Status of TE^2 Electron Gun

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ARIES WP16 internal discussion

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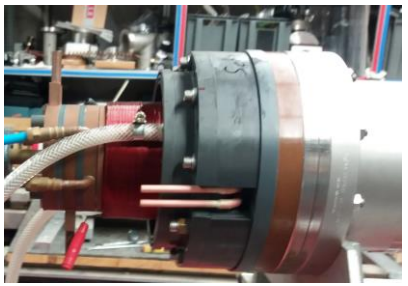
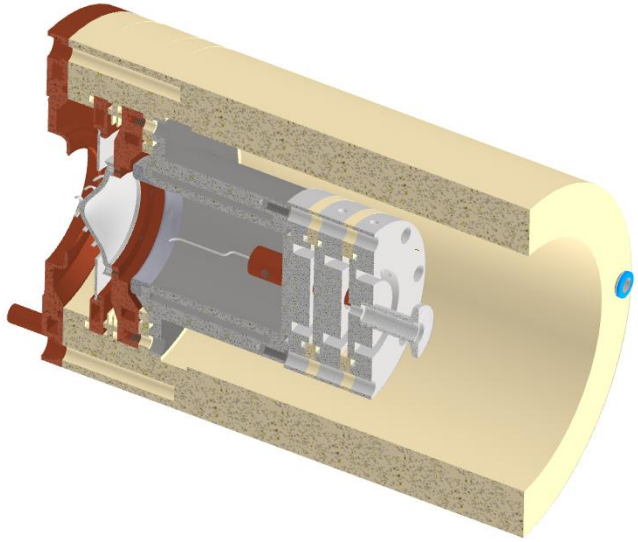
Status of E-Gun

Adaption to Solenoid and Design Upgrades of TE^2-Gun

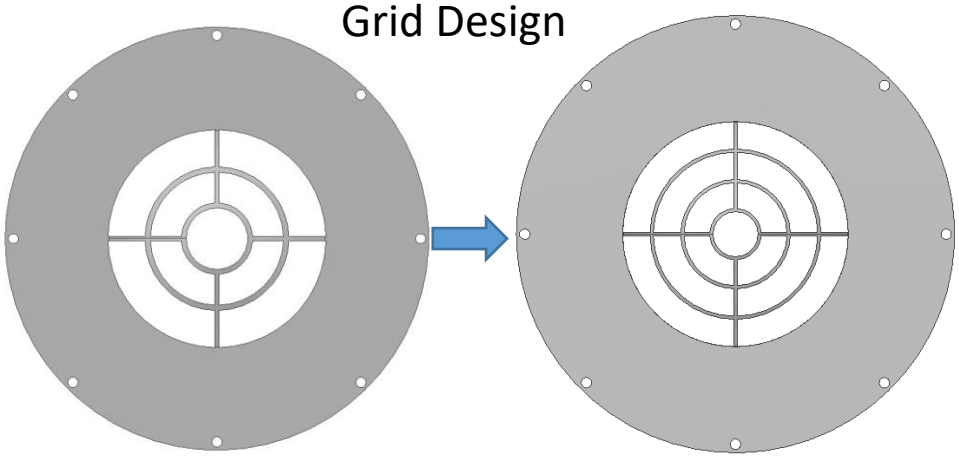


Modifications of:

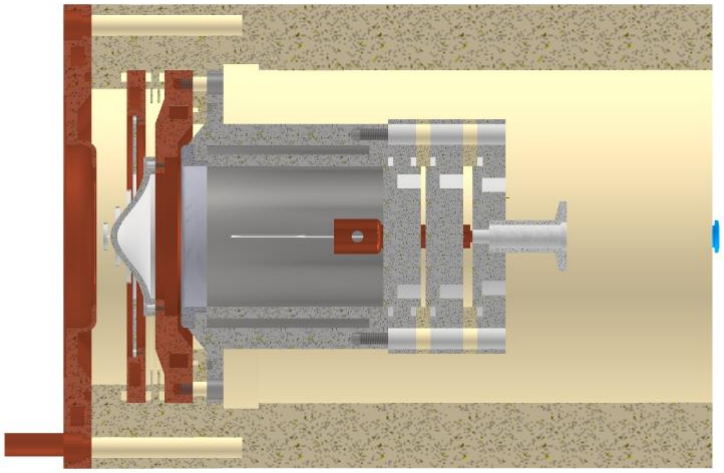
- cooling connections and flange edges
  - ground electrode
  - grid electrode
- modulating grid
- anode
- Insulating shield between gun and solenoid



