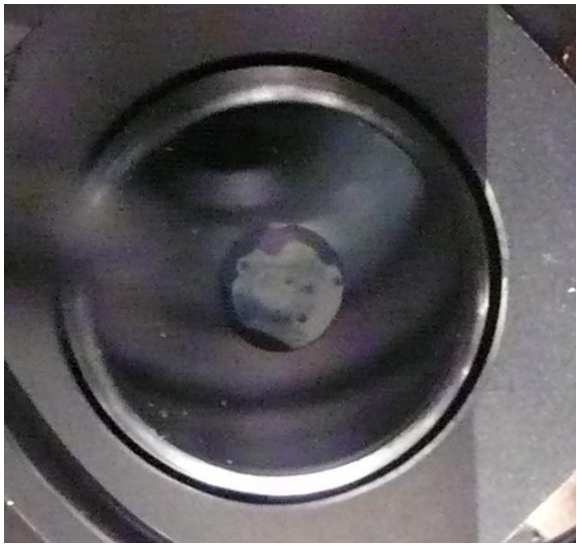
PITZ RC, 13.06.2013



Problems

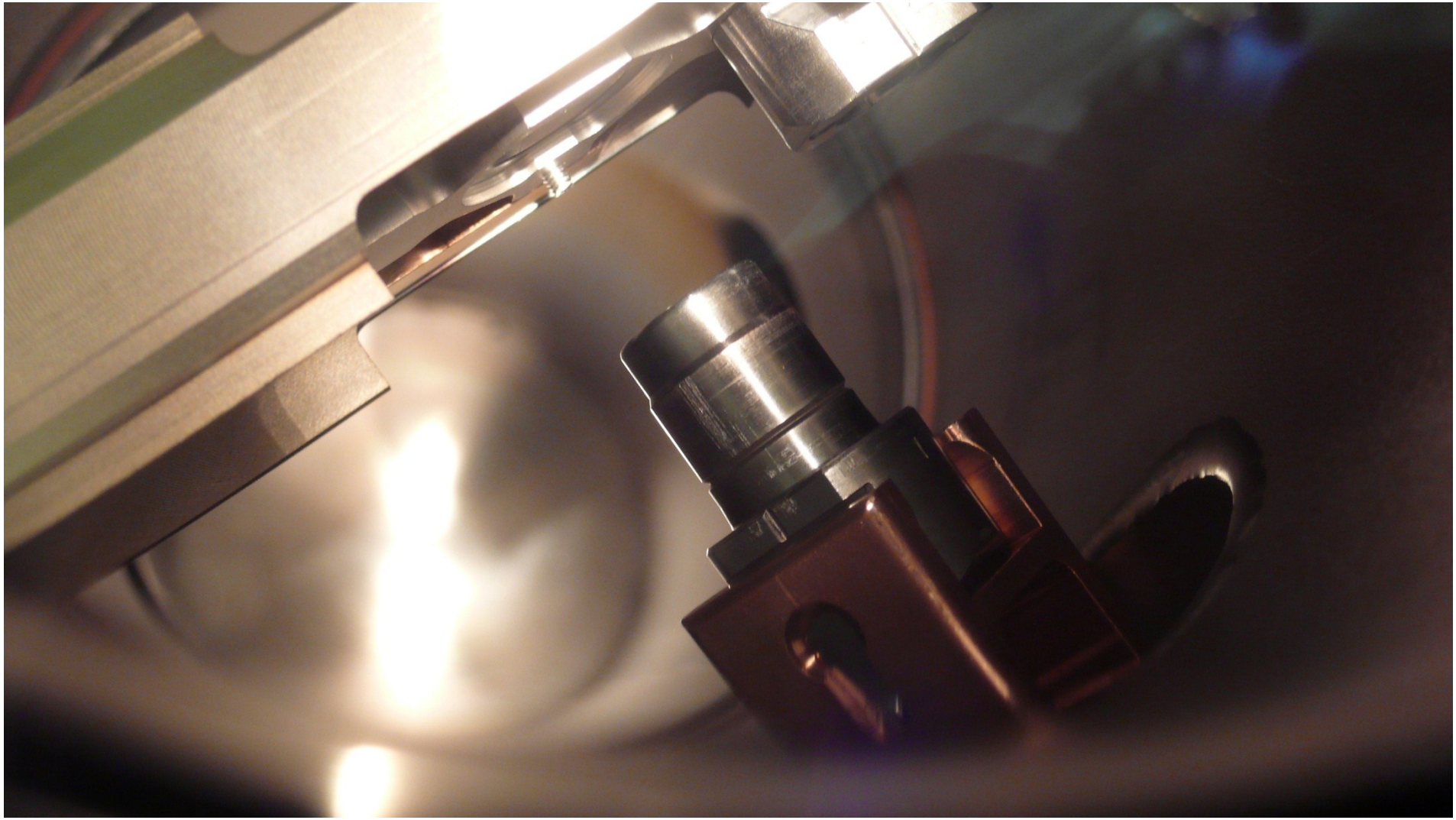
Fixed:

