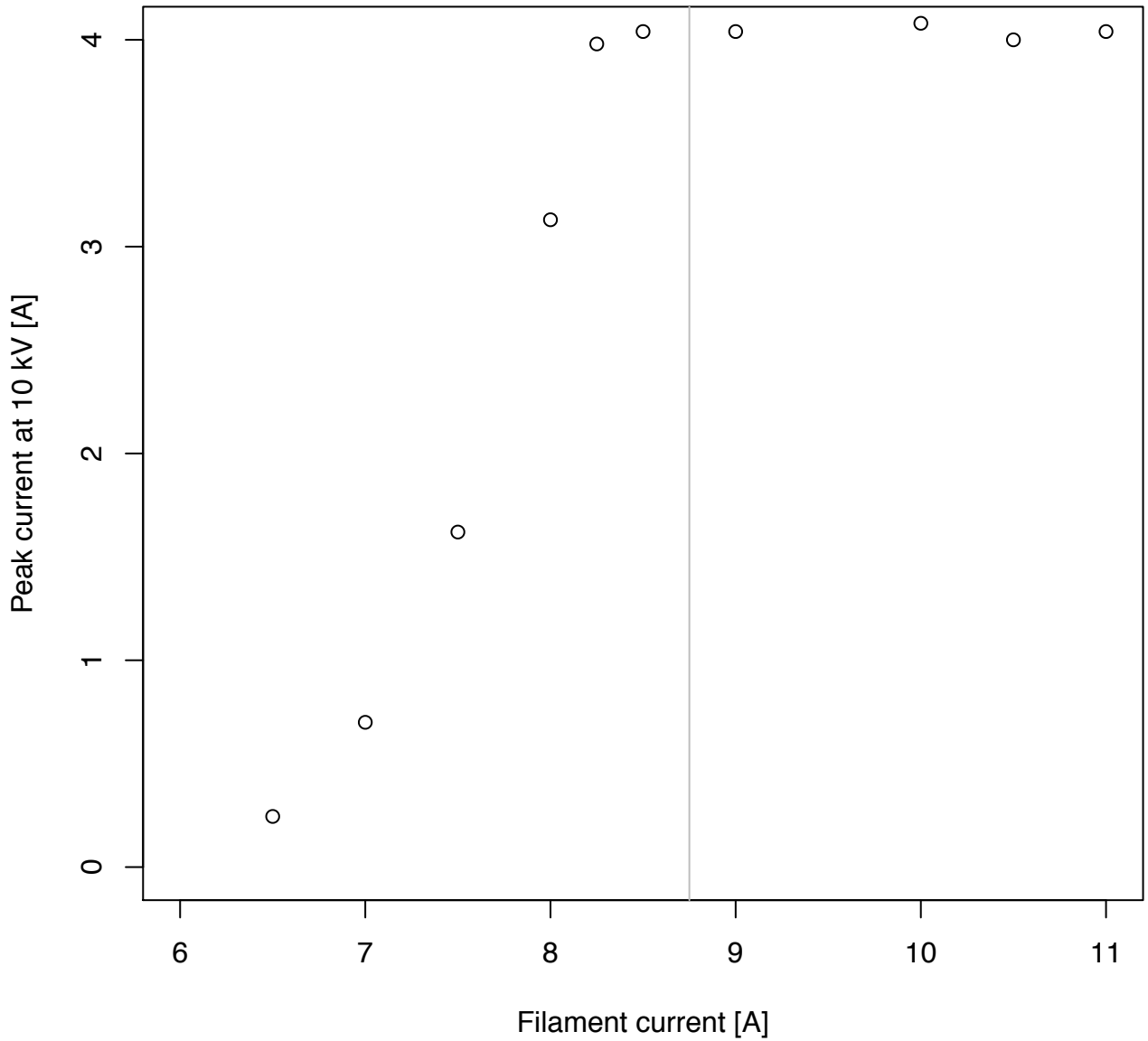
Performance of the new 1-in hollow gun

G. Stancari

