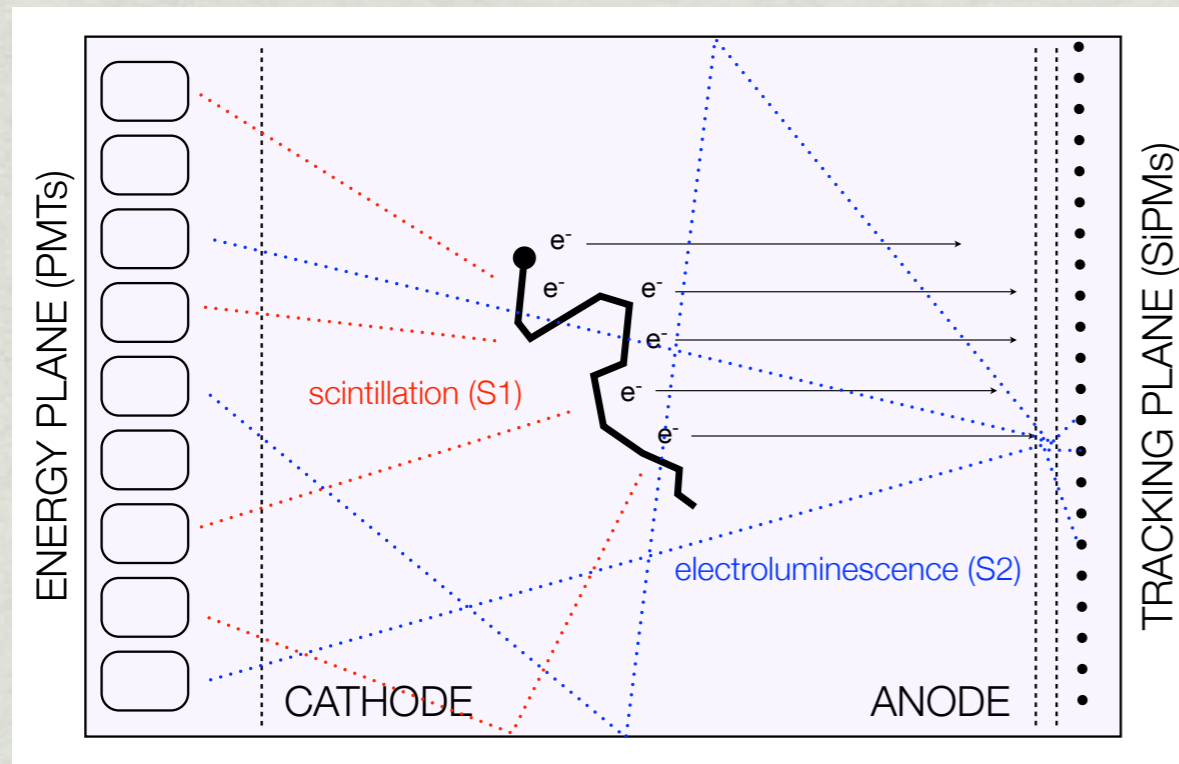




# HHV Feedthroughs in NEXT

F. Monrabal

# NEXT-Concept



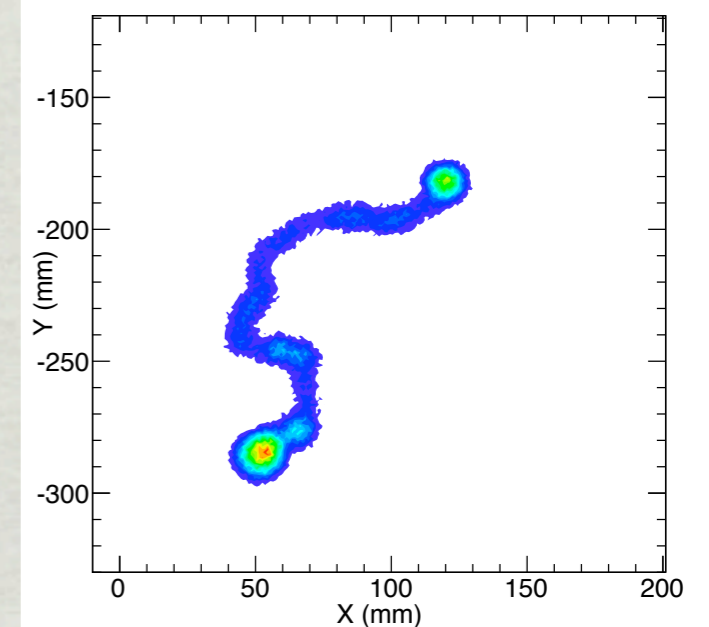
- Operates with GXe
- electron excites and ionizes Xe
- excited Xe emit scintillation light (S1)
- electrons from ionization drift
- electrons in the electroluminescence (EL) mesh excite Xe and produce photons (S2)