Grid Design

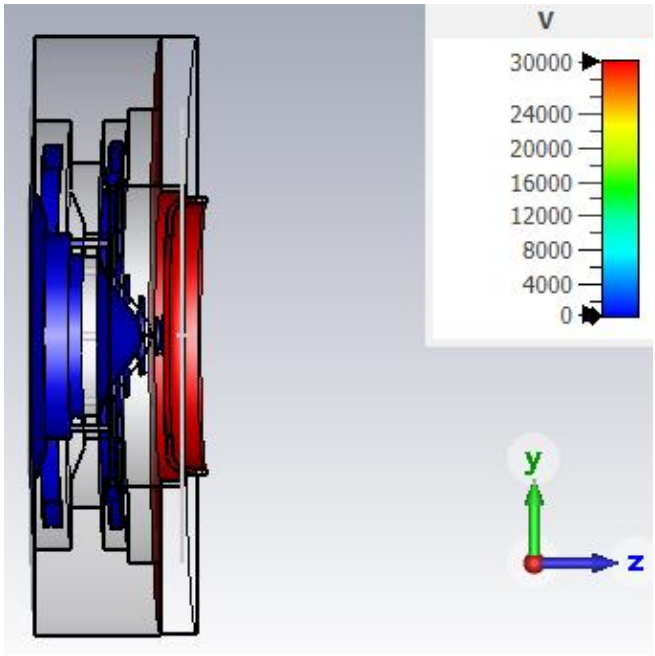


current design *new design*

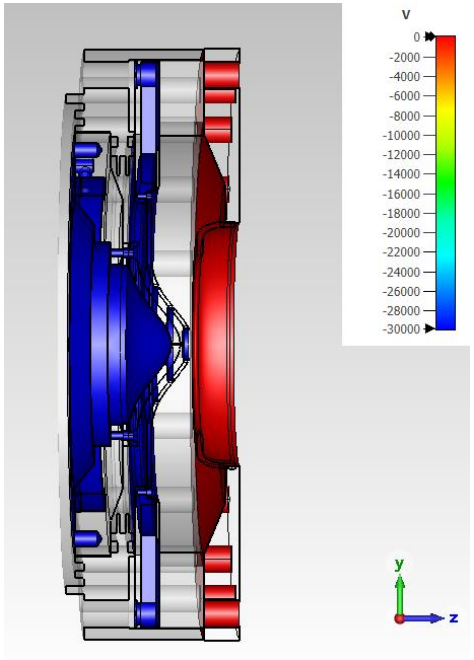


Design Upgrade of TE^2-Gun

Former electrode design (with optimized grid)