- Damaged (water leak) RF2 preamplifier is replaced with one from the RF1

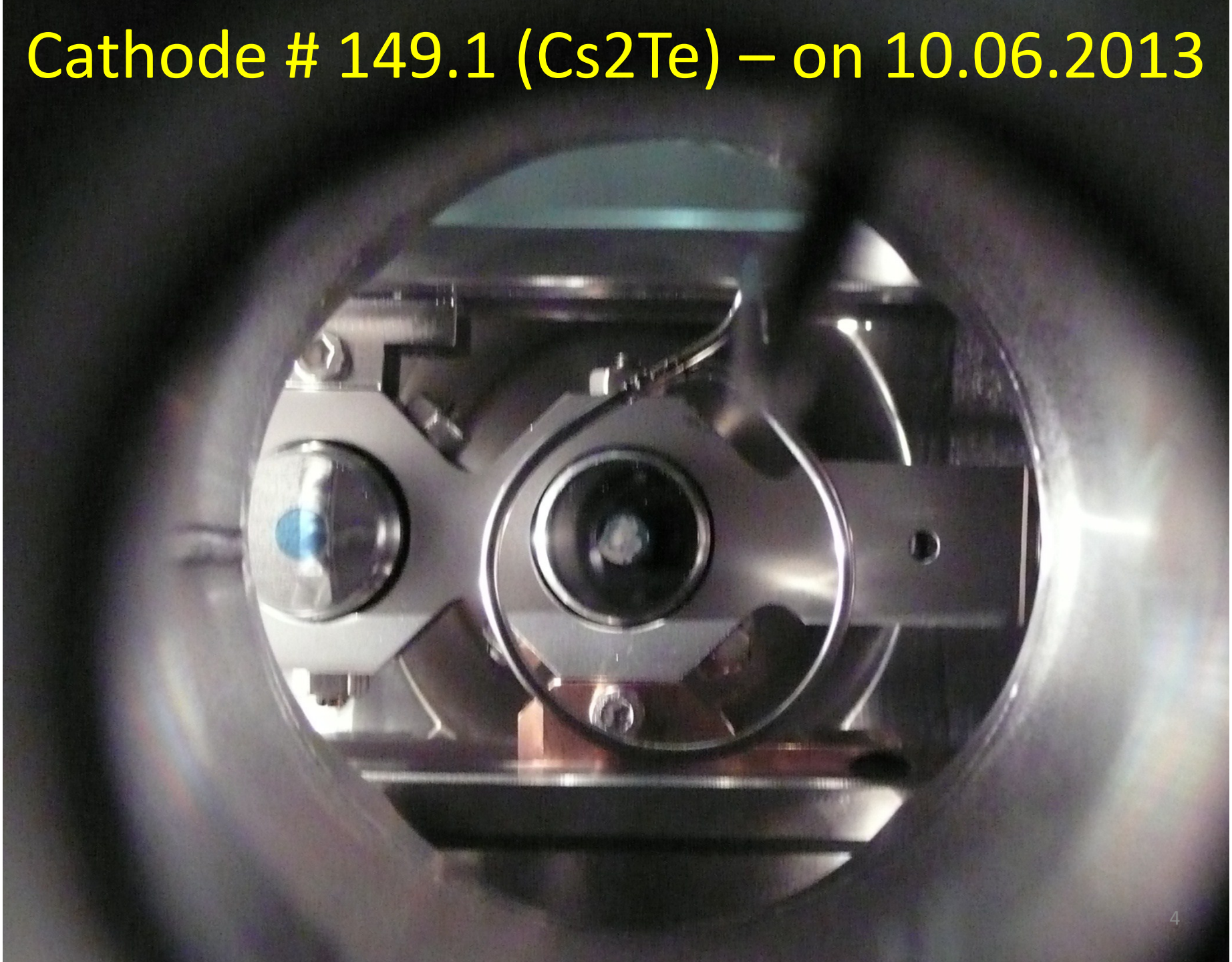
Not yet:

- Gun temperature (sensor) drift → yes, at 650us a small drift observed!
- Gun FB behavior
- **Temporal satellites in the laser**
- **Cathode #149.1 is damaged**
- **No preamplifier for the CDS so far**

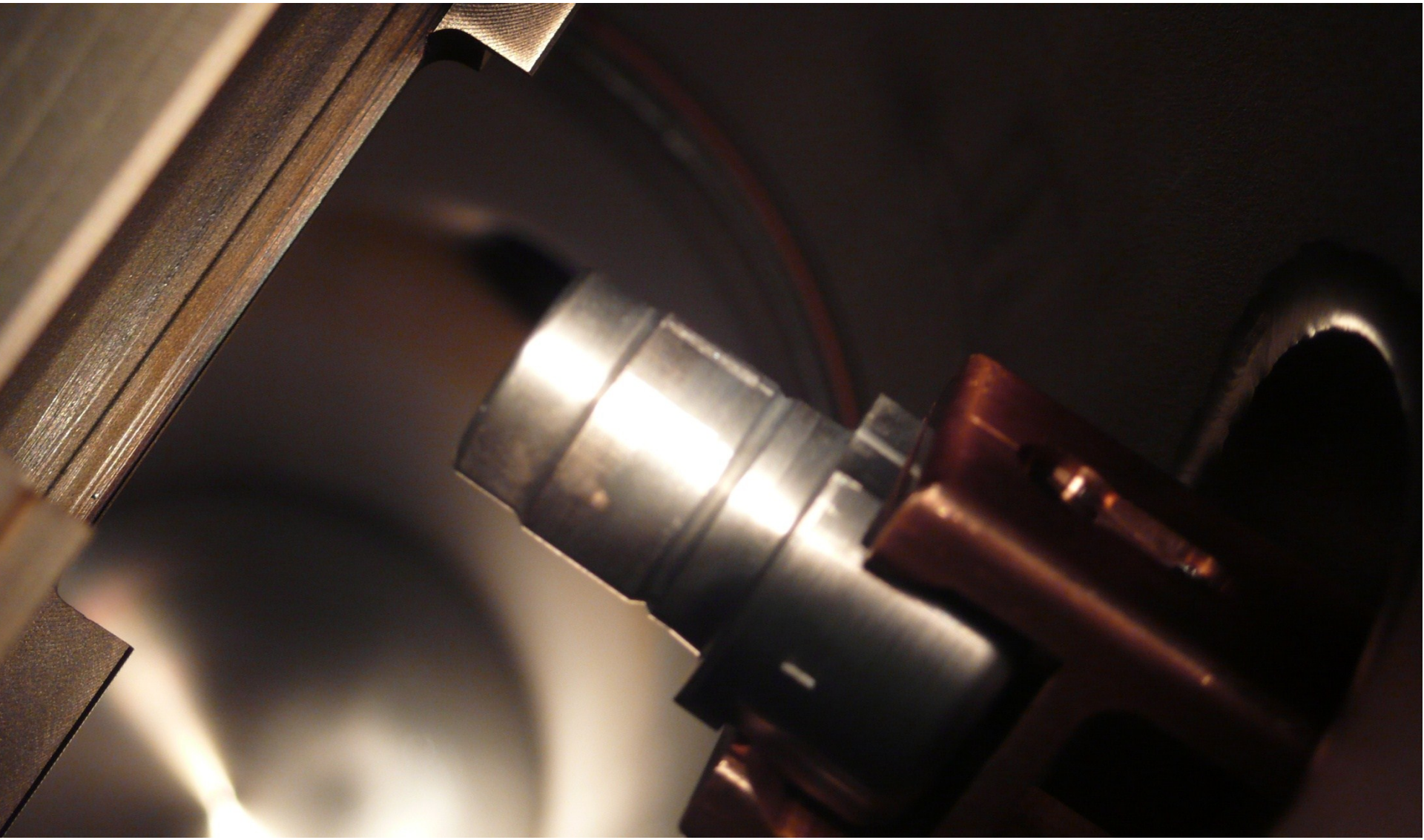
Cathode # 149.1 (Cs2Te) – on 10.06.2013



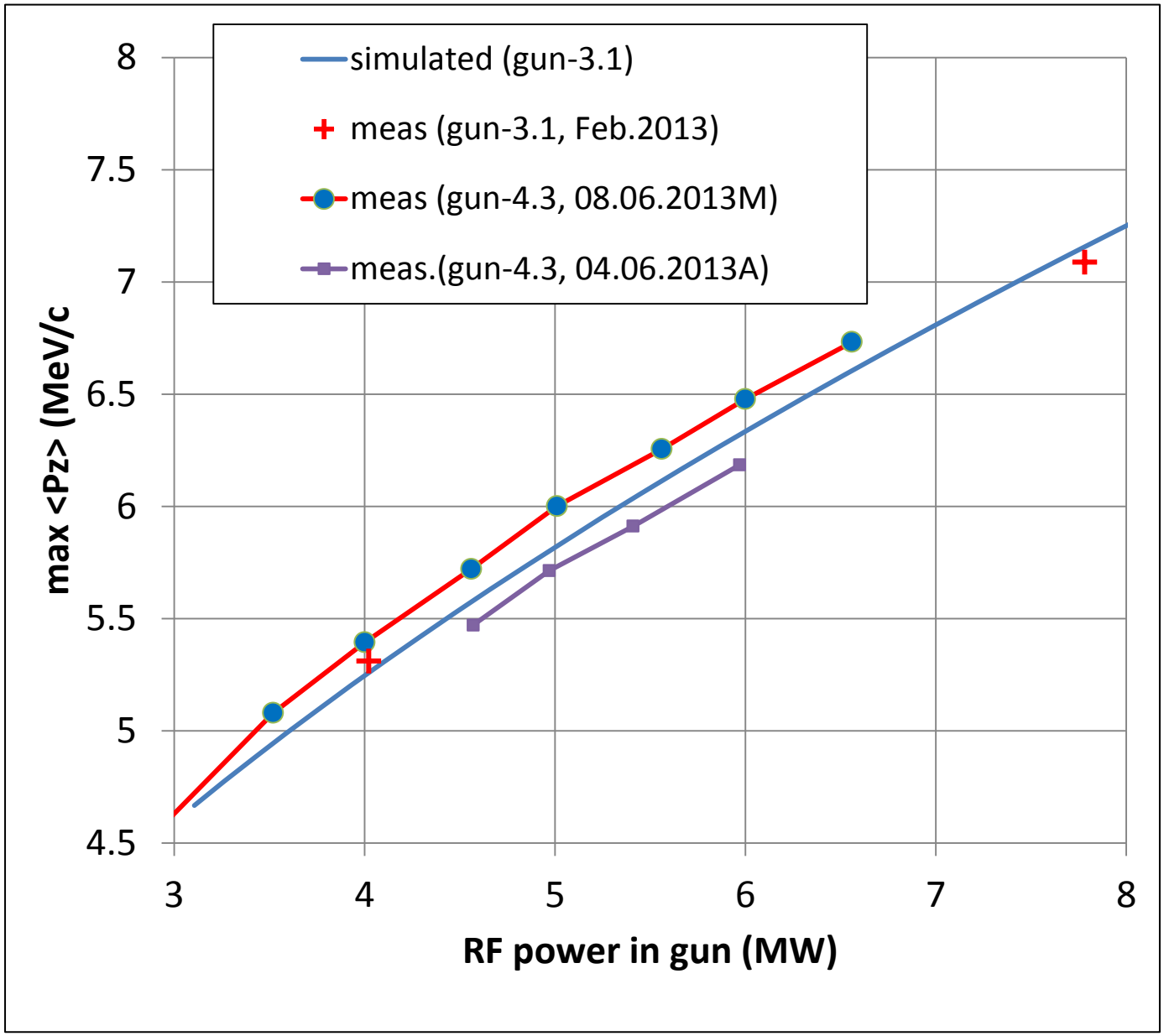
Cathode # 149.1 (Cs2Te) – on 10.06.2013



Cathode # 622 (Mo) – on 13.06.2013



Pz measurements



Next steps

1. Mo cathode – check the conditioning status, measure dark current
2. Check the cathode insertion (with moderate RF → resonance tempearture)
3. Cs2Te cathode #149.1, RF power ~2-3MW, check for photoelectrons
4. Laser inspection and BBA check
5. QE and QE-map for the cathode #149.1
6. Cathode Cs2Te #??? to be inserted (if ≠149.1 ➔ conditioning + QE&QE-map)
7. Solenoid sweep (0→500A) with 650us RF pulses, RF power from 0 to Pforw=6.0MW, monitor dark current
8. Longitudinal momentum measurements vs. peak power – done, but to be repeat
9. Solenoid BBA (MK)
10. LPS tomography measurements (DM) X → no booster
11. Booster steering measurements (MO) → no booster
12. Gun phase stability measurements (Igl) → after laser problems will be solved
13. Measure the **trip rate** **(during beam measurements)**

