

# History of annular coupled RF-Gun development

Mitsuhiro Yoshida

KEK 50<sup>th</sup> anniversary

Disk and washer RF-Gun for Tokyo university of science  
=> with curvature for SuperKEB test stand

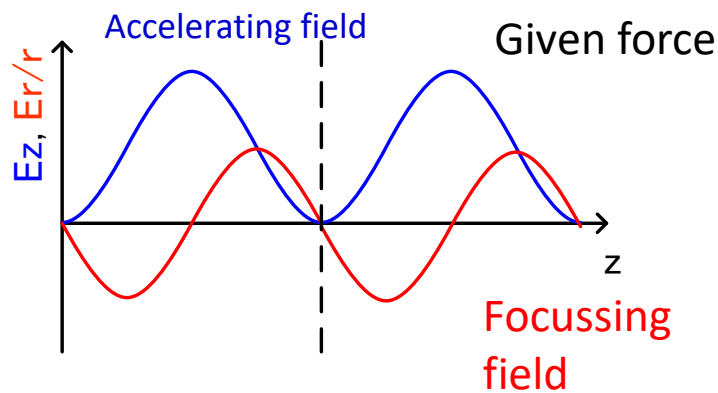
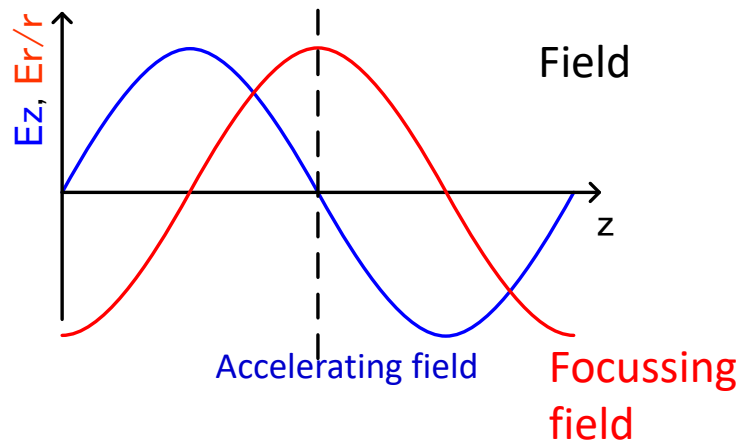
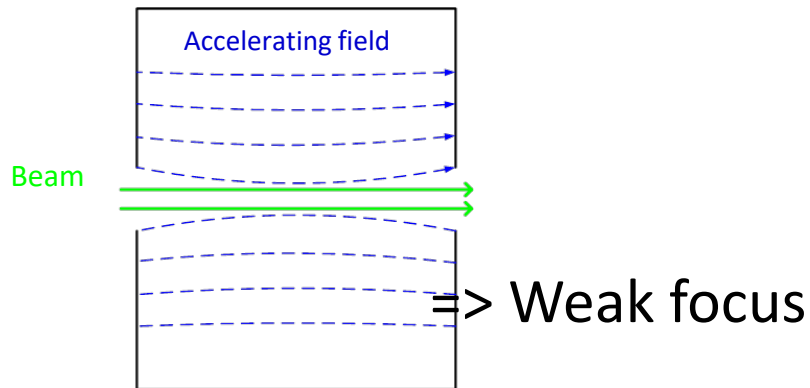


Quasi travelling wave side couple structure RF-Gun

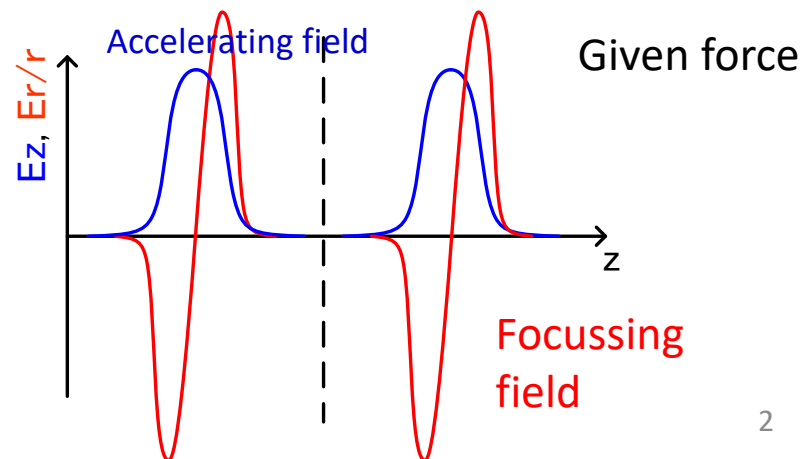
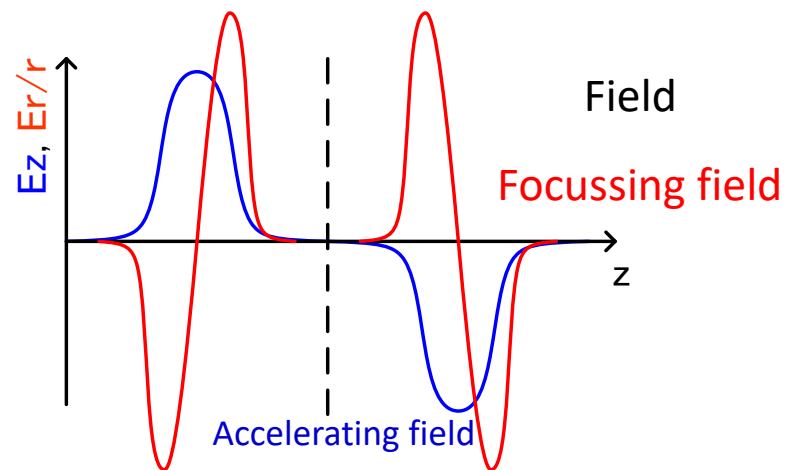
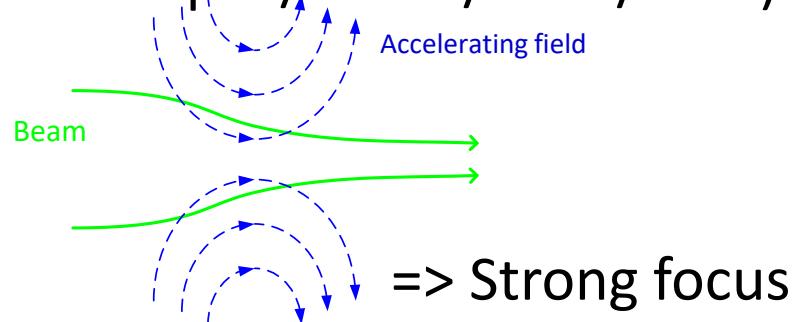


