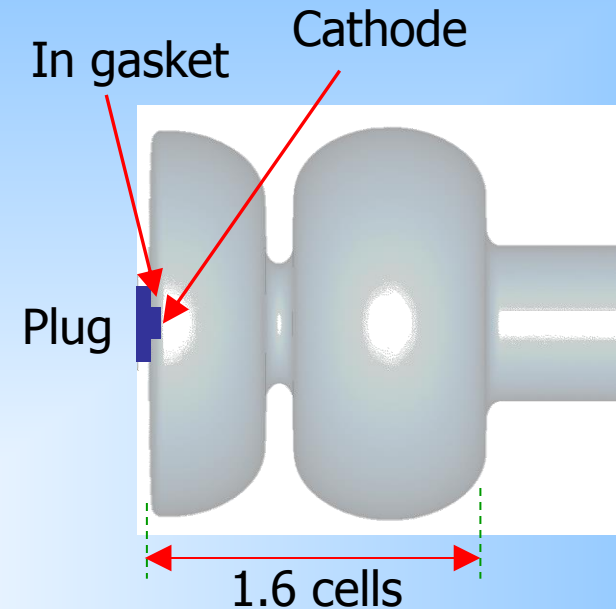

SRF Gun and Cathode activities at DESY

D. Kostin ¹, W. Grabowski ², M. Schmökel ¹,
N. Steinhau-Kuehl ¹, J. Sekutowicz ¹

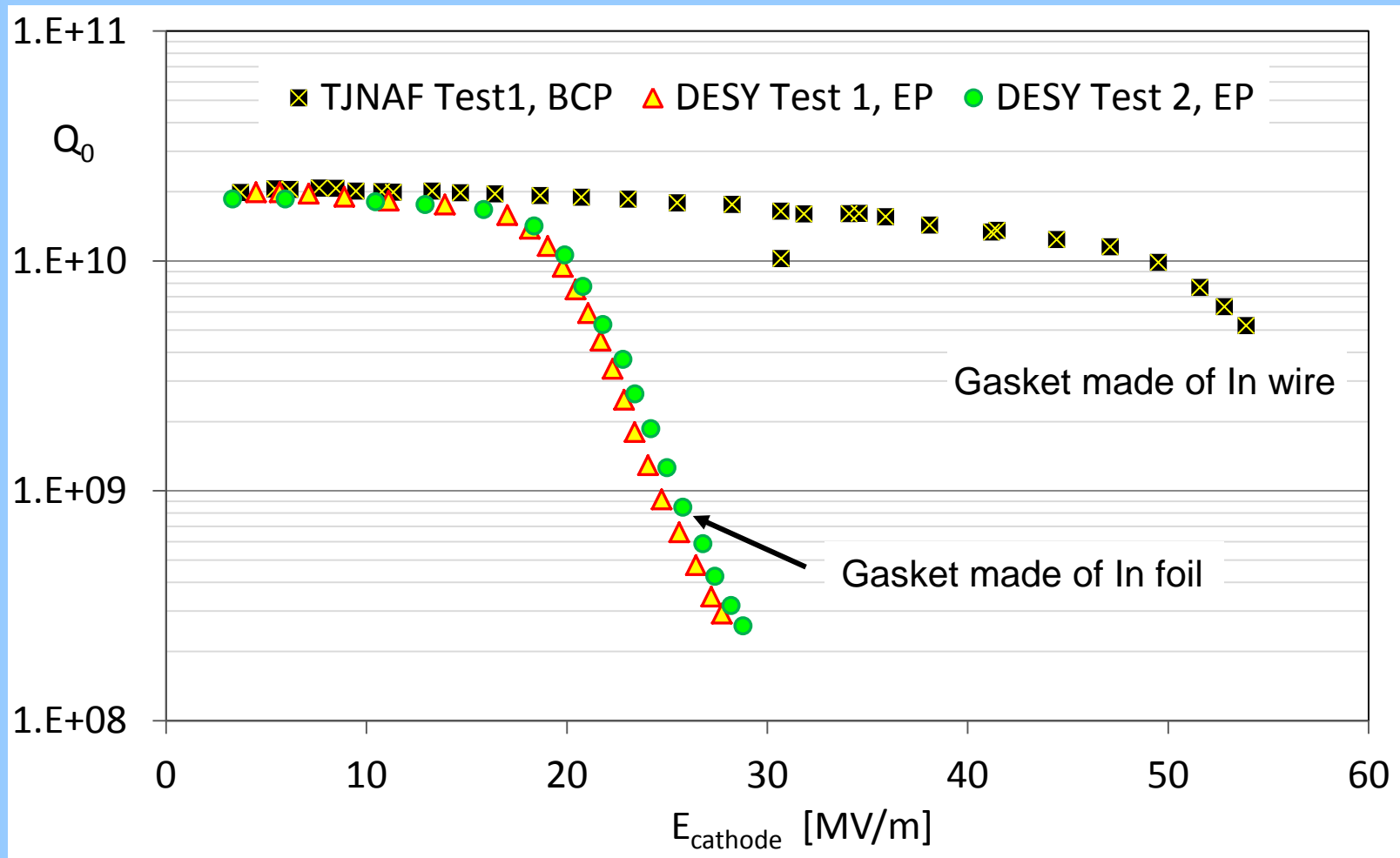
Superconducting Gun at DESY

- 1.6-cell cavity is made of high RRR Nb
- The gun is immersed in a superfluid He
- Cathode is on a removable plug
- The plug gasket is made of In.



Parameter	Unit	Value
π -mode frequency	[MHz]	1300
Active length $1.6 \cdot \lambda/2$	[m]	0.185
Nominal E_{cath} on the cathode	[MV/m]	50-60
Energy stored at nominal E_{cath}	[J]	14-20
Nominal beam energy	[MeV]	5-6

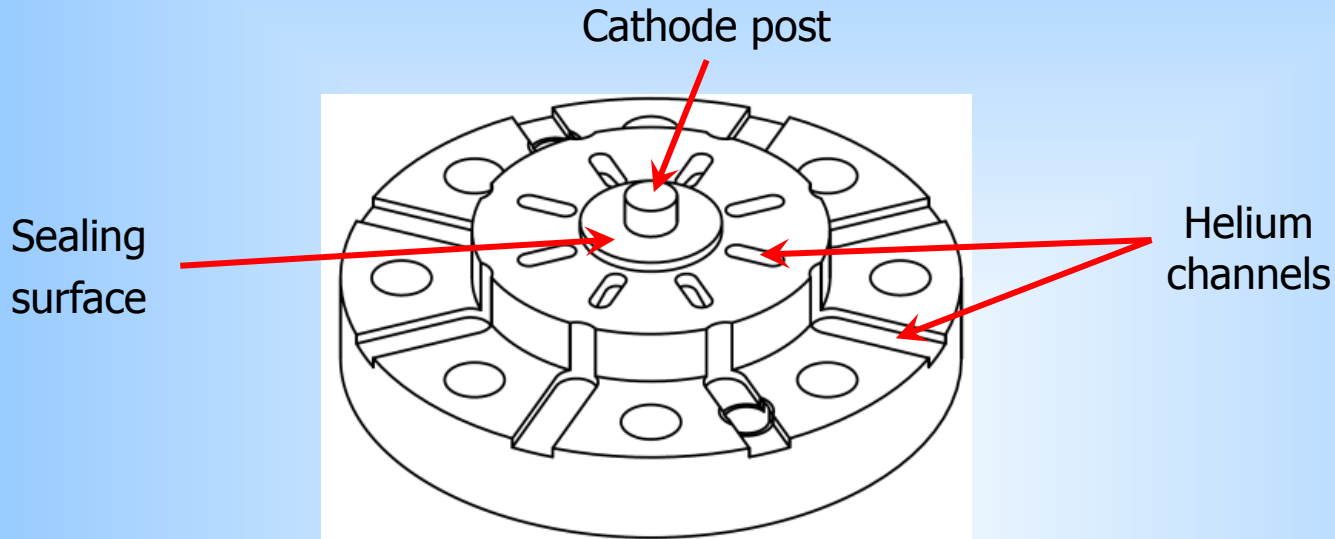
Recent baseline tests results



- Removing water vapour
- Present version of the cathode plug does not guarantee repeatability of the results
- Better cooled plug in fabrication.

Plug modification and next steps

Additional channels for superfluid helium to cool better the sealing surface and the cathode post.



- Tests with the modified Nb plug (baseline);
- Tests with the Pb coated plug;
- Tests with the GaN coated plug.

Why gallium nitride ?

- Quantum efficiency of Pb is **up to $5 \cdot 10^{-3}$** @ 213 nm;
- Quantum efficiency of GaN is **ca. 0.8** @ 260 nm of wavelength and over 120 nm thickness

But:

- GaN is not a superconductor
- We will make the coating thinner ca. 20 - 40 nm to have proximity effect
- Additionally difficulty is transport and assembly GaN coated plug in a noble gas atmosphere because it will be doped with Cs. This is rather challenging.

