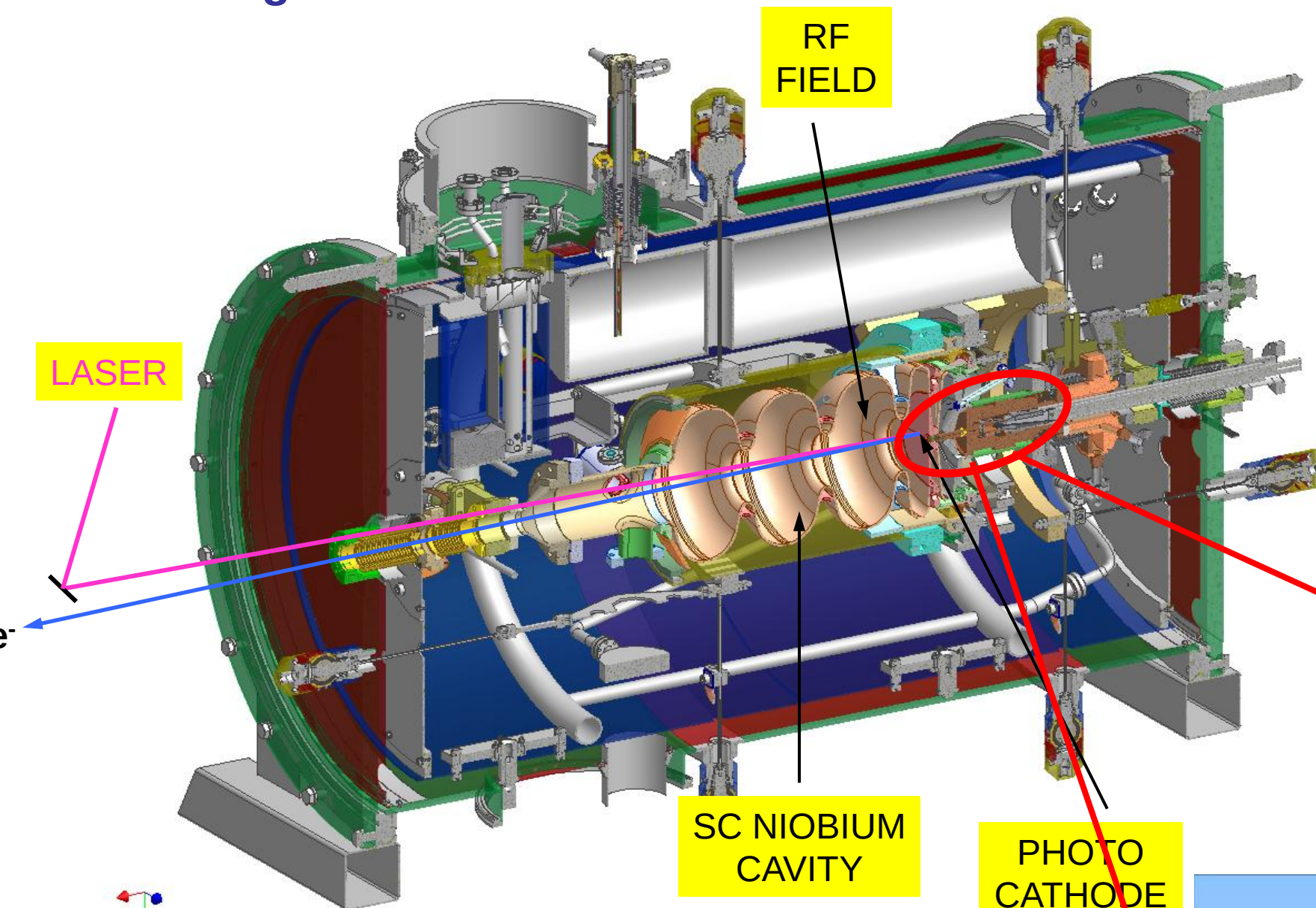


The properties of normal conducting cathodes in FZD superconducting cavity

Xiang, Rong; Arnold, A.; Buettig, M.; Janssen, D.; Justus, M.; Lehnert, U.
Michel, P.; Murcek, P.; Schamlott, A.; Schneider, Ch.; Schurig, R.; Staufenbiel, F.; Teichert, J.