Travelling wave cut disk structure RF-Gun  
with double choke cathode cell

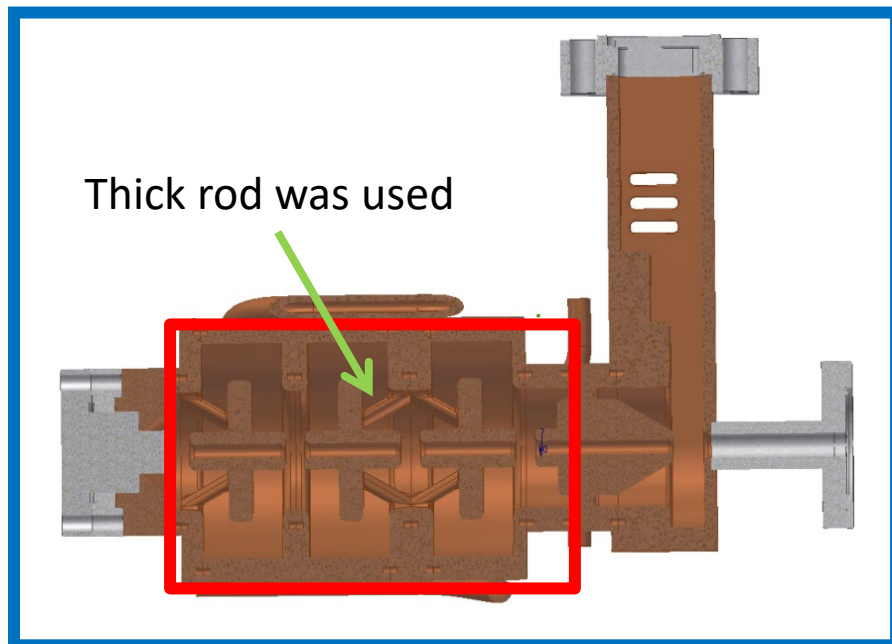
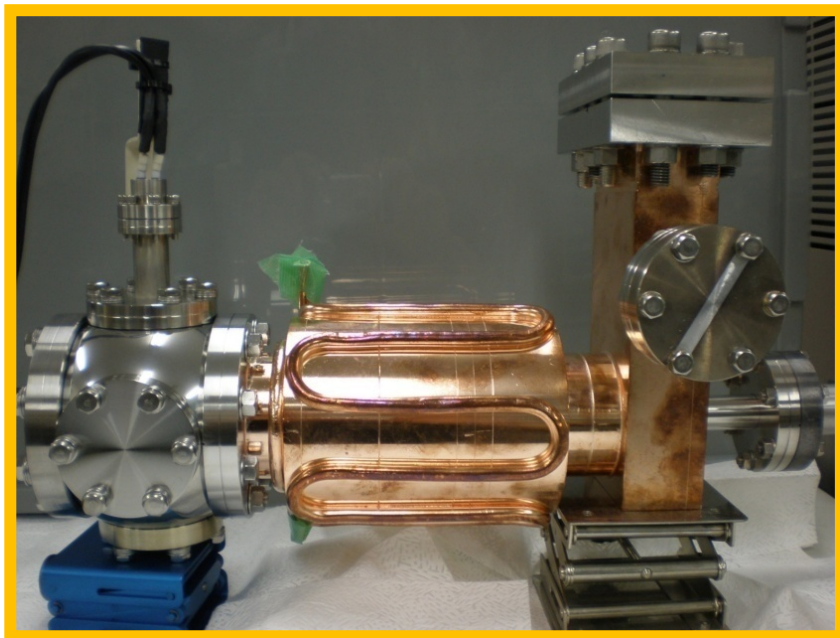
# Pill-box cavity



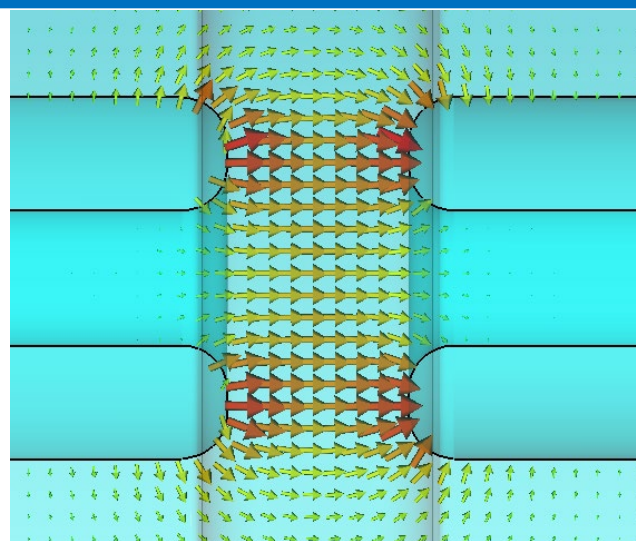
# Annular coupled cavity with nose (Side couple / DAW / ACS / CDS)