Gun-4.3: measurement program

M.Krasilnikov

General plan

1. Laser (rough) alignment at the cathode, produce photoelectrons (MG, MK)
2. Rough solenoid alignment (to provide a beam transport) (MK)
3. Longitudinal momentum measurements vs. peak RF power
4. Solenoid BBA (MK)
5. Final decision on the max RF peak power (Pmax→6MW?)
6. Complete the conditioning up to Pmax for RF pulses up to 650us with solenoid sweep
7. CDS booster short recovery (? Still 2 weeks for the high power run)
8. Gun phase stability measurements (Igl)
9. Longitudinal phase space measurements (DM)
10. Trip rate monitoring (➔ all measurements after the conditioning are to be done at full RF average power e.g. 6M x 650us x 10Hz)
11. Booster steering studies (MO)
12. …

Longitudinal momentum vs. RF peak power

- RF pulse length=200us (?)
- RF peak power: 6.5MW; 6MW;5.5MW;… FB=ON
- Cathode laser pulse:
  - Temporal → short Gaussian
  - BSA→ 1.2mm (?)
- Measurements:
  - Momentum scan in LEDA vs. gun SPPhase (new MAMA tests?) (10 frames, 0.5 deg phase step)
  - Statistics for the MMMG phase (100 frames statistics)
  - Schottky scan to determine the zero-crossing phase
  - …
- Expected results:
  - Max(<Pz>) vs. RF peak power (3MW:step 0.5MW:6.5MW)
  - MMMG phase vs. RF peak power