Upgraded electrode design



E-Gun Parameters:
U_a=30 kV
U_c=0 kV
U_g=0 kV
I_{ex}=8.4 A
B_z=0.6T

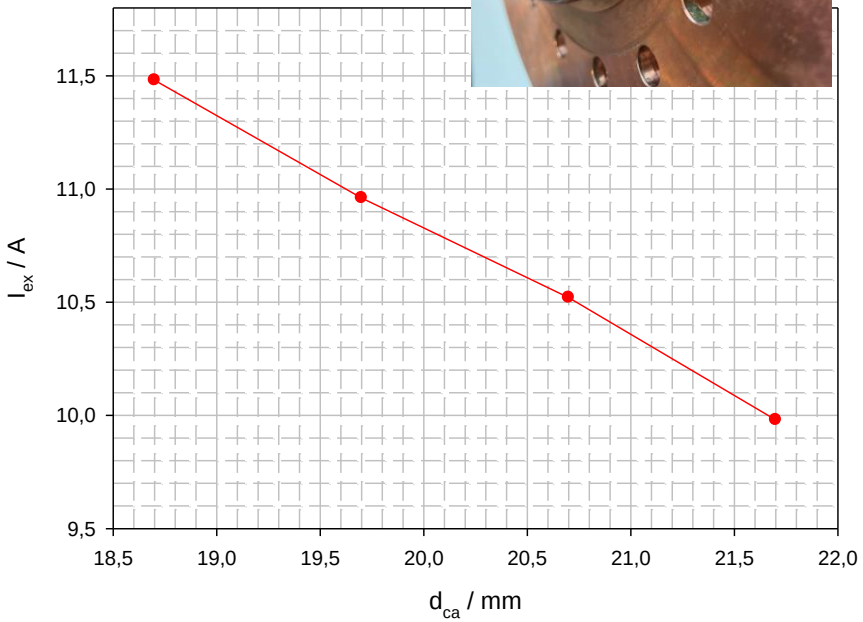
E-Gun Parameters:
U_a=30 kV
U_c=0 kV
U_g=0 kV
I_{ex}=10.7 A
B_z=0.6 T