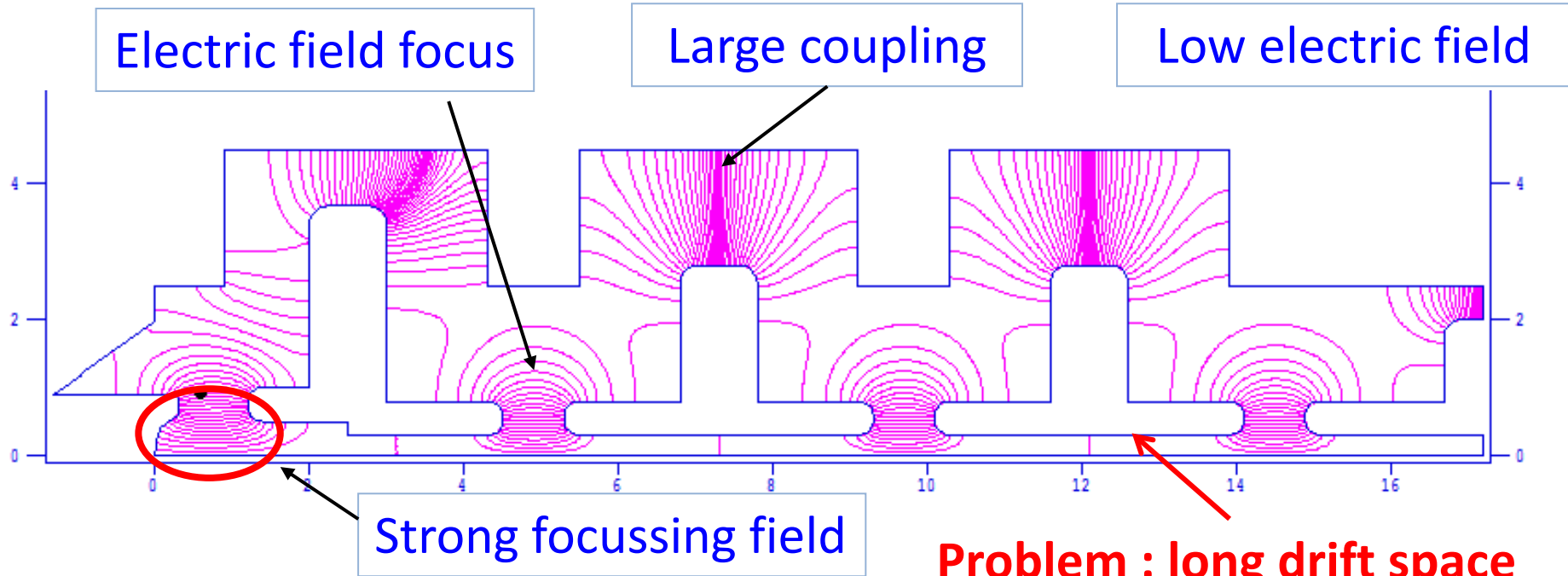
# First annular coupled RF-GUN : Disk And Washer(DAW) for IR-FEL at Tokyo University of Science



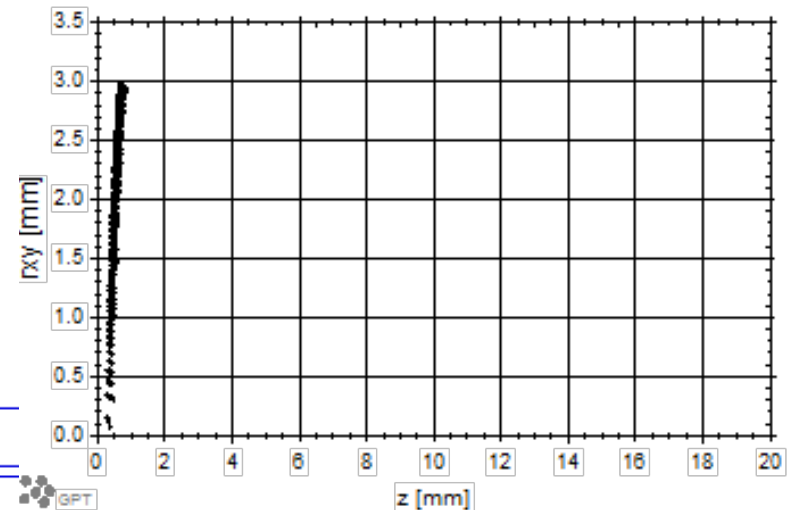
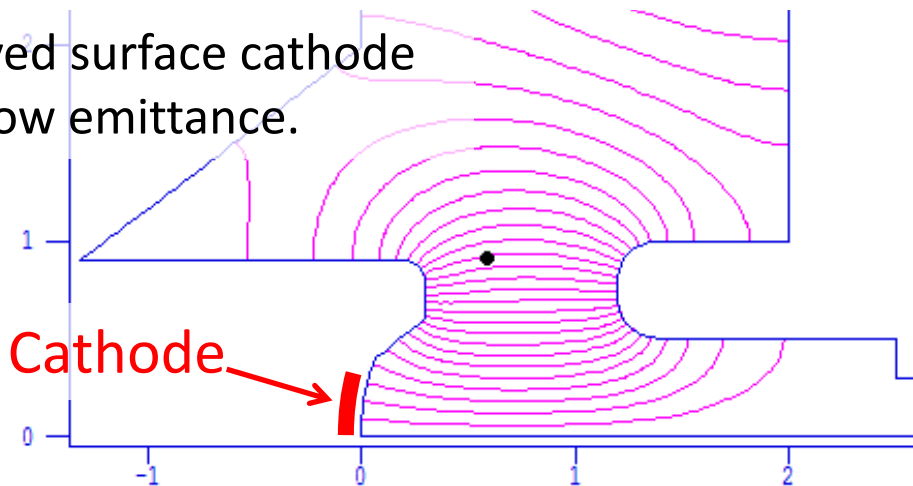
Input RF	: 2[MW]
Beam energy	: 2[MeV]
On-axis maximum electric field	: 57.6[MV/m]



