PITZ: Gun-4.4 conditioning status

20.11.2013, MK

PITZ Run Status 20.11.2013

Achievements:

- >30 min. run with 6.0MW in gun at 650us, full solenoid sweep, reached 6.2MW in the cavity
- Photoelectrons produced, laser BBA done
- First e-beam momentum measurements (max. mean momentum vs. peak power(5MW-directional coupler measurements) result in a reasonable agreement with simulations: Prf=6.5MW➔Ecath~60MV/m

Next steps:

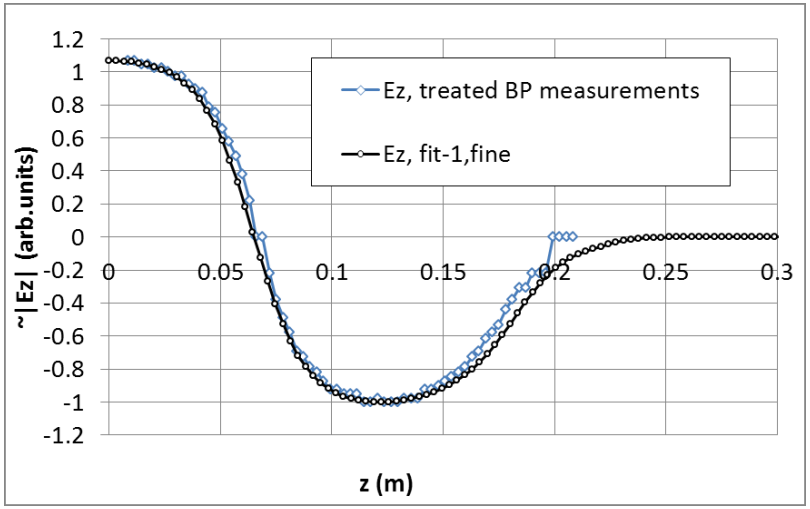
- Complete the conditioning at 650us (?vacuum behind the cathode)
- E-beam program

Problems:

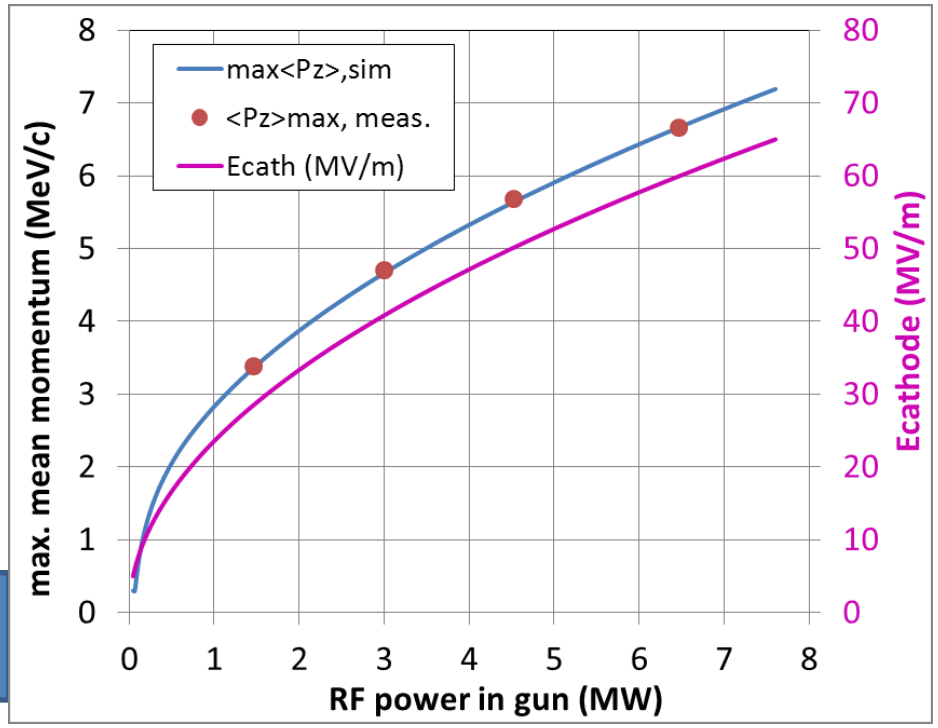
- Gun resonance temperature drift/changes (reference SPT measurements 1degC over the last week, ~3degC from start of conditioning)
- “10MW directional coupler” measurements are not reliable
- Vacuum activity behind the cathode, especially at 650us rf pulse operation
- Cathode #126 (Cs2Te) damages, significantly (x3) increased dark current for this cathode
- “Self-rotation” of cathodes
- Solenoid micromover is not in operation (was not calibrated at the shutdown period) → solenoid BBA delayed