Measurement program (D.Malyutin, 2013 v.2): "Longitudinal phase space tomography at PITZ"

- **Goal:** Measurements of the electron bunch longitudinal phase space for different electron bunch charges for short Gaussian laser temporal shape. This is foreseen as additional measurements to try to improve the temporal and momentum resolutions in contrast with the last data taken.
- **Measurement points**: **LEDA**, **HEDA1** and **HEDA2**.
- **Bunch charges:** 20 pC, 100 pC, 400 pC, 700 pC.
- **Laser pulse shapes:** 2.8 ps gauss, BSA = 1.2 – 1.4 mm.
- **Number of laser pulses:** to have enough intensity on the LEDA, HEDA1 and HEDA2 observation screens (1-50).
- **Gun:** 60 MV/m (6.8 MeV/c beam momentum), RF phase for the MMMG.
- **Booster:** 16* MeV/c gain (22.4* MeV/c beam momentum downstream), RF phase scans. 3.2 MW RF power in the booster cavity.
- **Dates:** June 2013.
- **Difficulties:** Gun and booster conditioning is on-going.
- **Required number of shifts 3 – 4:**
  - Beam transport up to HEDA2, booster steering free – 1 shift. Can be done by others? - yes
  - Beam matching for the HEDA2 measurements, HEDA2 momentum resolution studies – 1 shift. Can be done by others? - no
  - Measurements – 1(2) shift. Can be done by others? - no