# DAW (Disk and Washer) RF-Gun with Cathode curvature for SuperKEKB test stand (3-2)

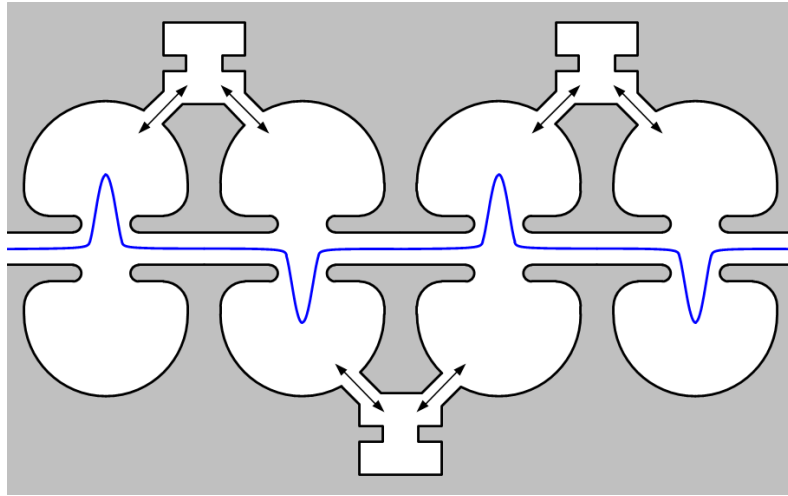


Curved surface cathode for low emittance.

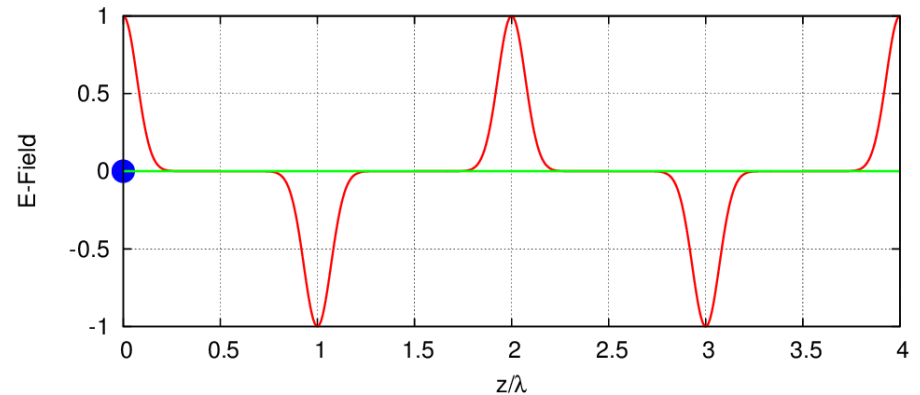
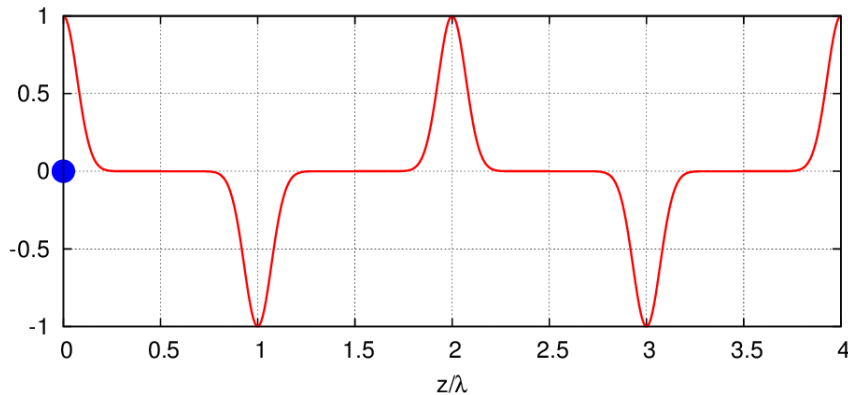
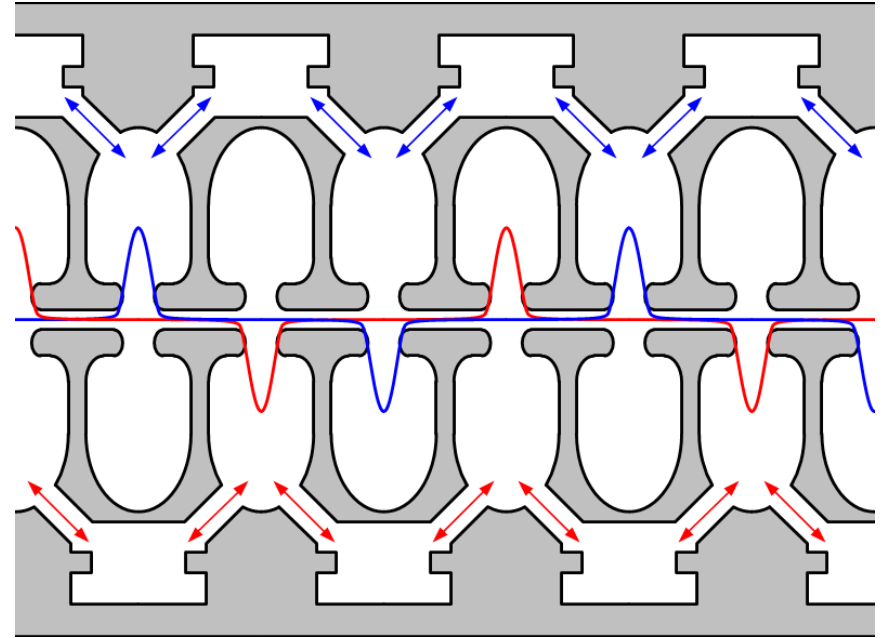