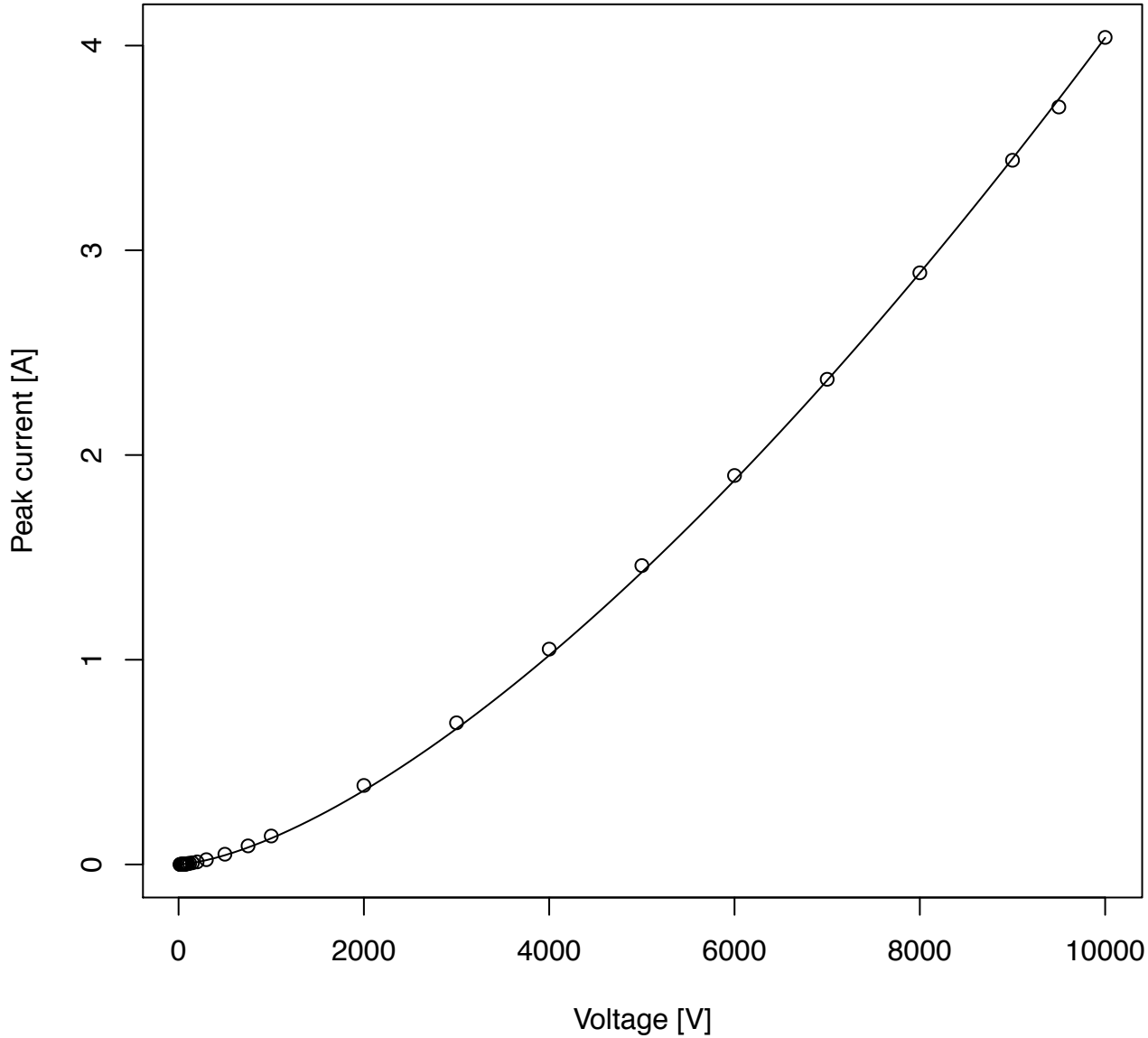
HEBC group meeting
Fermilab, 16 February 2012