Coating of samples is in progress in collaboration with BNL.

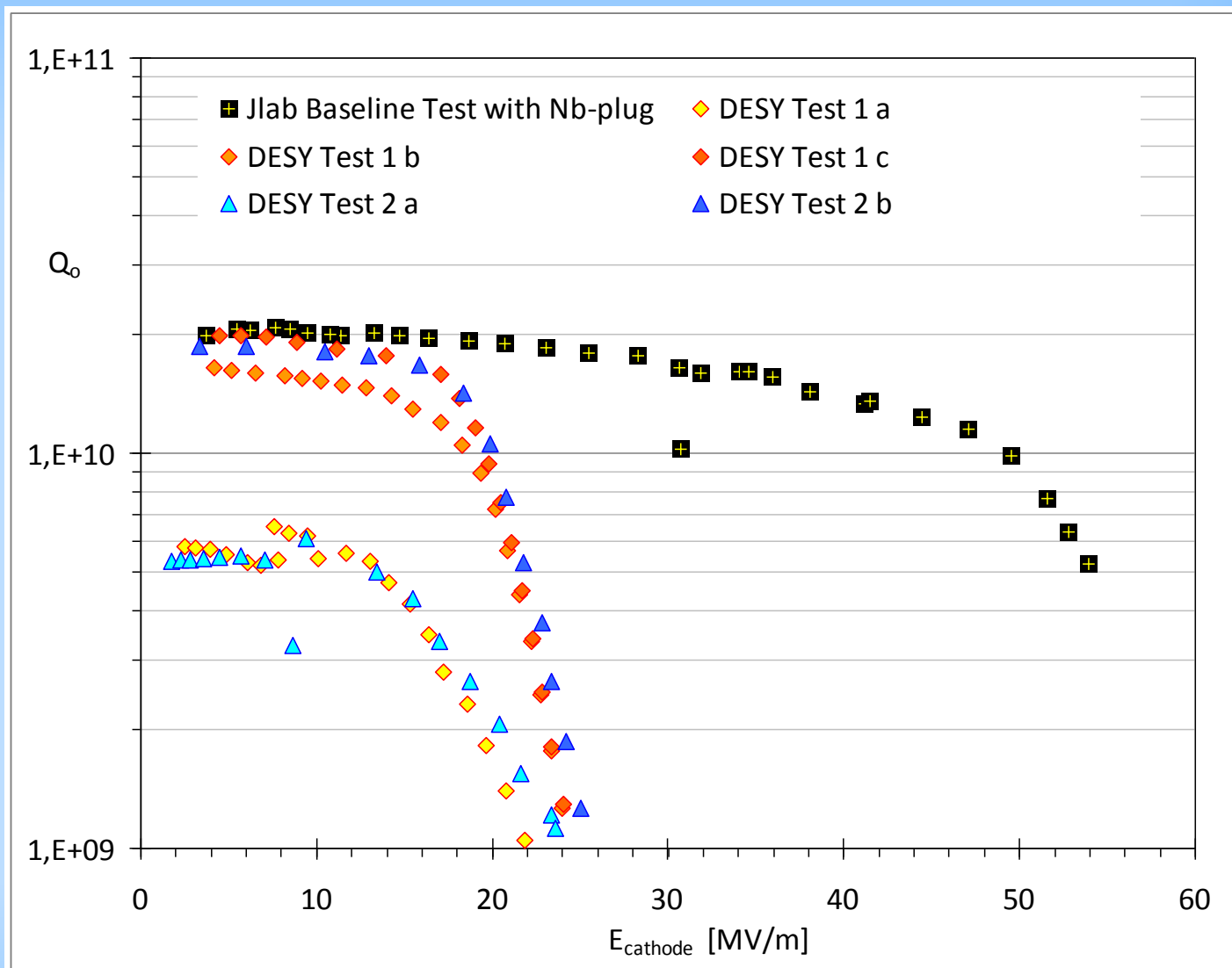
Thank you
for your attention

- Chemical cleaning BCP and/or EP
- Assembly in cleanroom (Plug Installation)
- High Pressure Water Rinsing
- Vacuum tests
- Vertical test at 1.8K or 2K.

Appendix: recent baseline tests results

- Tests 1a and 2a were done before first quench;
- Tests 1b, 1c and 2b were done after first quench.

Between test 1 and test 2 the gun was heated to remove remaining water vapour.



There is not significant difference between results of test 1 and test 2.