# Design of a quasi traveling wave side couple RF gun

Normal side couple structure

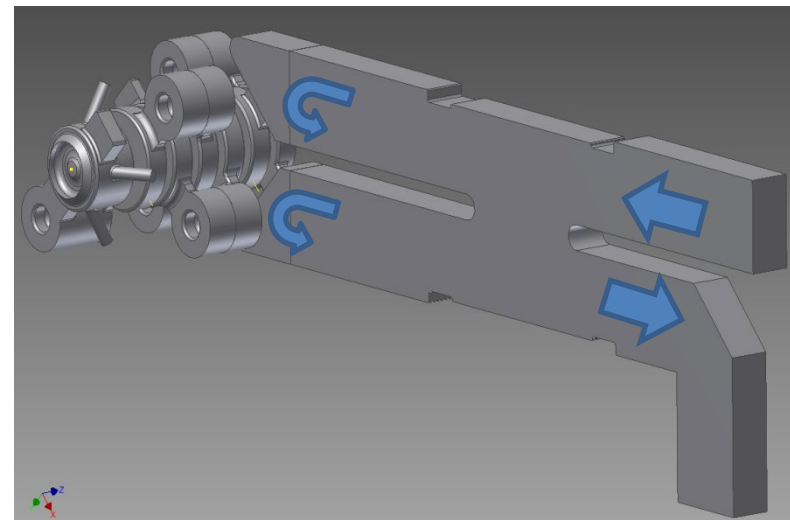
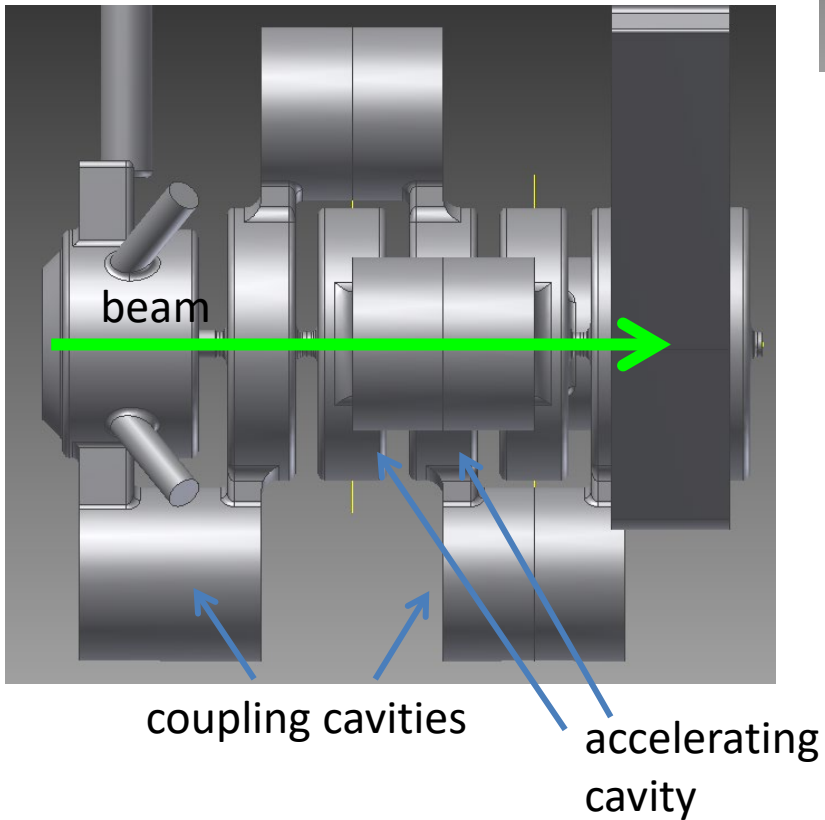
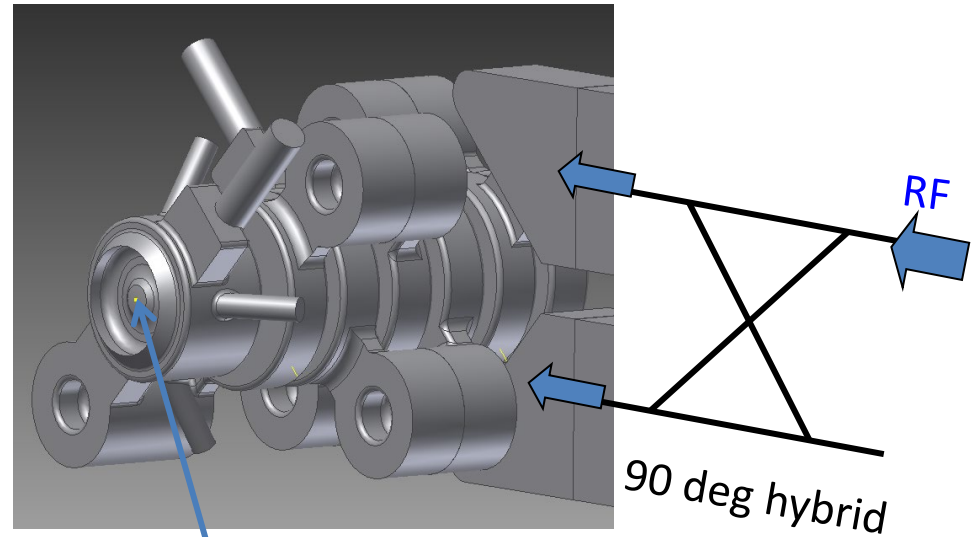
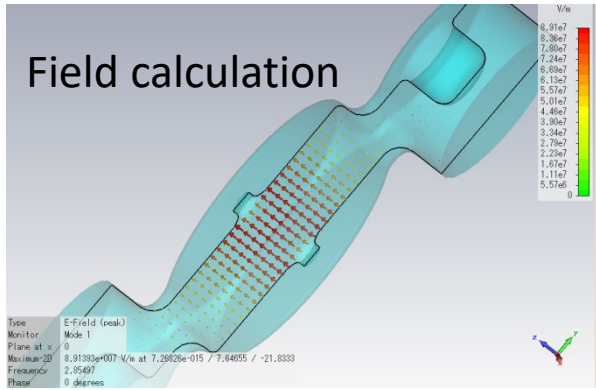