approx. 2.3 A less than „final gun design“ as reported in MS53

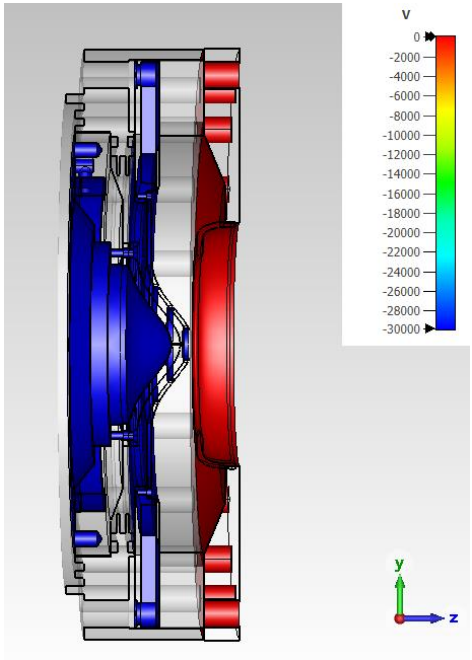
Design Upgrade of TE^2-Gun

Variable cathode-anode-distance

possible variation of
± 4mm



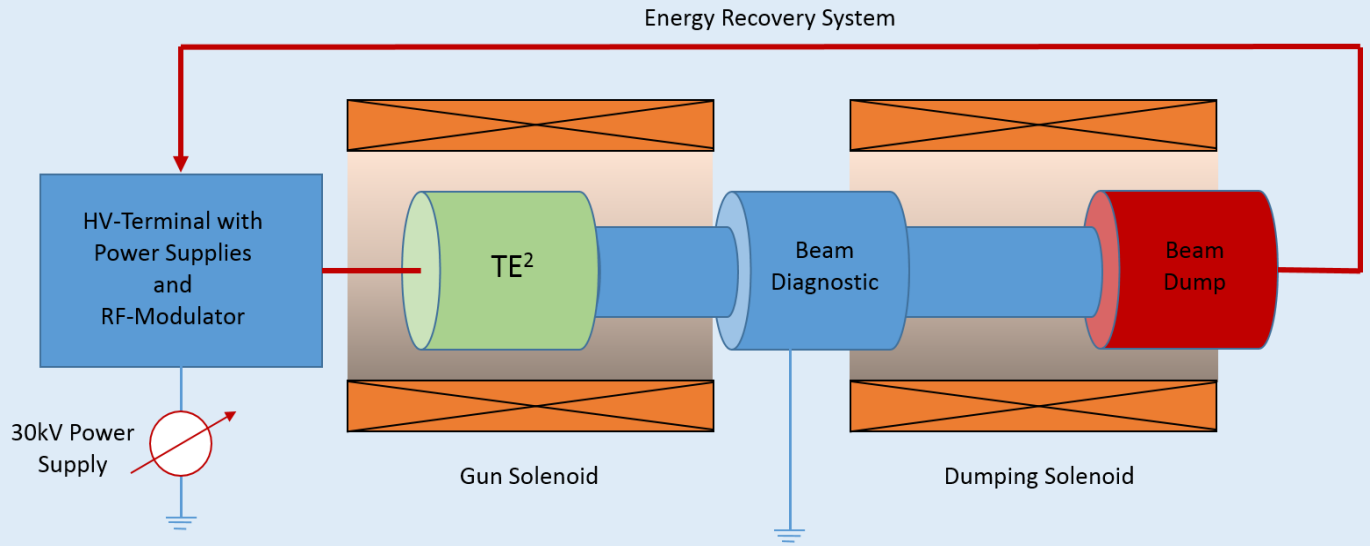
Upgraded electrode design



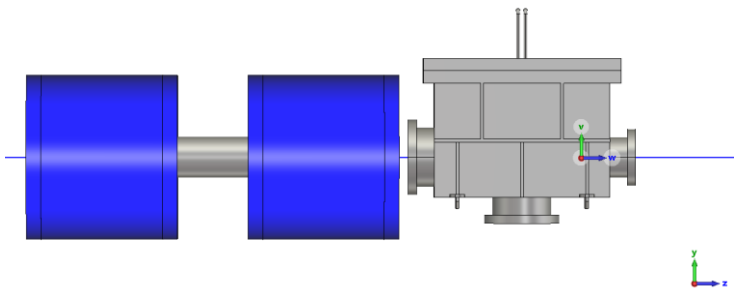
E-Gun Parameters:
U_a=30 kV
U_c=0 kV
U_g=0 kV
I_{ex}=10.7 A
B_z=0.6 T

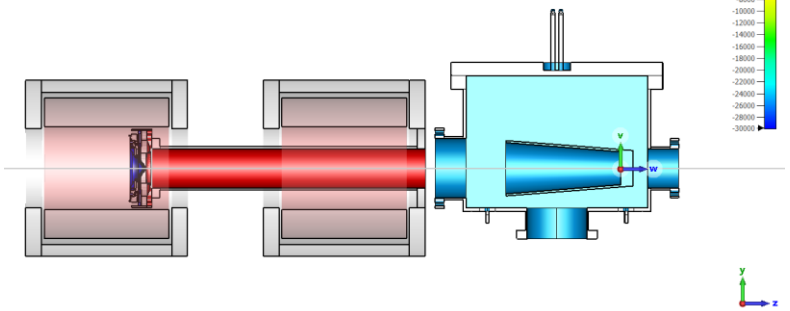
design provides also flexibilty in adjusting cathode-grid-distance