Introduction

FZD SRF gun overview

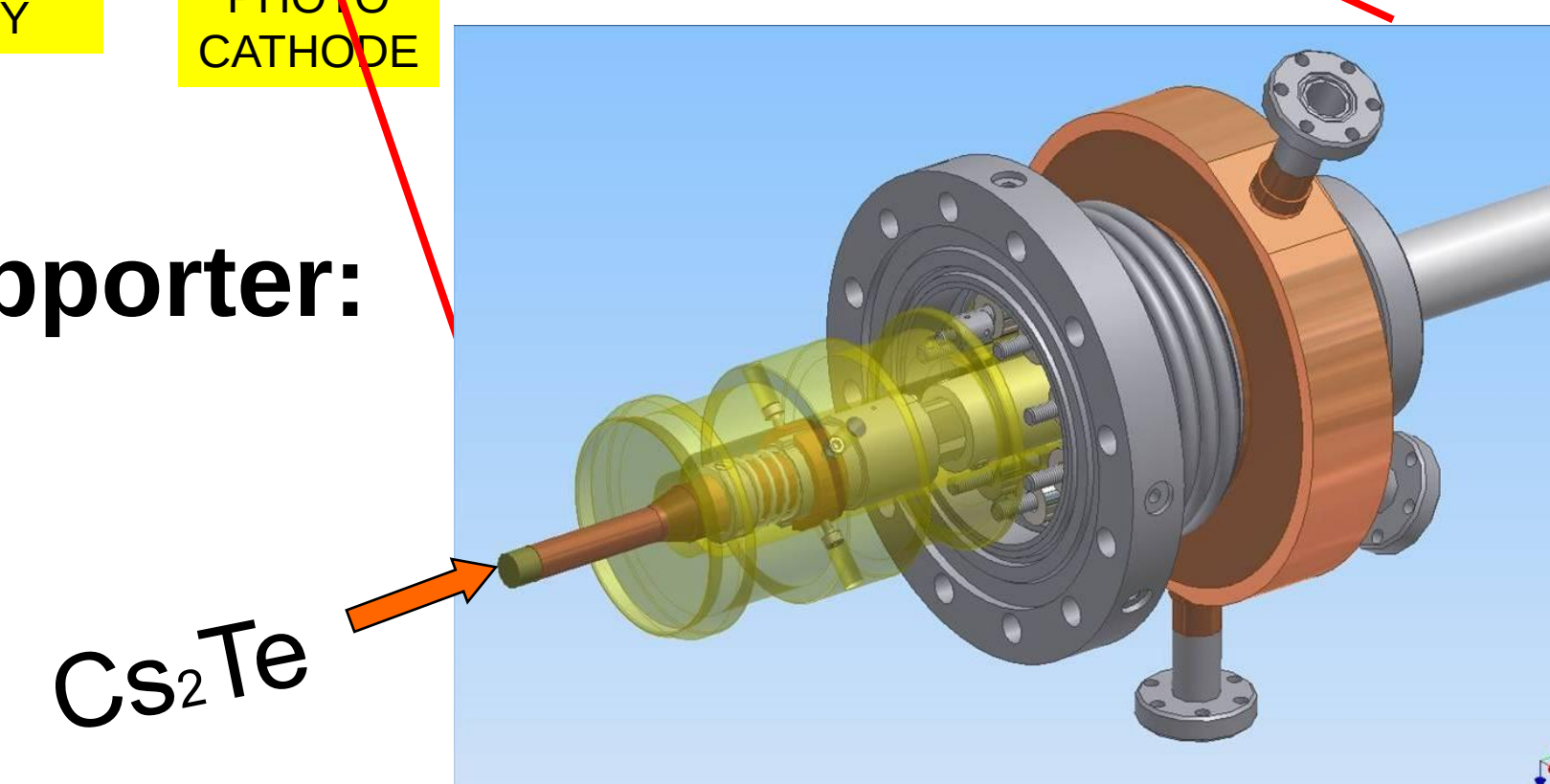


Cs₂Te in SC cavity

Compatibility
QE & Life time
Dark current
.....

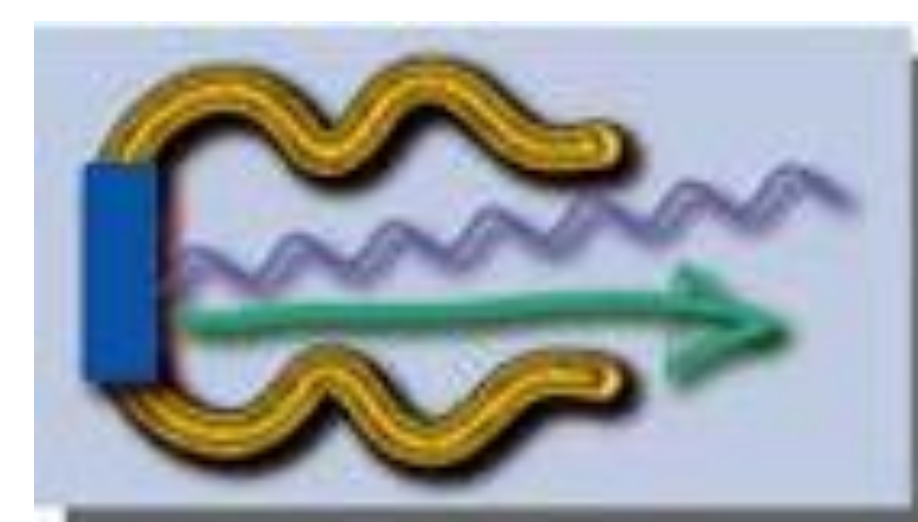
Special cathode supporter:

Isolated to the cavity
Cooled with LN₂
Adjustable position



Summary and Outlook

Photocathode + Nb cavity →



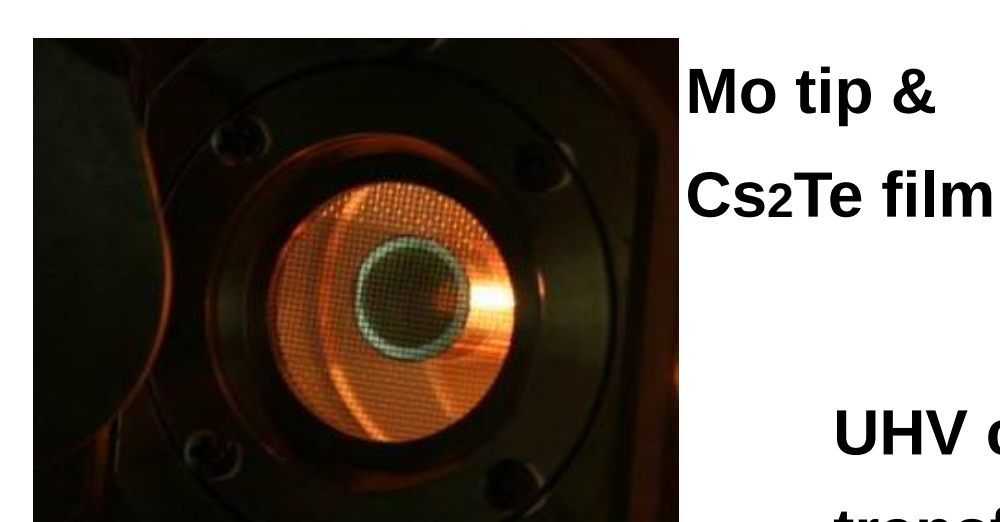
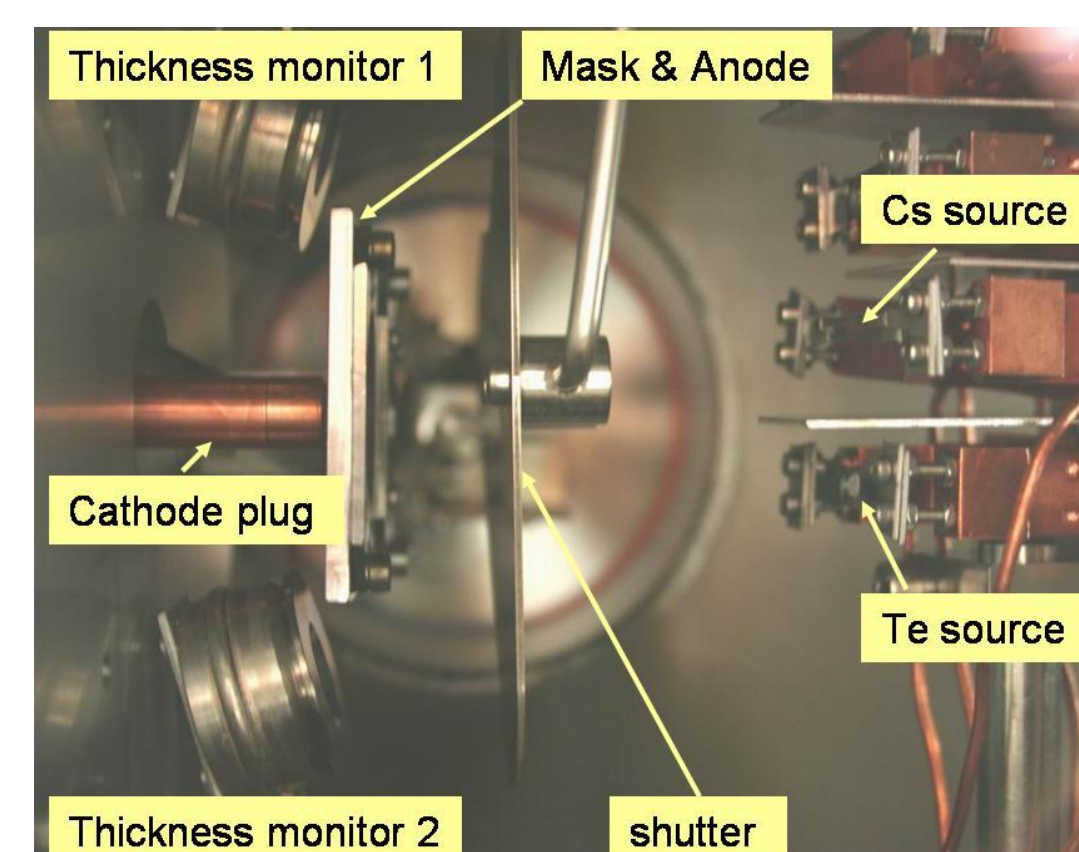
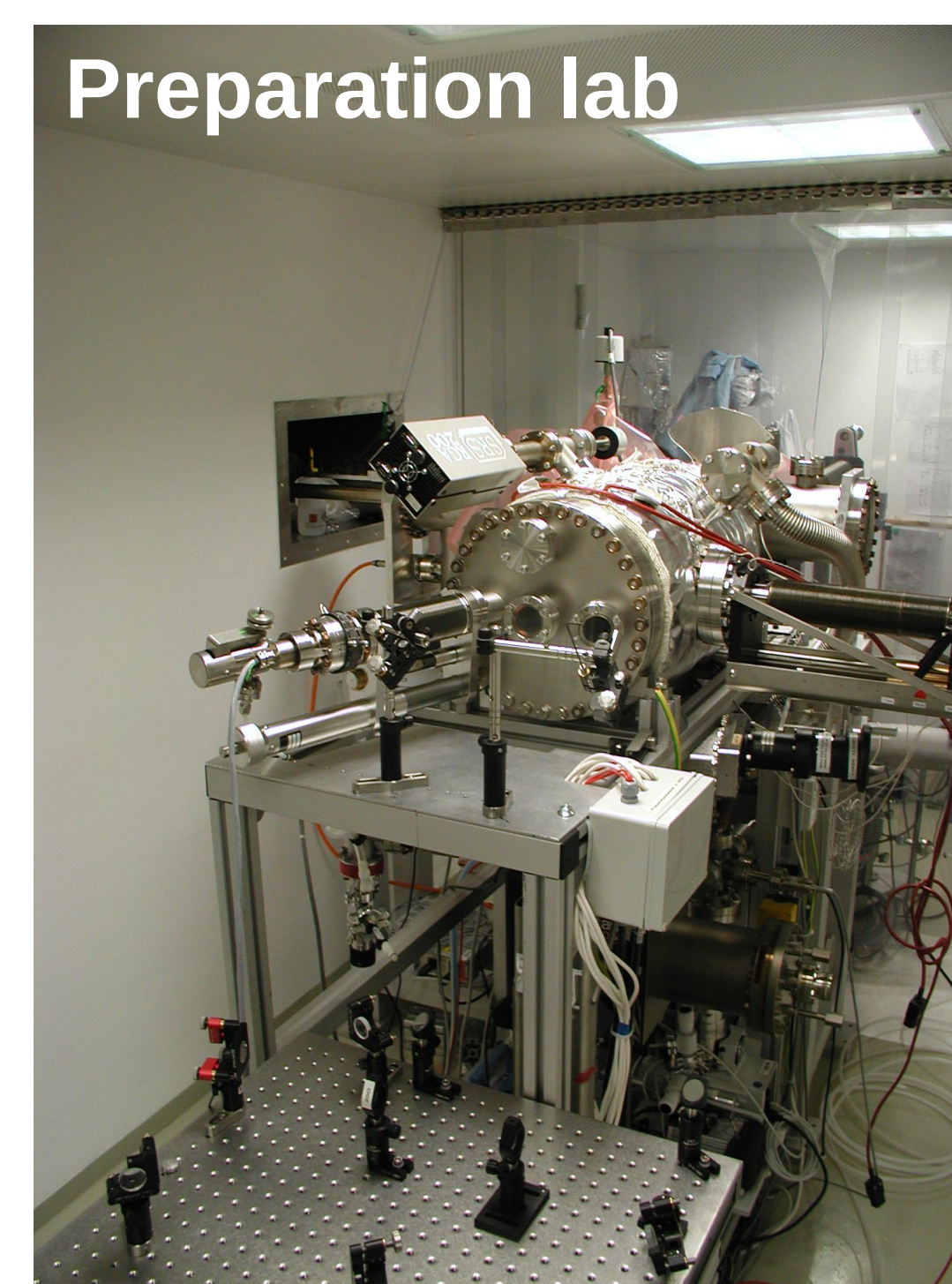
Next step: better vacuum for higher QE