Quasi traveling wave sidecouple structure



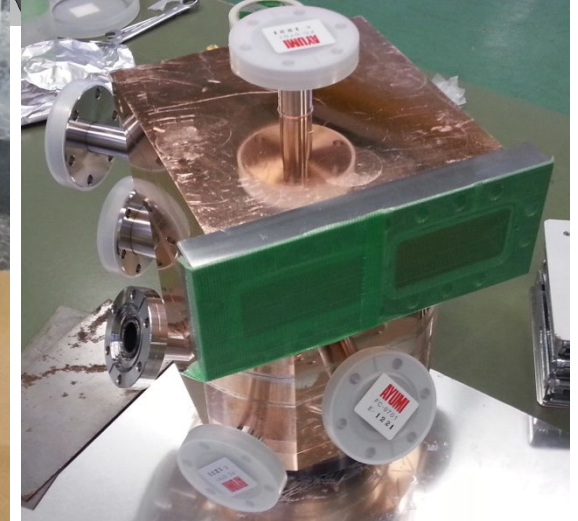
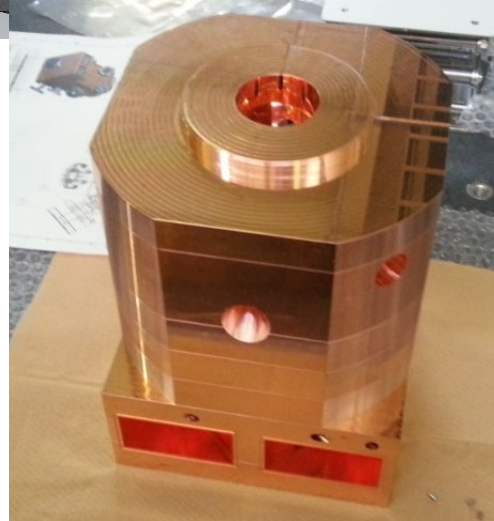
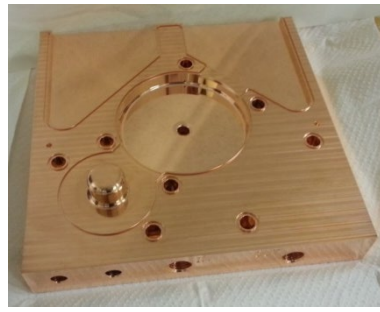
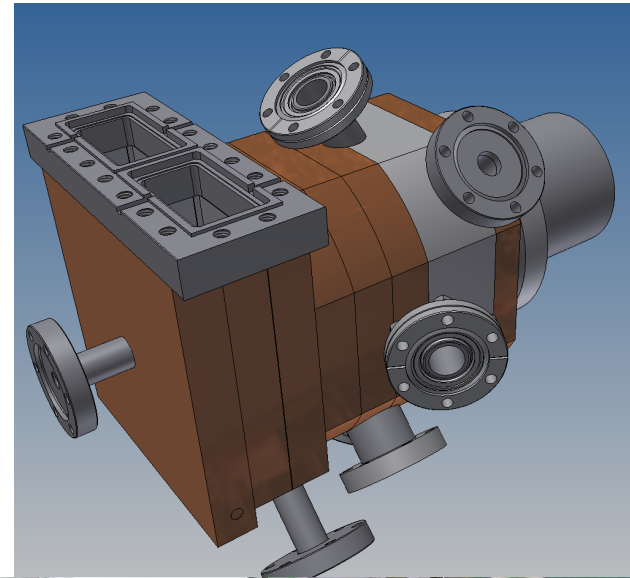
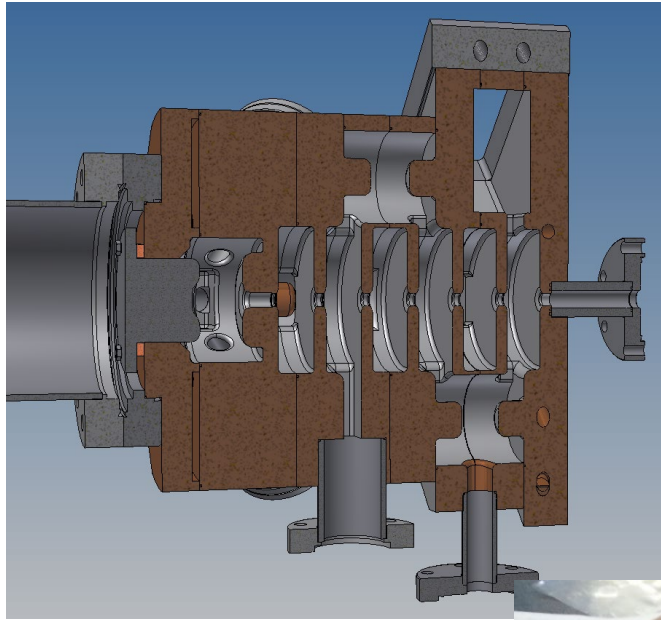
Quasi traveling wave side couple has stronger focusing and accelerated gradient than DAW.