Concept of Electron Source Test Bench

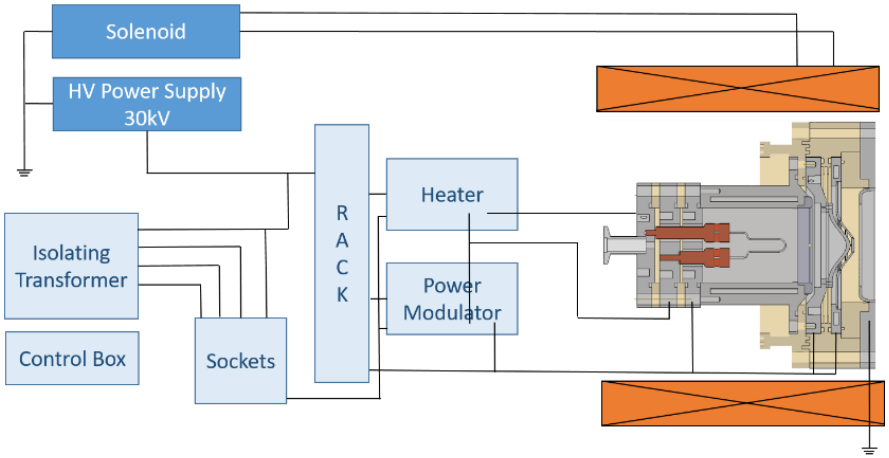


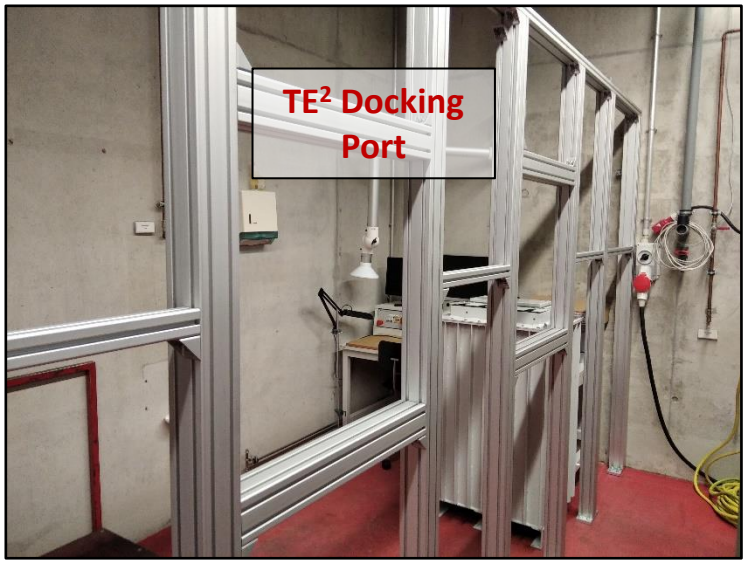
- final beam power of about 300 kW (DC operation)
- loss monitors and beam diagnostics
- power modulator
- beam dump with energy recovering system