Alternative: GaAs-type photocathode

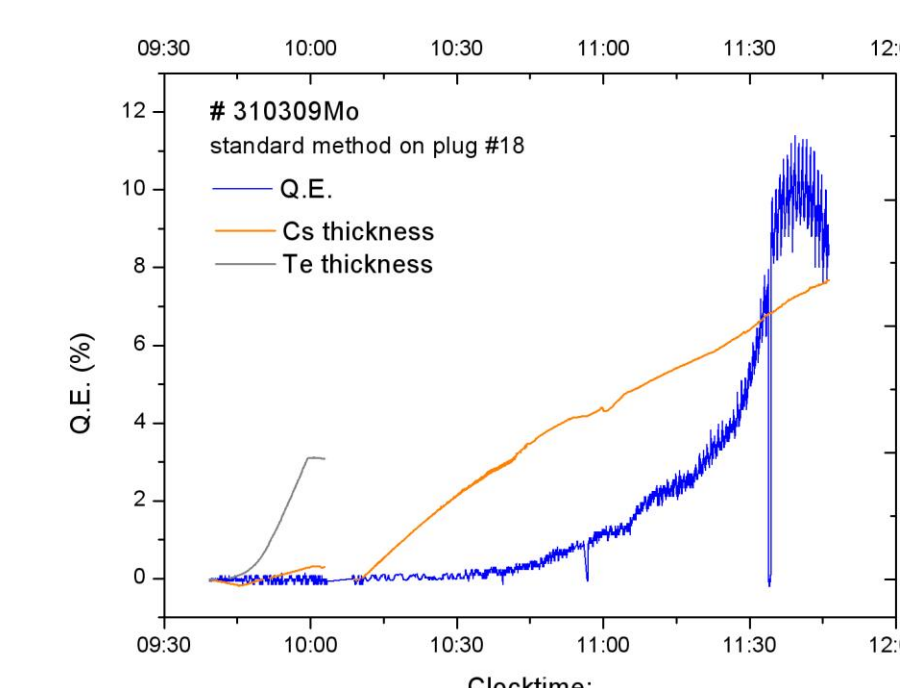
unpolarized electron source
polarized electron source