Gun-4.4: Momentum and gradient

Field profile fit



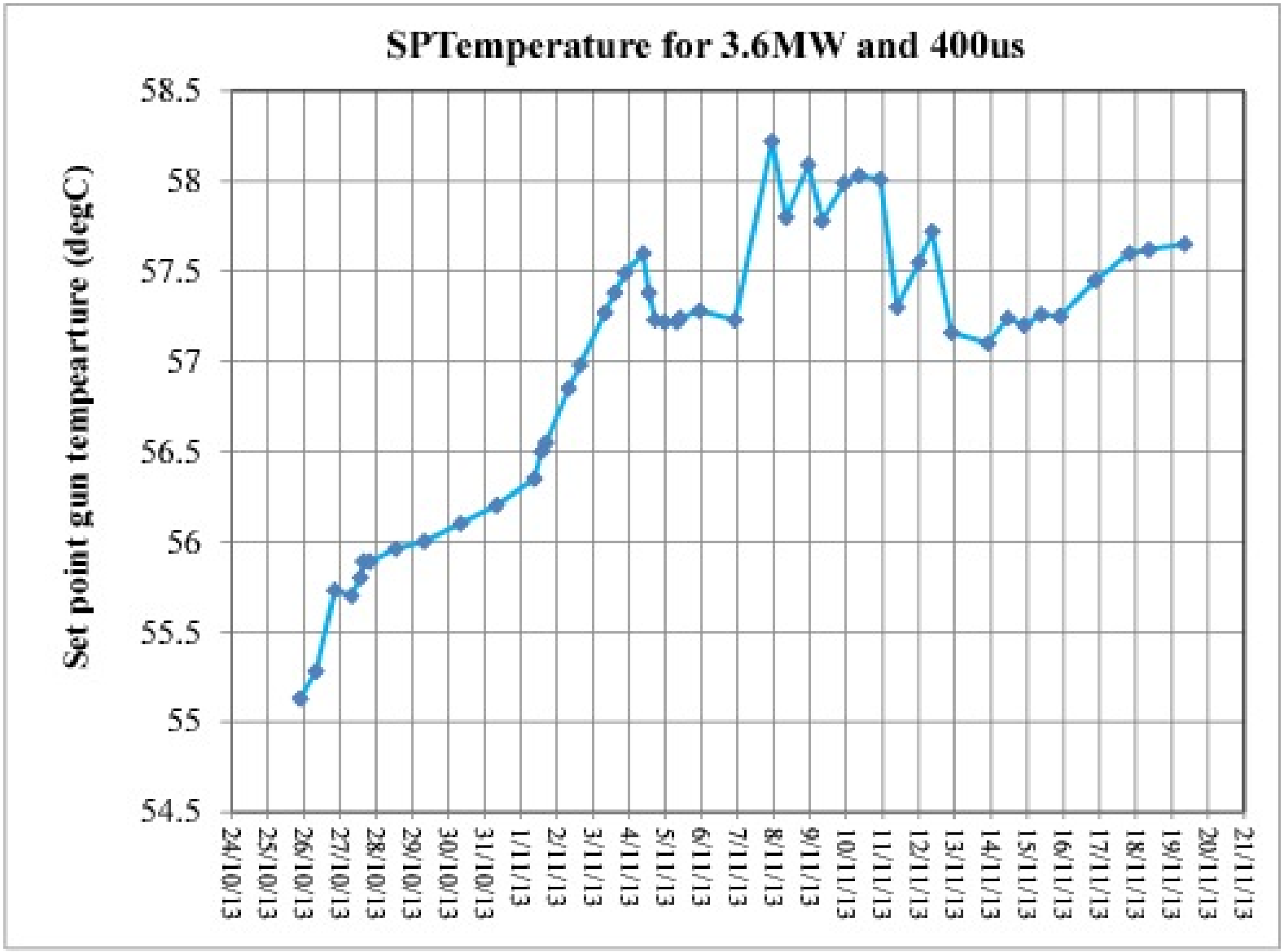
RF power in gun at 5MW-DC (MW)	<Pz>max, meas.	
1.46	3.39	0.004
3	4.704	0.003
4.53	5.6776	0.0008
6.47	6.657	0.003