Measured yield as a function of heater current

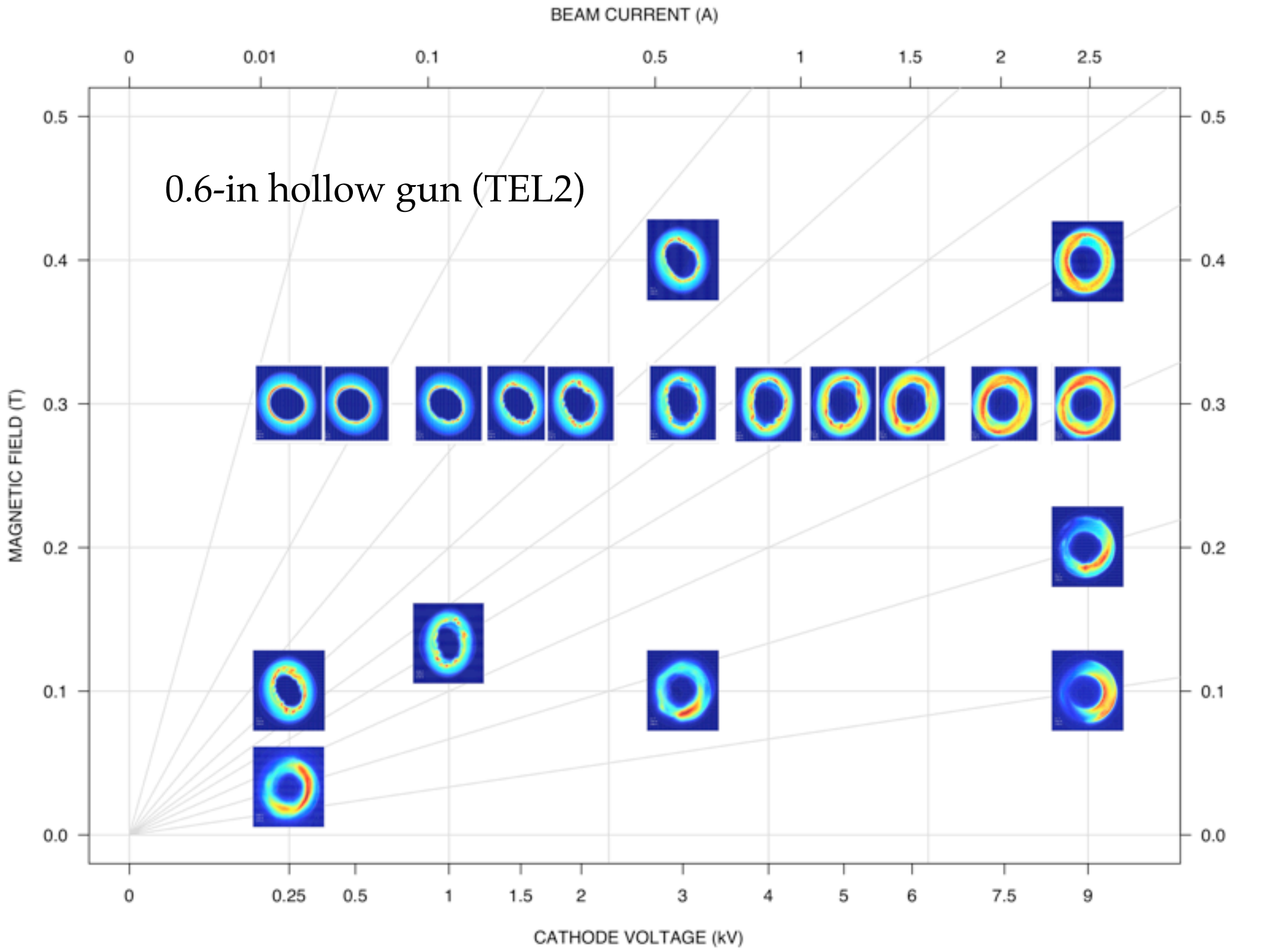


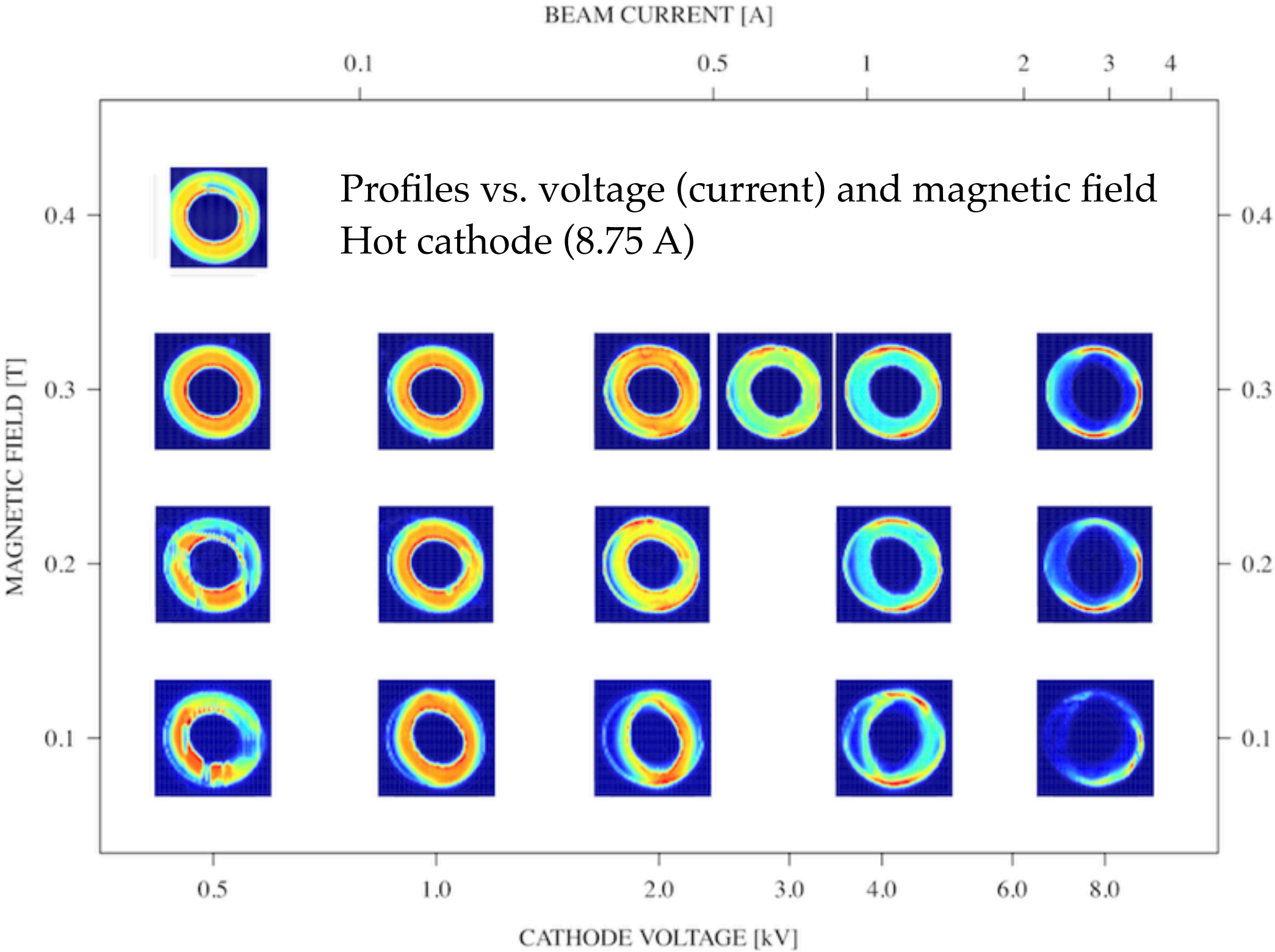
Chosen set point of 8.75 A, 9.1 V