Preparation

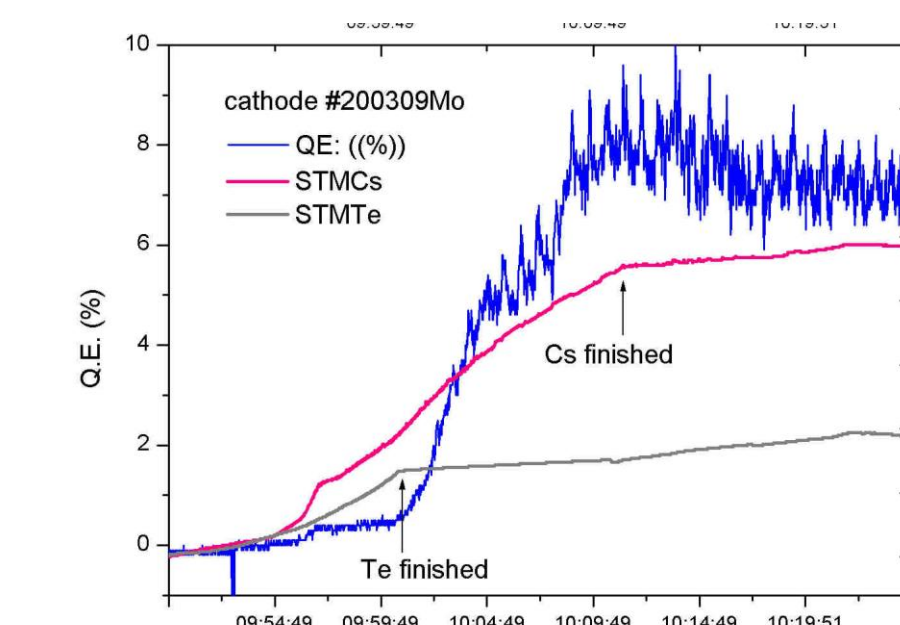
Preparation lab



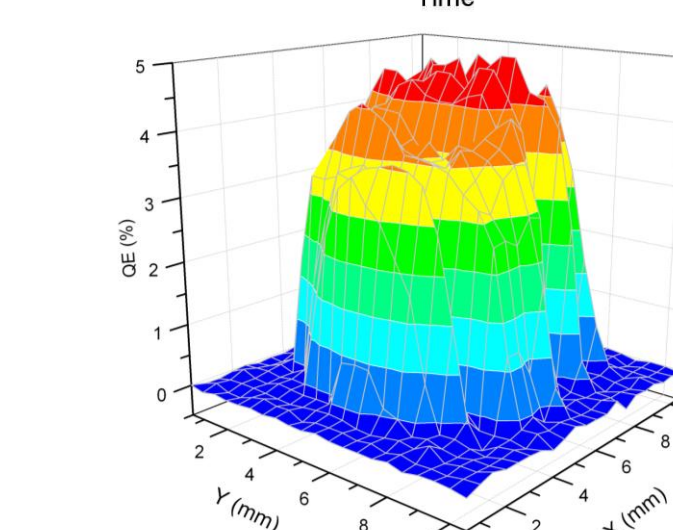
UHV cathode transfer system



