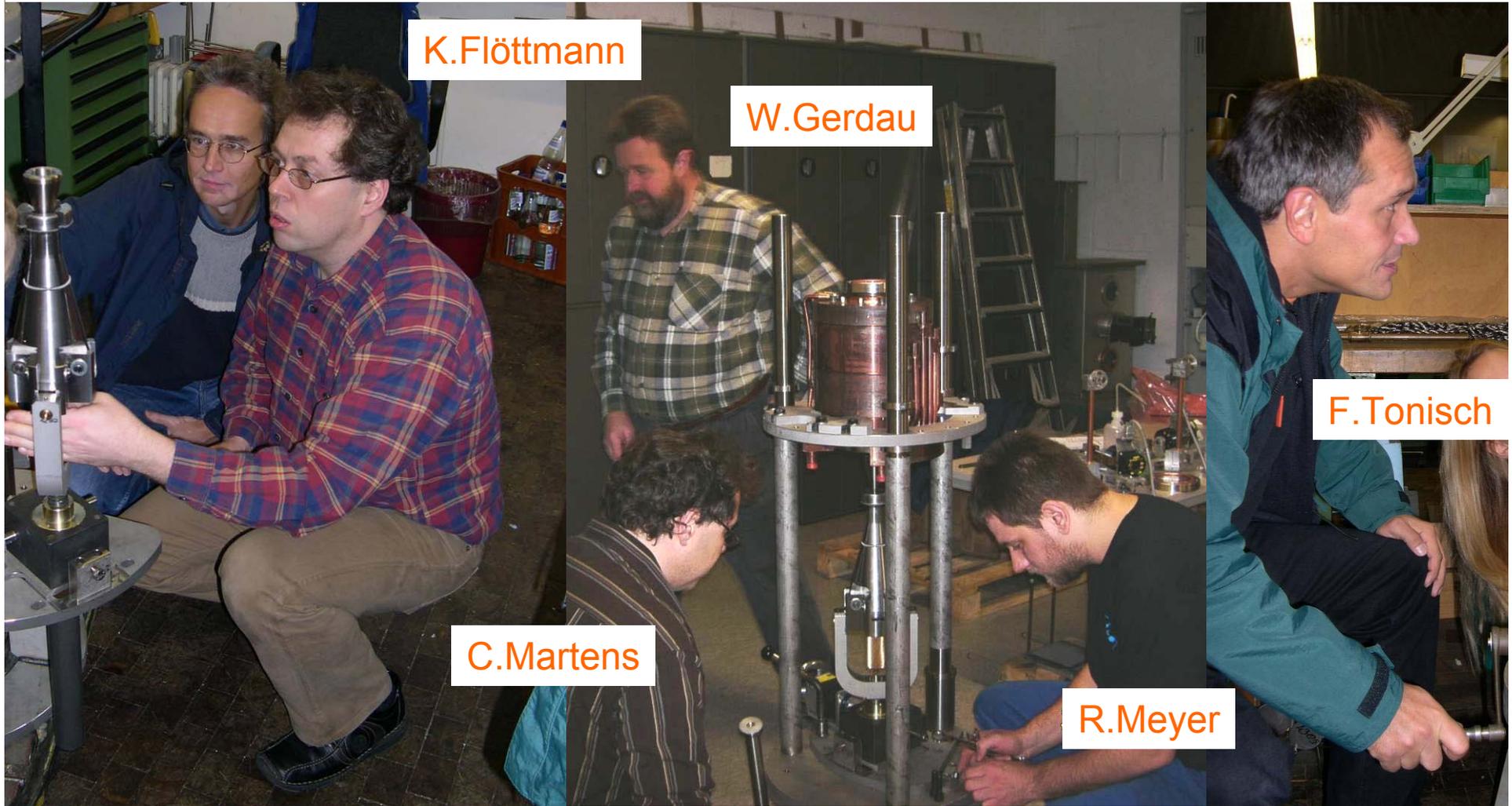
$E_{\text{half}} / E_{\text{full}} \sim 1.08$

$Q = 24\ 200$



Acknowledgement

Thanks to the people involved!



A.Oppelt