Measured yield as a function of voltage

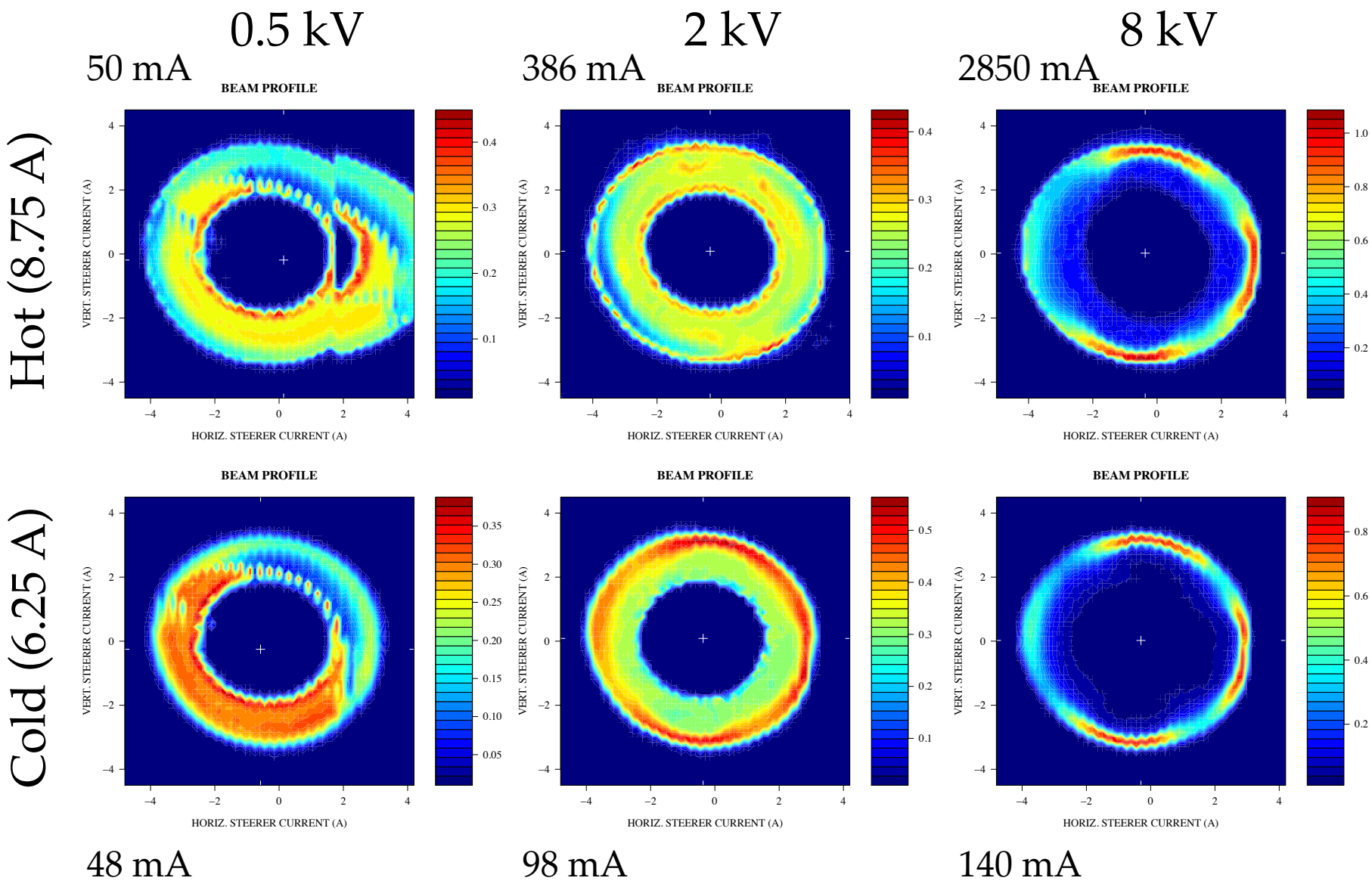


Microperveance is 4.0 (6.3 from SAM calculation - geometry?)


0.6-in hollow gun (TEL2)
BEAM CURRENT (A)
0
0.01
0.1
0.5
1
1.5
2
2.5
MAGNETIC FIELD (T)
0.0
0.1
0.2
0.3
0.4
0.5
CATHODE VOLTAGE (kV)
0
0.25
0.5
1
1.5
2
3
4
5
6
7.5
9