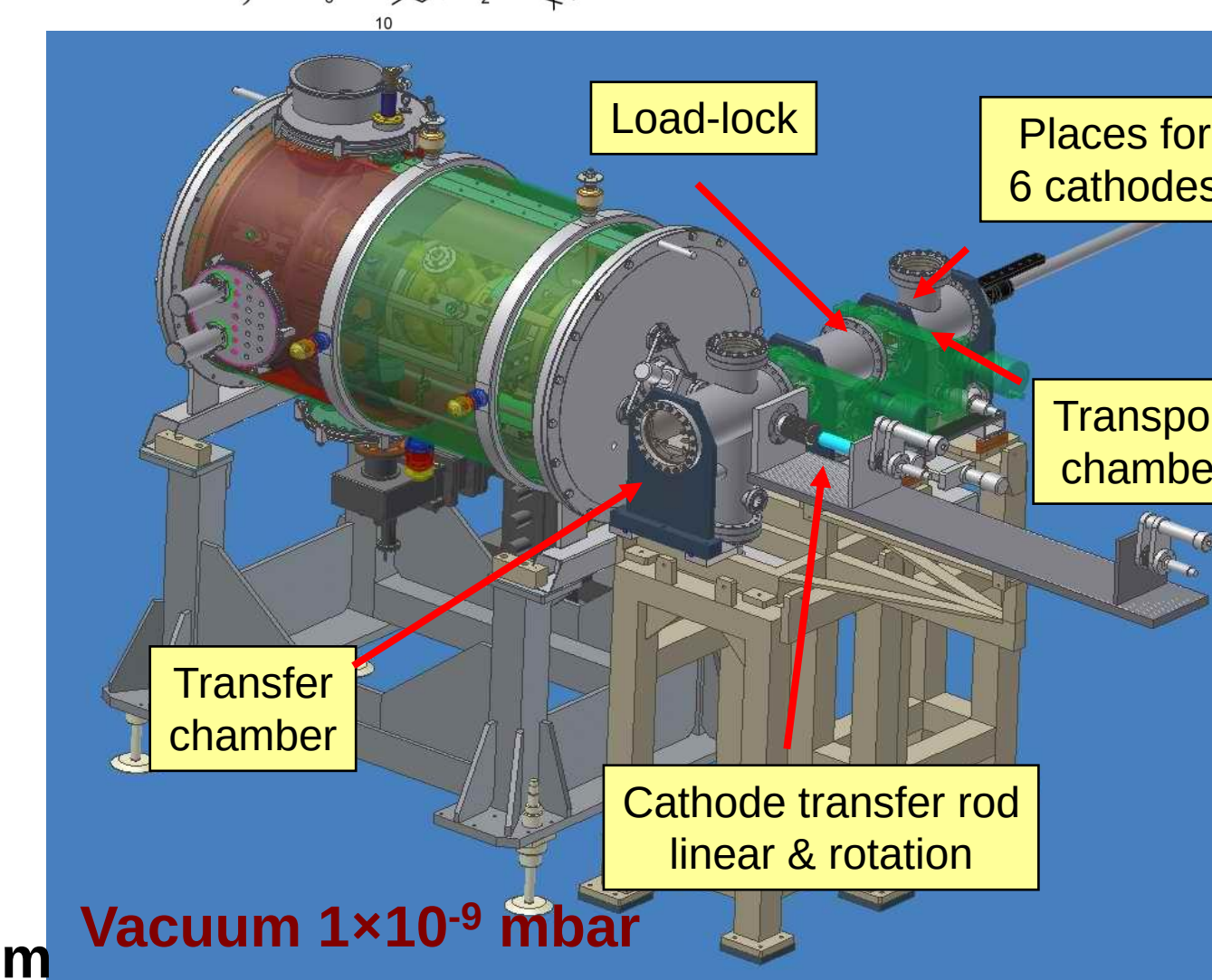
Standard
Te 10nm
Cs activation



Co-evaporation
Fast process
Slow degradation