# Cavity design





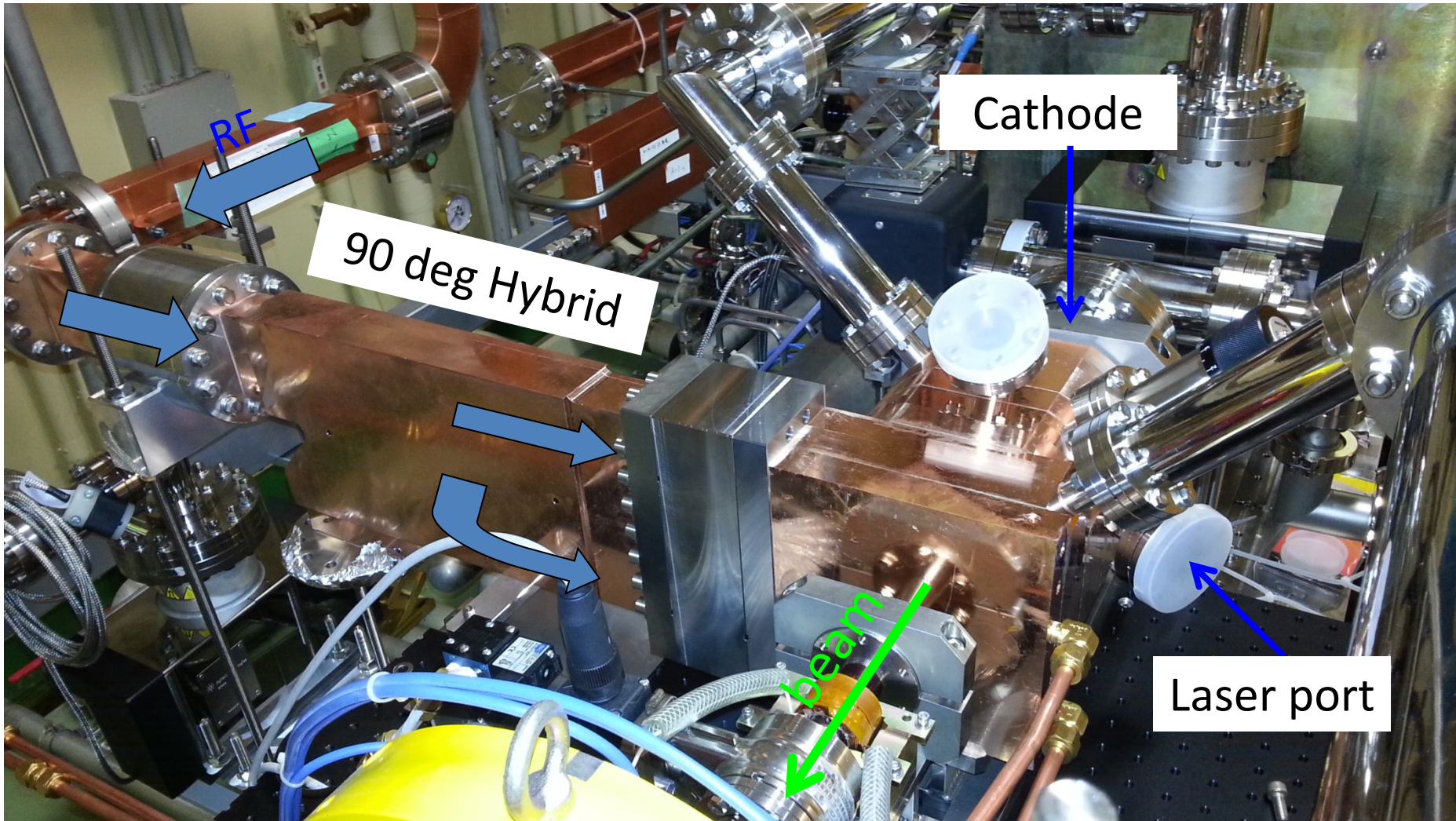
# QTW side couple RF-Gun



- 10 MeV @ 20 MW is designed value **but lower power due to long pulse.**
- **Incompatible with SLED.**
- **Cathode QE depression by cathode vacuum level.**