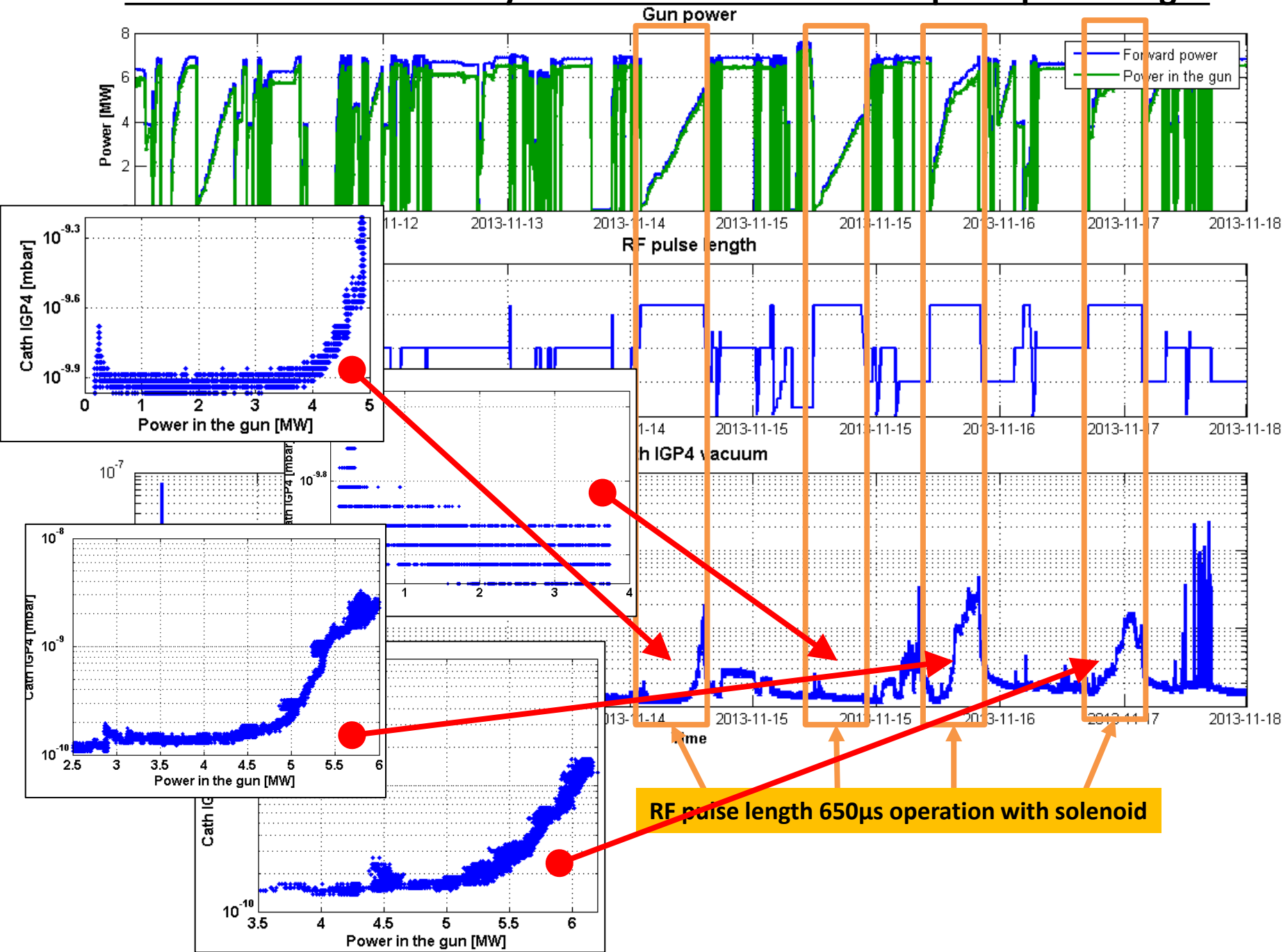
$$P_{gun}[MW] = 0.0018 \cdot \left(E_{cath}[\frac{MV}{m}]\right)^2$$