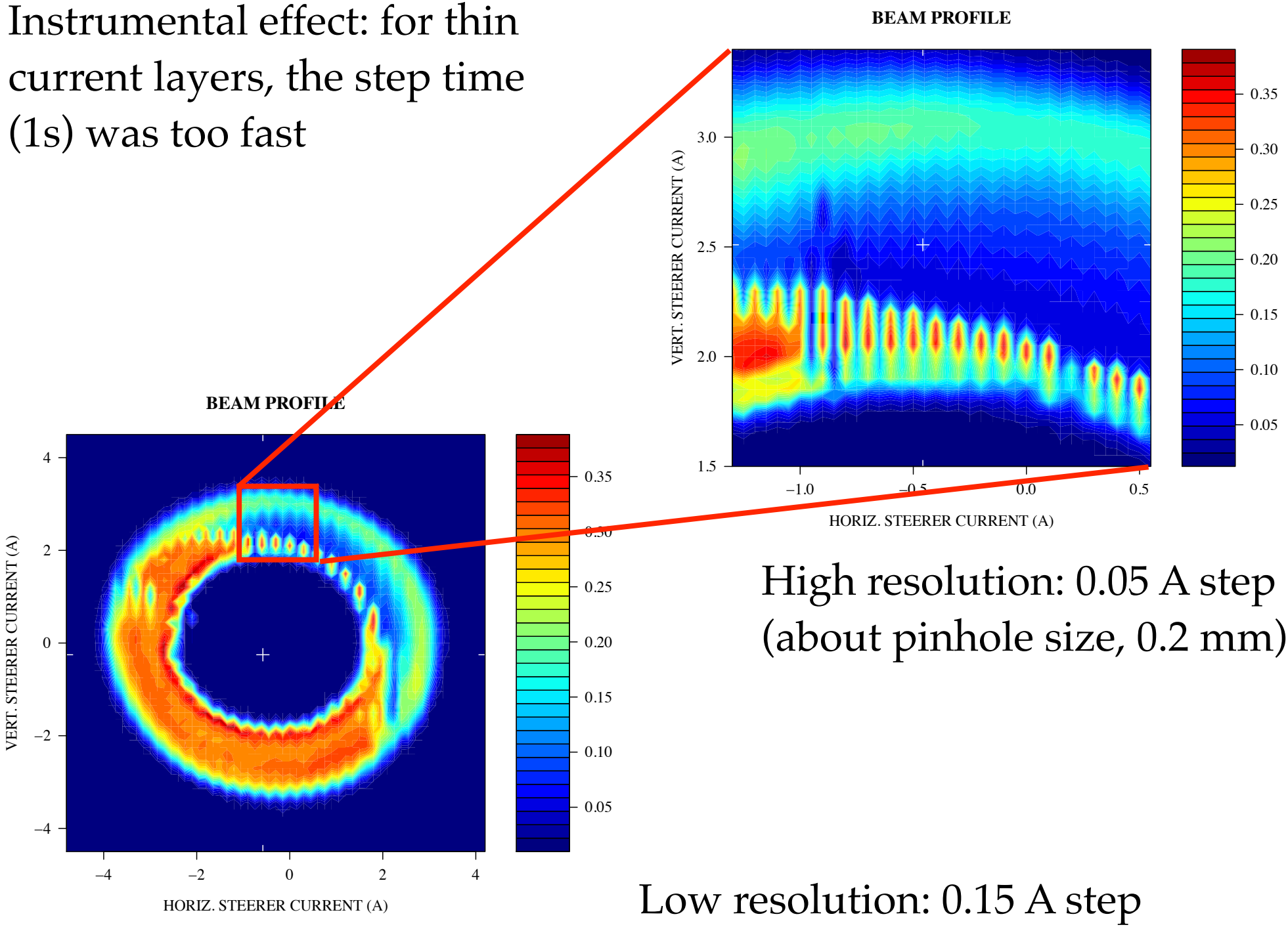

BEAM CURRENT [A]
0.1
0.5
1
2
3
4
Profiles vs. voltage (current) and magnetic field
Hot cathode (8.75 A)
MAGNETIC FIELD [T]
0.4
0.3
0.2
0.1
0.5
1.0
2.0
3.0
4.0
6.0
8.0
CATHODE VOLTAGE [kV]