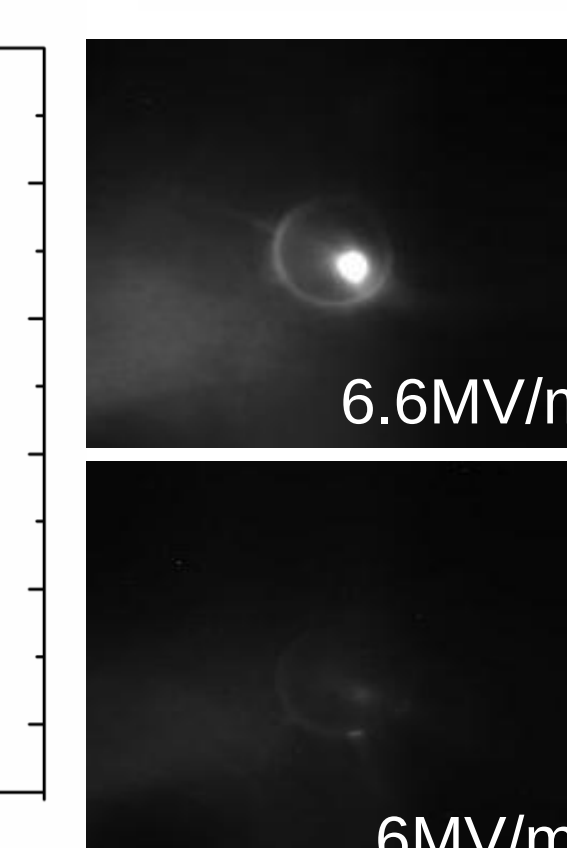
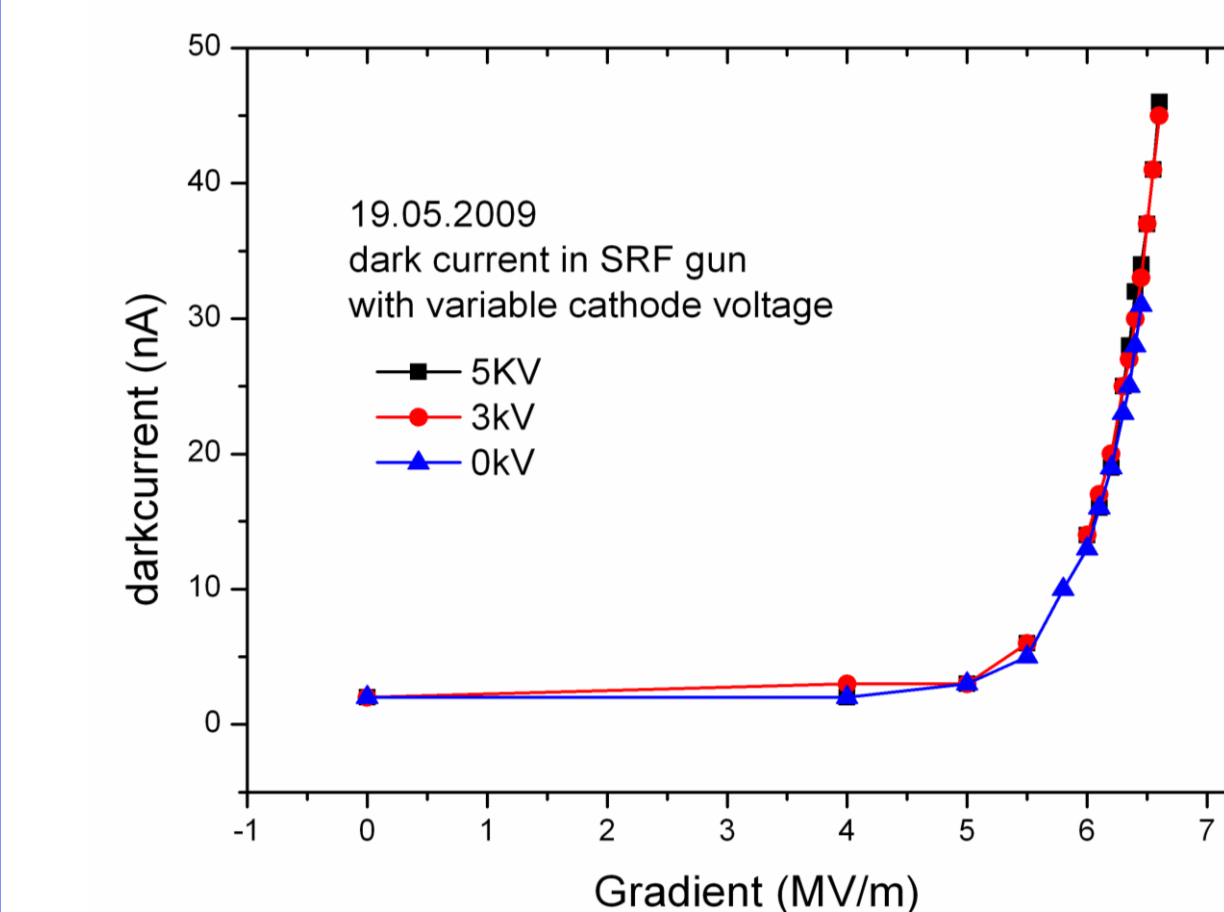
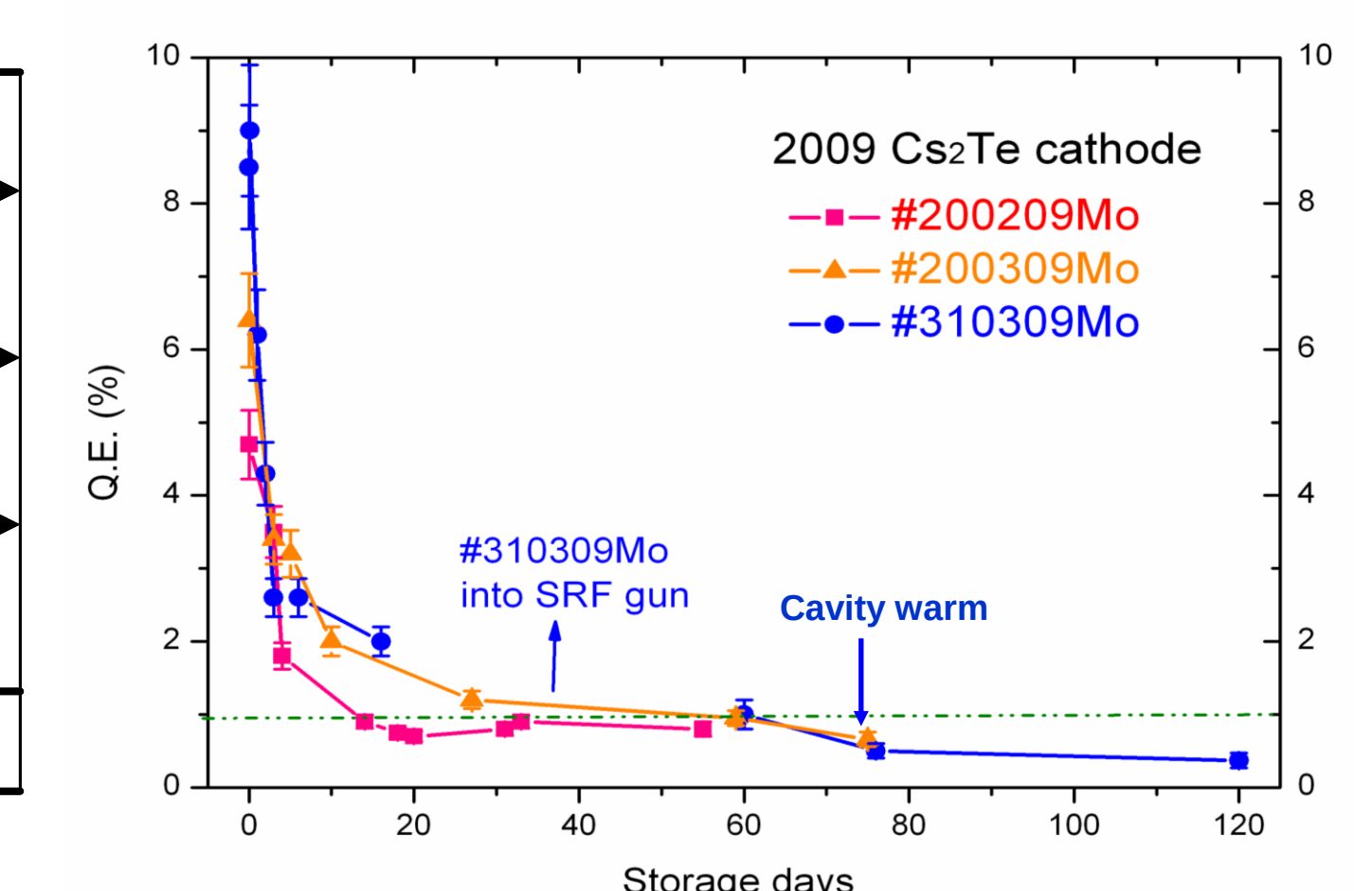