$$60\,\frac{MV}{m} \rightarrow\ 6.5MW$$

Weeks 46-47: Resonance temperature

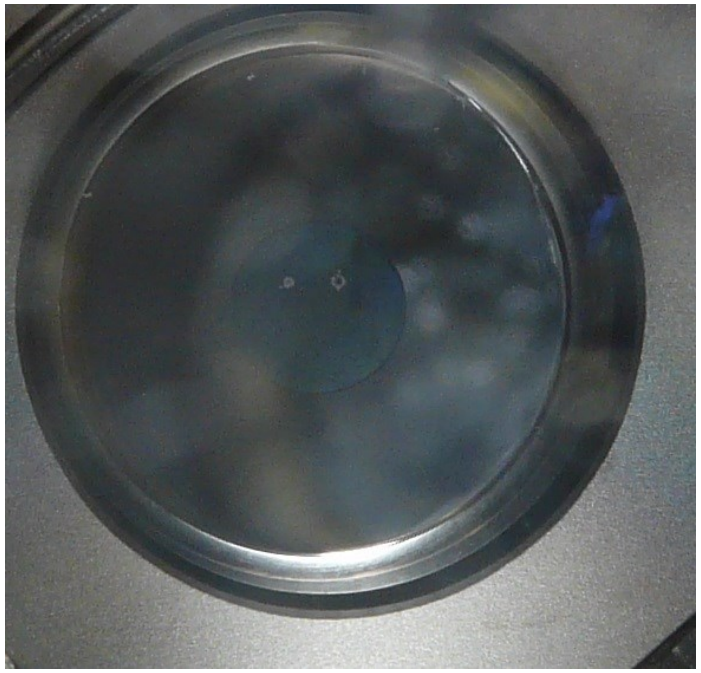


Week 46: vacuum activity behind the cathode at 650µs RF pulse length



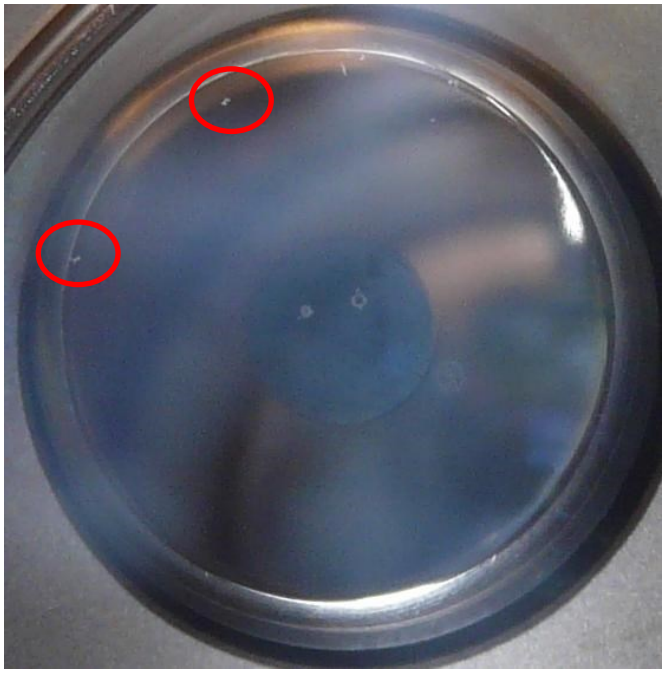
Cathode #126.2 (Cs2Te), observations

on 18.11.2013A

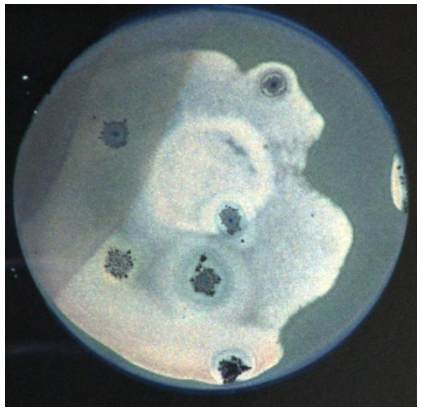


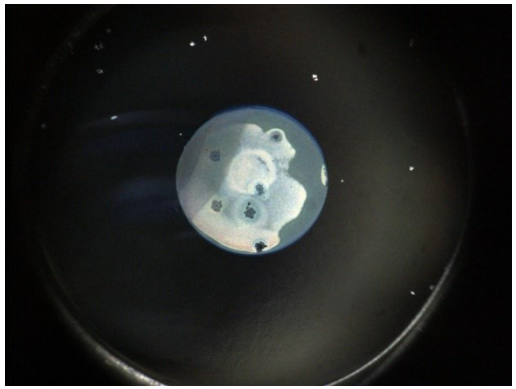
2 xPMT-ILs

on 19.11.2013M



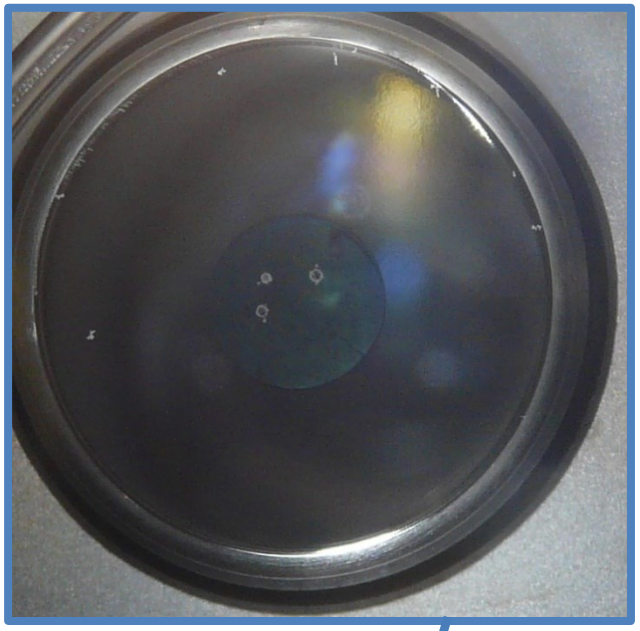
Cathode #149.1 (Cs2Te), was in gun-4.3, picture taken on 18.11.2013 by S. Lederer (in Hamburg)