Profiles vs. voltage at different temperatures and currents



Again, profile depends mostly on voltage and not current

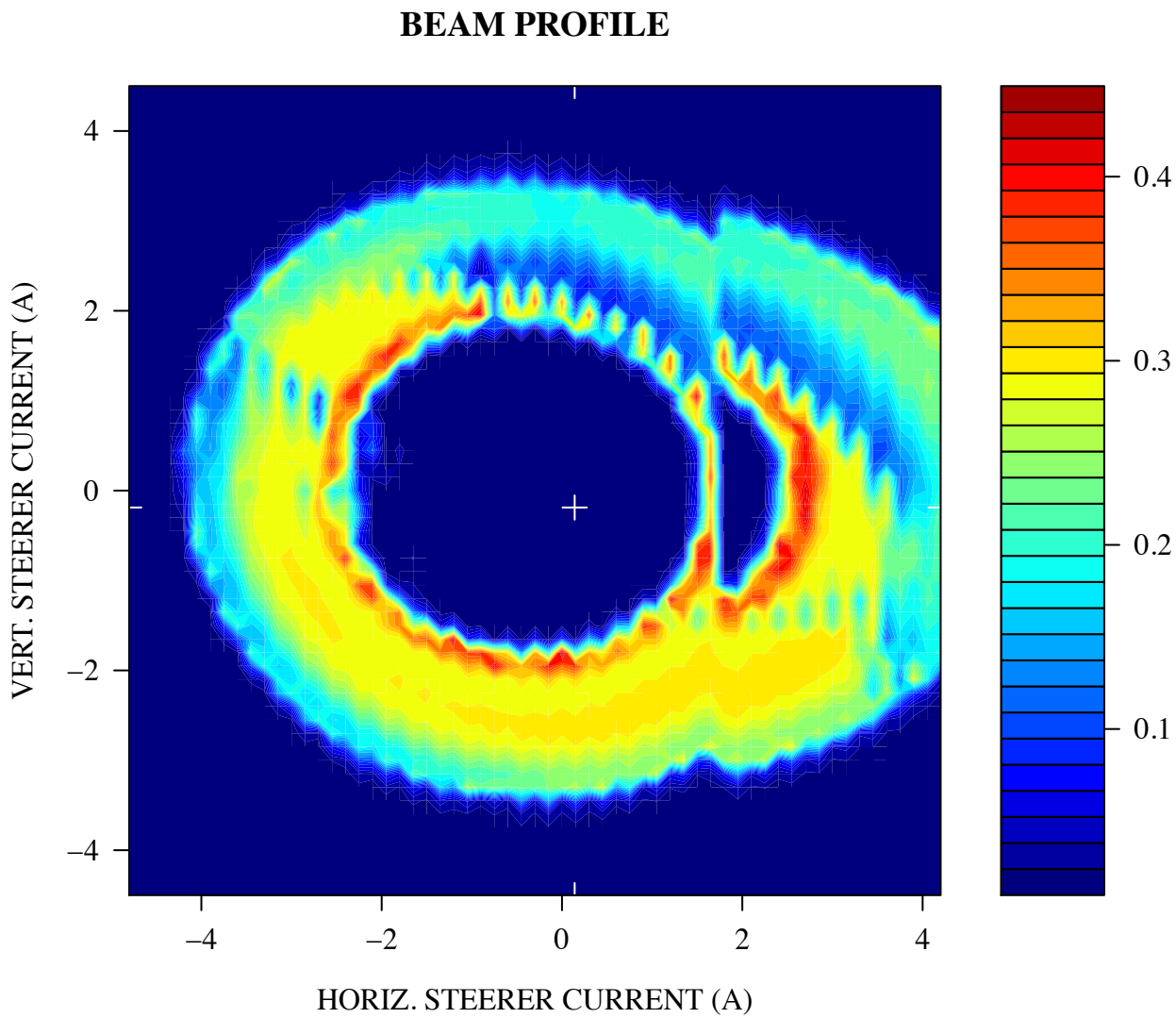
Instrumental effect: for thin current layers, the step time (1s) was too fast



High resolution: 0.05 A step (about pinhole size, 0.2 mm)

Low resolution: 0.15 A step

Horizontal corrector power supply (Z:HCORB2) failed during last scan



Repaired by EE Support Feb 8.

Comments

- HV rating good (~10 kV)

- vacuum OK, but could be improved (factor 4)

- perveance is 30% lower than expected. Actual gun geometry to be checked and modified?

- profiles depend mostly on electric field configuration and not on total beam current. Mechanical imperfections?