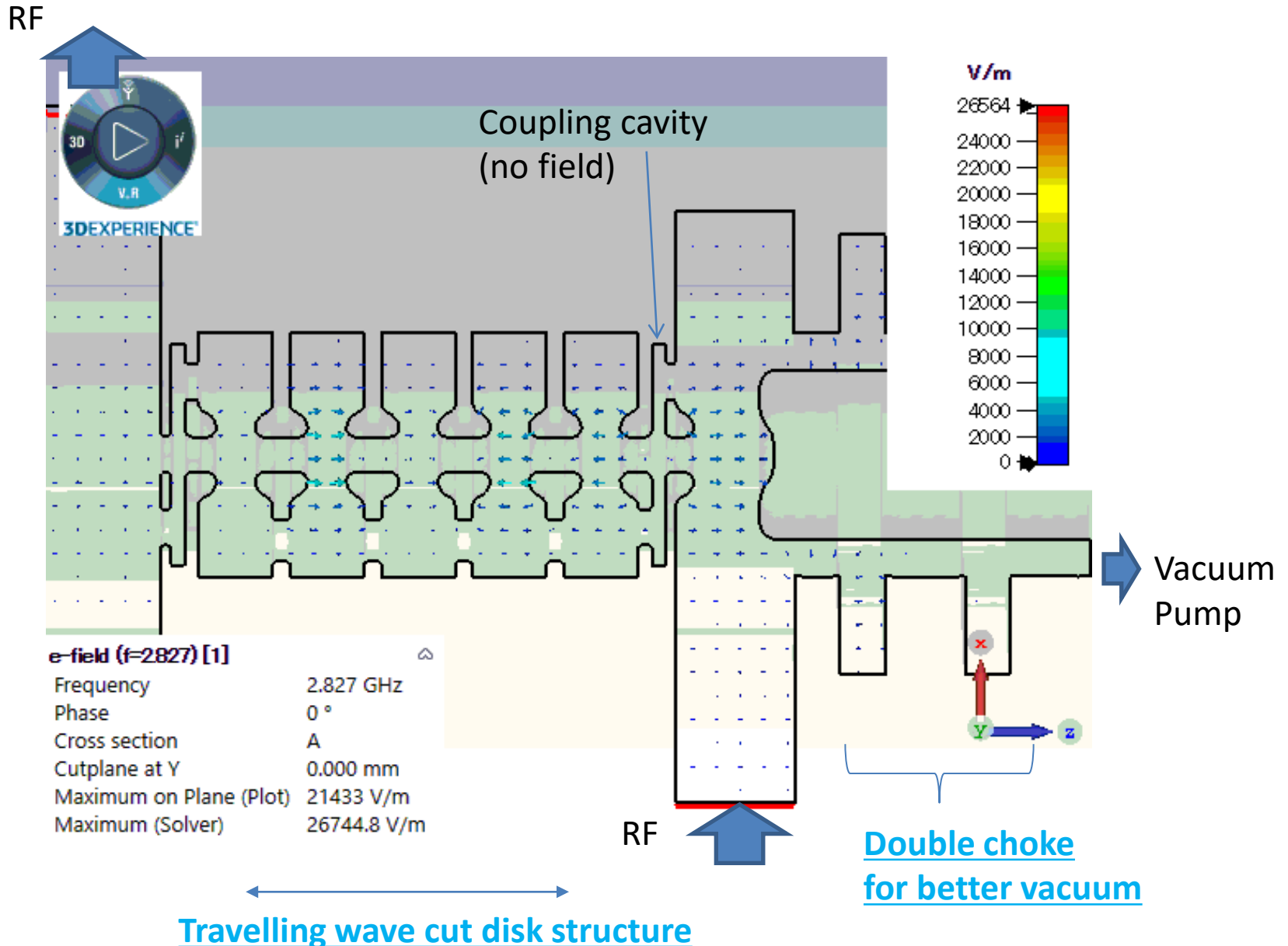
# Installed QTW RF gun



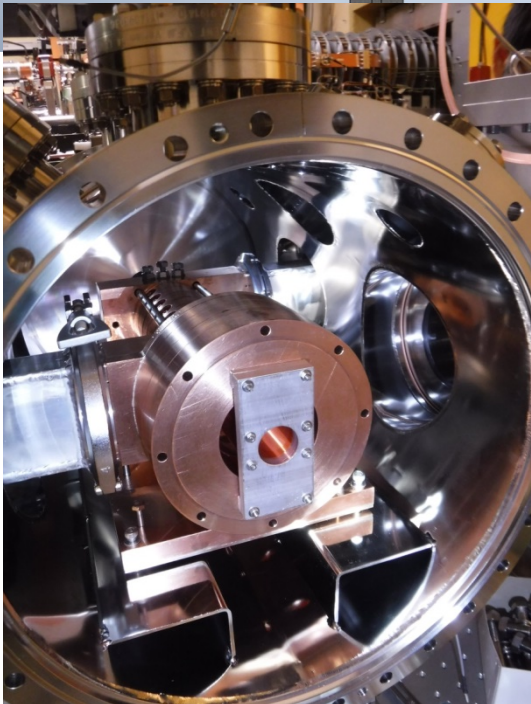
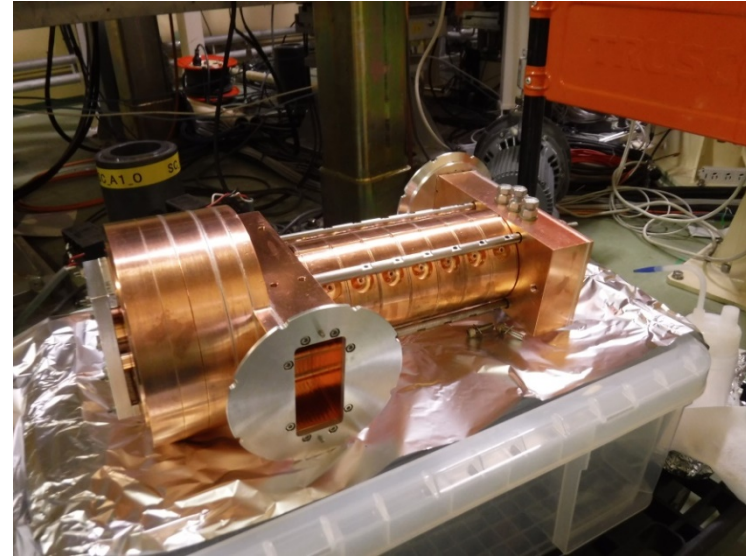
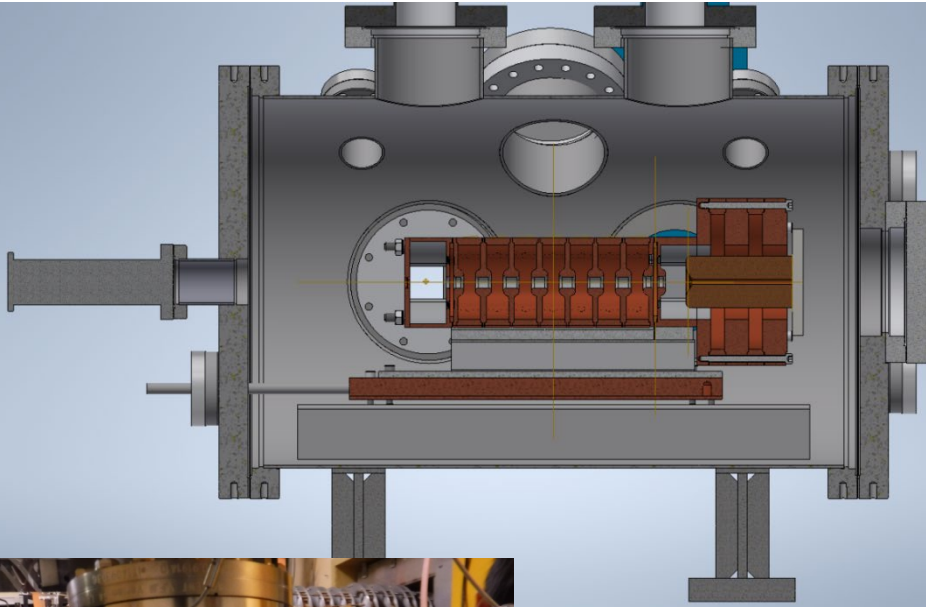
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# Traveling wave cut disk structure RF-Gun with double choke cathode cell



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- In-vacuum RF-Gun with three Ion pumps with double choke cathode cell.
- Extra fine tuning for short travelling cut disk structure