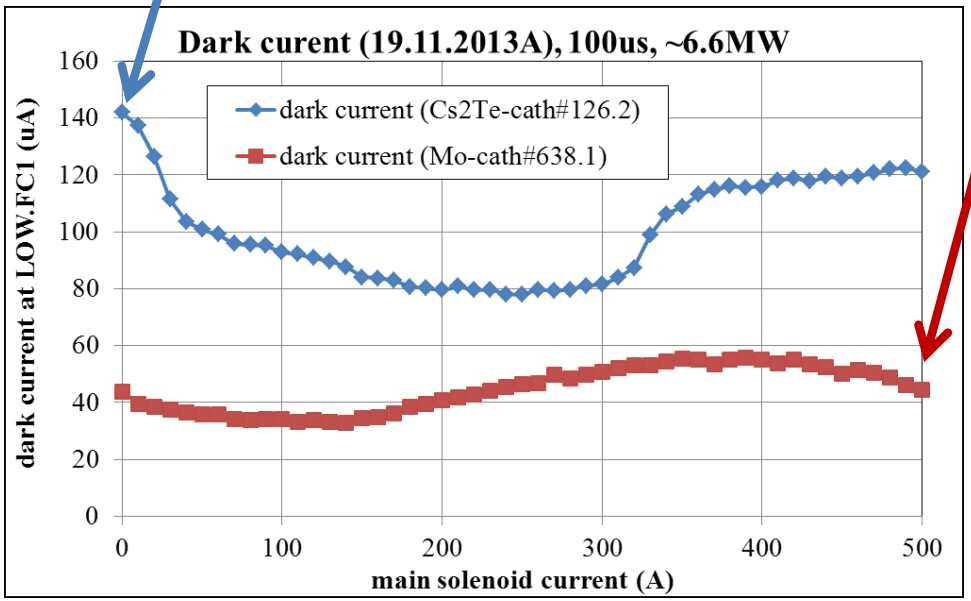


Dark current for different cathodes measured on 19.11.2013A

Cs2Te, #126.2



Mo, #638.1



???

- Goal: 650us x 6.5MW x 10Hz, but vacuum activity behind the cathode
- Which Cs2Te cathode to be used: #126.2 is only one in the box with standard thickness, but damaged and high dark current
- 50us x 7.2MW short operation (several hours) in manual mode helped to make a progress in the conditioning, what about 100us?
- …