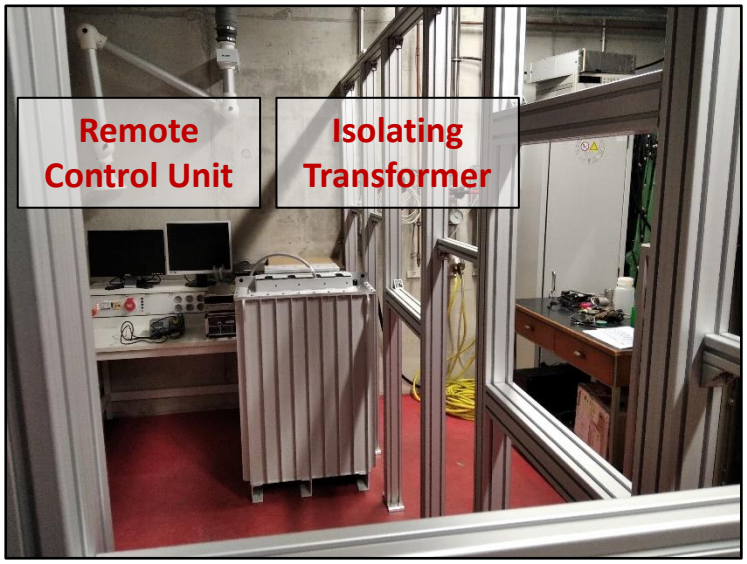




HV-Terminal for TE^2 Operation



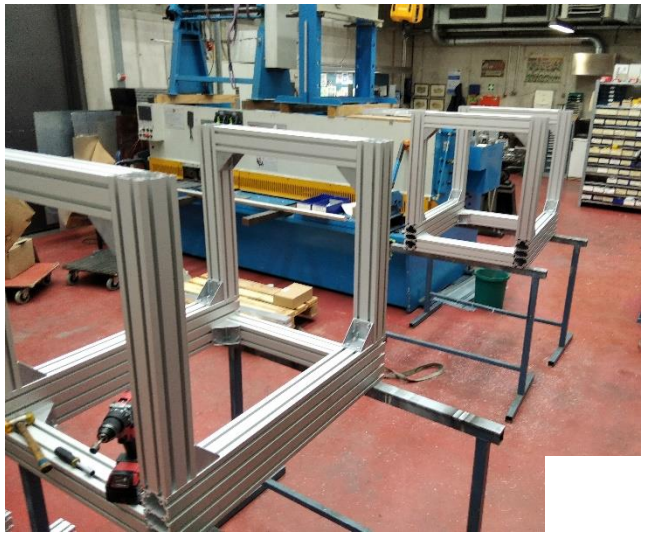


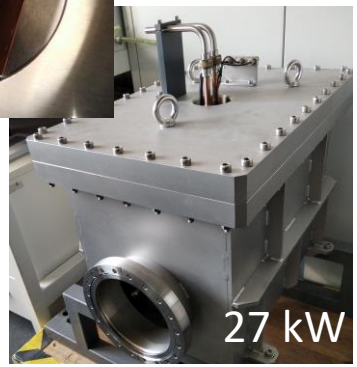


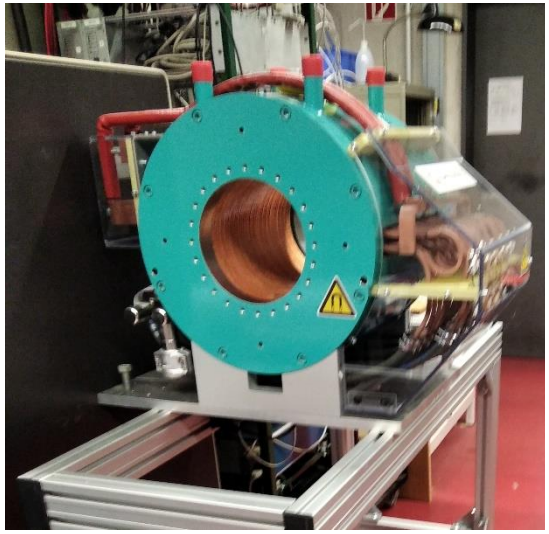
Status of Terminal and Test Bench

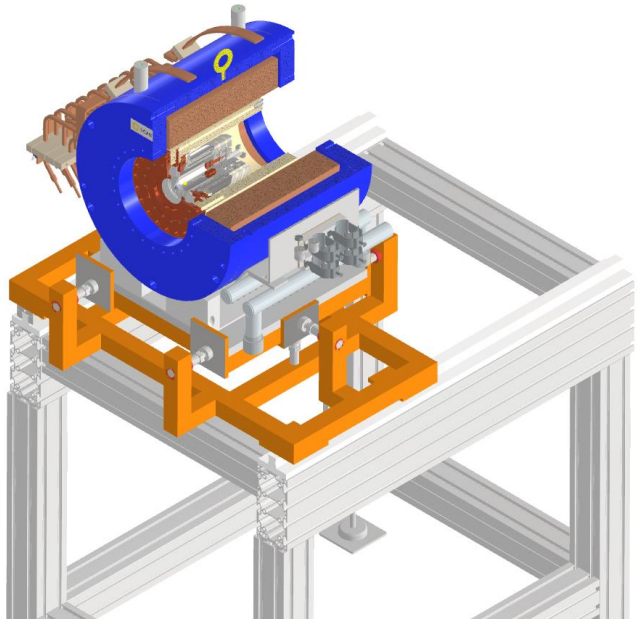
Status of:

- terminal (cooling, cables, insulation sockets)
  - under construction
- experiment carrier
  - under construction
- adjustment unit for solenoid
  - in design process, material already delivered
- TE^2 parts
  - Vinidur and copper parts are under construction at IAP workshop
  - cathode and grid ordered, delivery delayed (KW 24)
- Controls (IT infrastructure, software)
  - T. Dönges, BSc Cand.