Distribution scan
with low intensity
UV laser

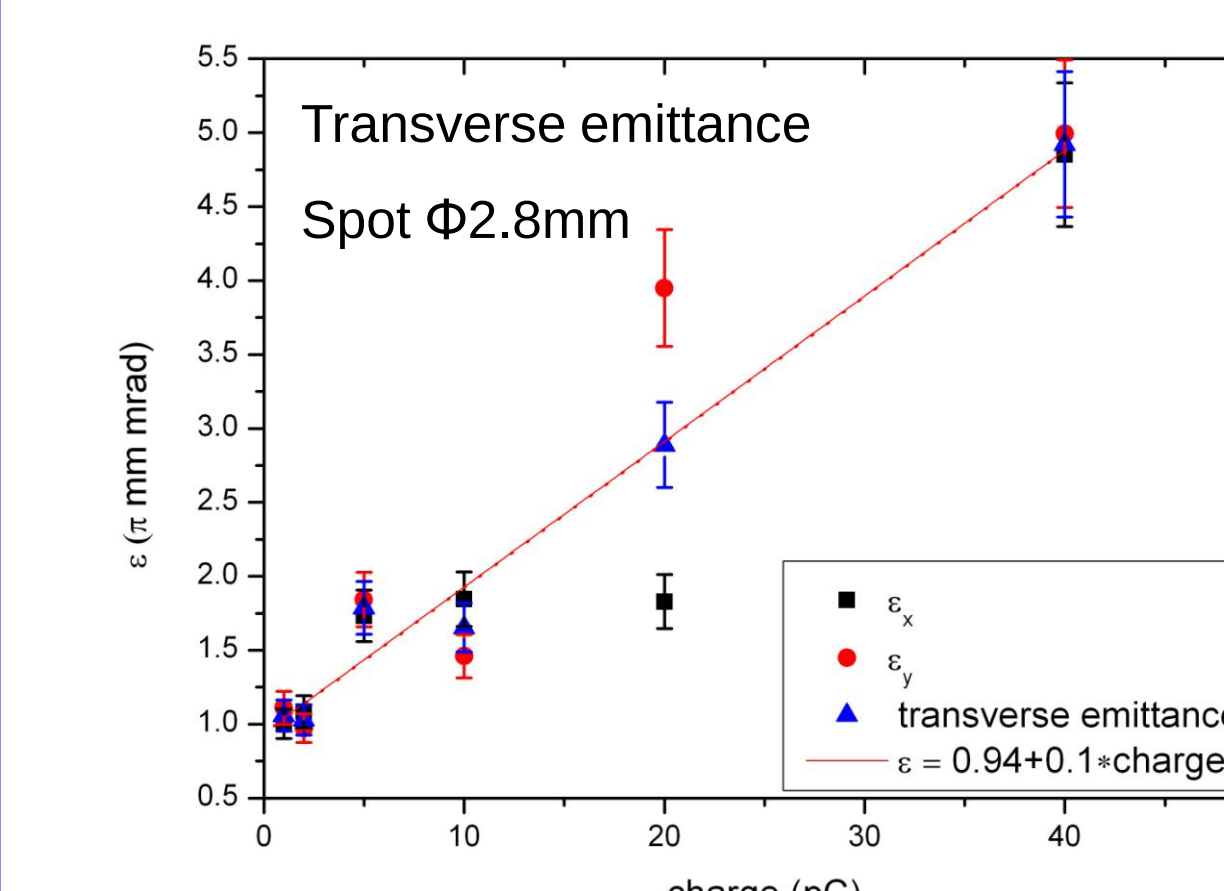


Cs₂Te Photocathode in SRF cavity

Cathode	Serving time	Q.E. in gun
#090508Mo	2008-5-23 to 2008-6-23	0.05%
#070708Mo	2008-7-21 to 2008-9-19	0.1%
#310309Mo	2009-5-8 to 2009-8-24	1.1%
#040809Mo	2009-8-24 ~	0.6%



Dark current from
field emission
Start from 6MV/m
1.cavity
2.Cathode itself



Thermal emittance

$$\epsilon_{th}(\text{Cs}_2\text{Te}) = 0.67 \pm 0.1 \text{ mm.mrad} * R \text{ (mm)}$$

Reference 2 in room temperature:
 $\epsilon_{th}(\text{Cs}_2\text{Te}) \sim 0.6 \text{ mm.mrad} * R \text{ (mm)}$

No obvious temperature effect

Acknowledgement

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Reference

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