Update on CERN integration

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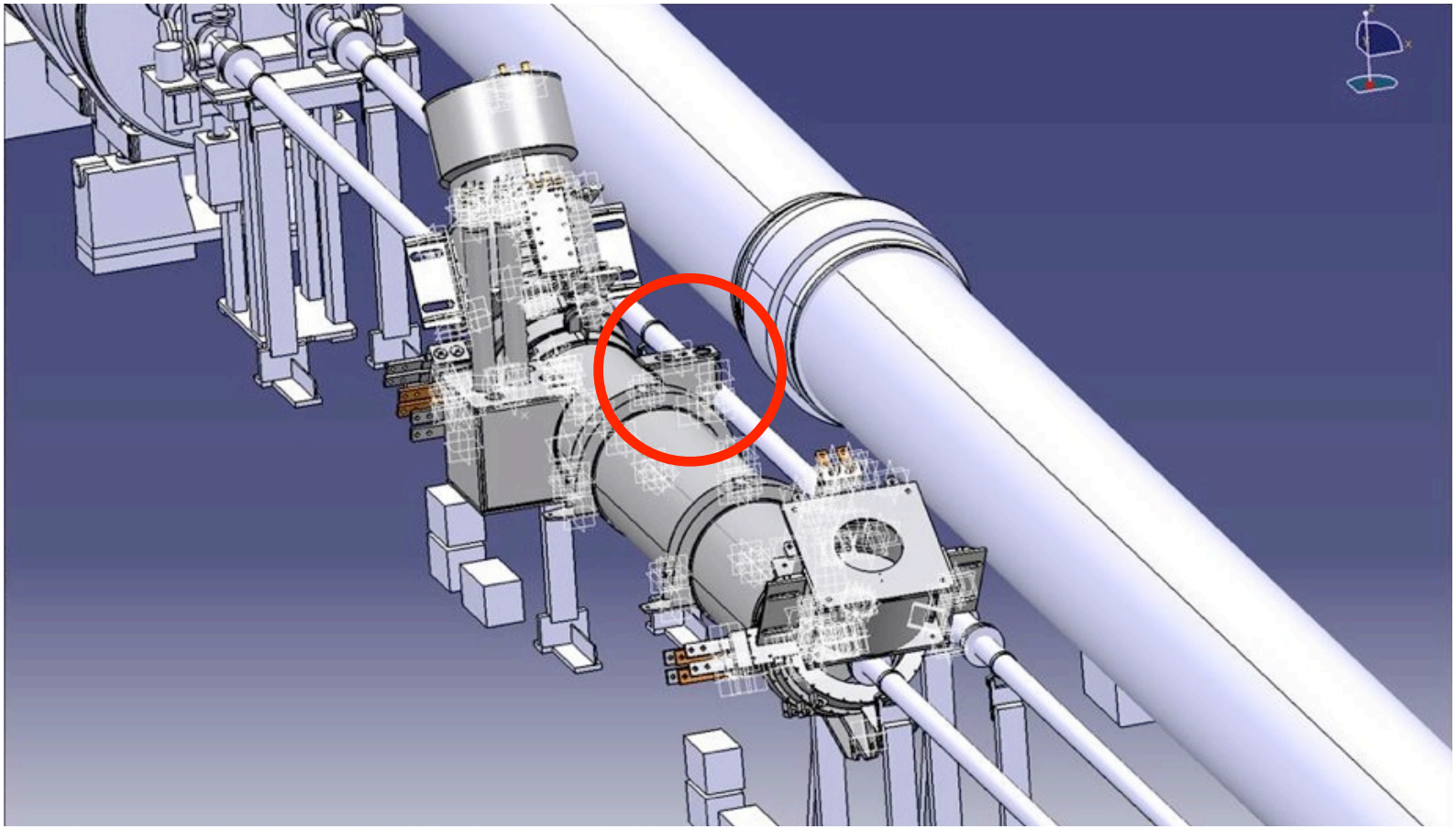
Known interference of N_2 cryo box with outer beam pipe in LHC at IR4. Could be solved by 10-deg rotation of cryostat.



Belen Salvachua (LHC Collimation) will meet with Yvon Muttoni (CERN Integration) tomorrow.

No N_2 available for shields, only He at 20 bar?