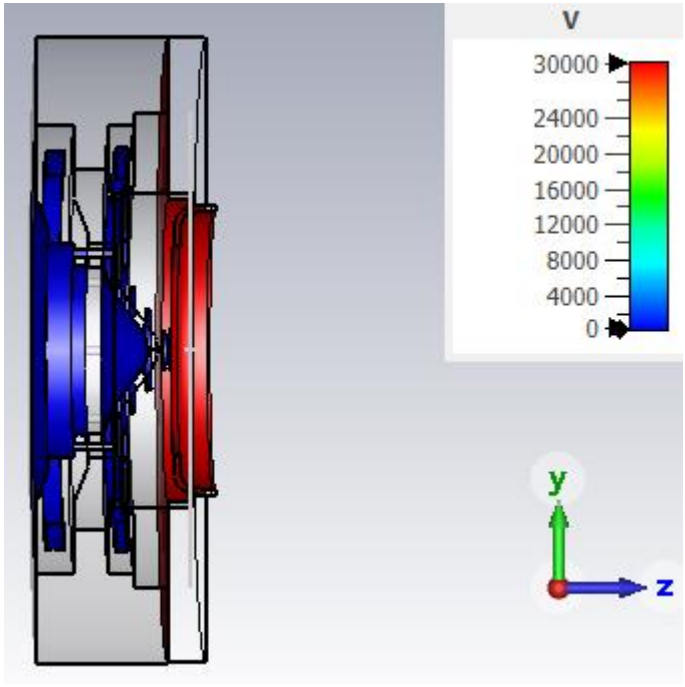




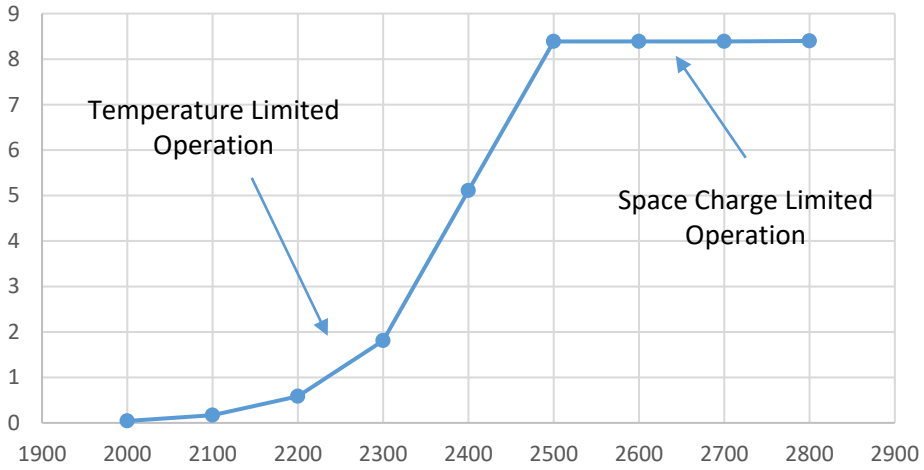


Numerical Studies of TE^2-Gun

Thermionic Model



Cathode Operation Range



E-Gun Parameter:

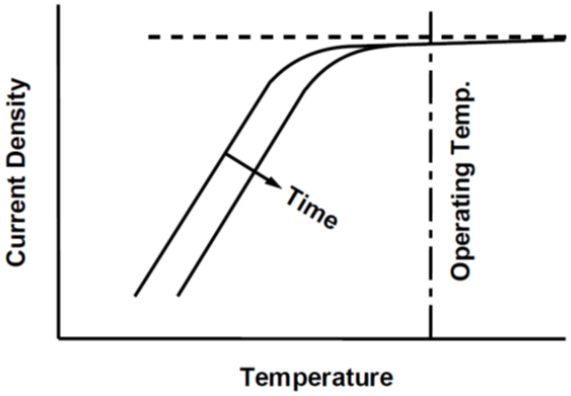
U_a=30 kV T=2000 -2800 K

U_c=0 kV tungsten

U_g=0 kV

B_z=0.6 T

Operating Temperature



benchmark of simulations

has to be determined experimentally

Schedule

Task	Status	Schedule
Assembling of HV-terminal	under construction	Q1 - Q2 2021
Construction of test stand	under construction	Q1 - Q2 2021
Installation of e-gun solenoid and integration of TE^2	Solenoid delivered by GSI/FAIR TE^2 parts are being manufactured Experimental carrier under construction support solenoid is being designed, material already delivered	Q2 2021
Extraction of low intensity electron beams	control system under development Numerical beam dynamics studies started	Q2 – Q3 2021
Extraction of high intensity electron beams with modulation	Beam dump delivered by Goethe-University	Q3 - Q4 2021