## ■ NEXT OBJECTIVES:

- RADIOPURE  $5 \cdot 10^{-4}$  COUNTS / (KEV KG Y)
- ENERGY RESOLUTION  $< 1\%$  (FWHM @  $Q_{BB}$ )
- TOPOLOGY: IDENTIFY ELECTRON END-POINT (BLOB)

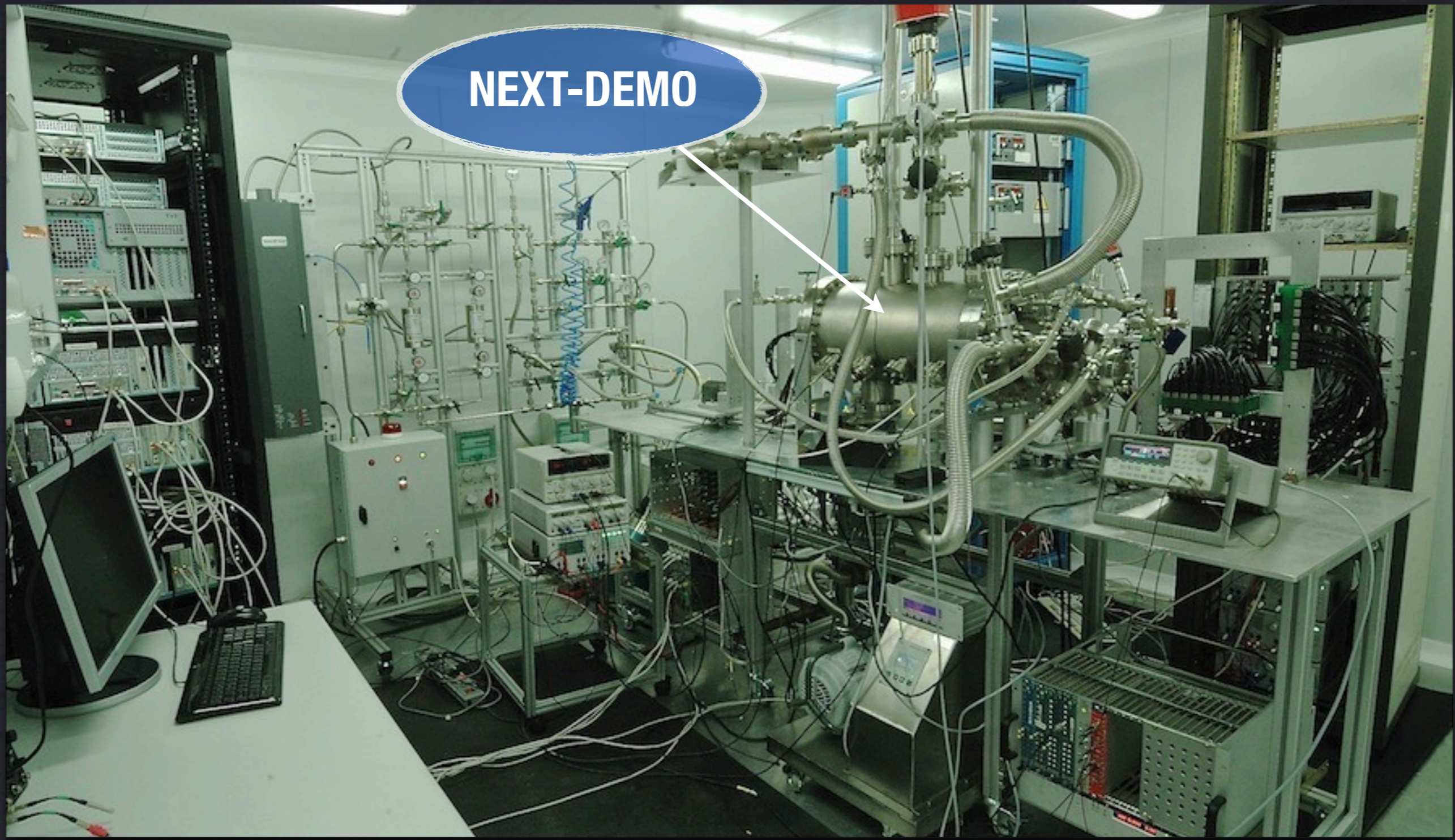
1 B (BKG) 2 B (SIGNAL)

**IDEALIZATION OF  $BB_{0N}$  EVENT:**  
 2 ELECTRONS THAT FORM A TRACK WITH TWO 'BLOBS' (LARGE ENERGY DEPOSITION) AT THE END-POINTS





**NEXT-DEMO**

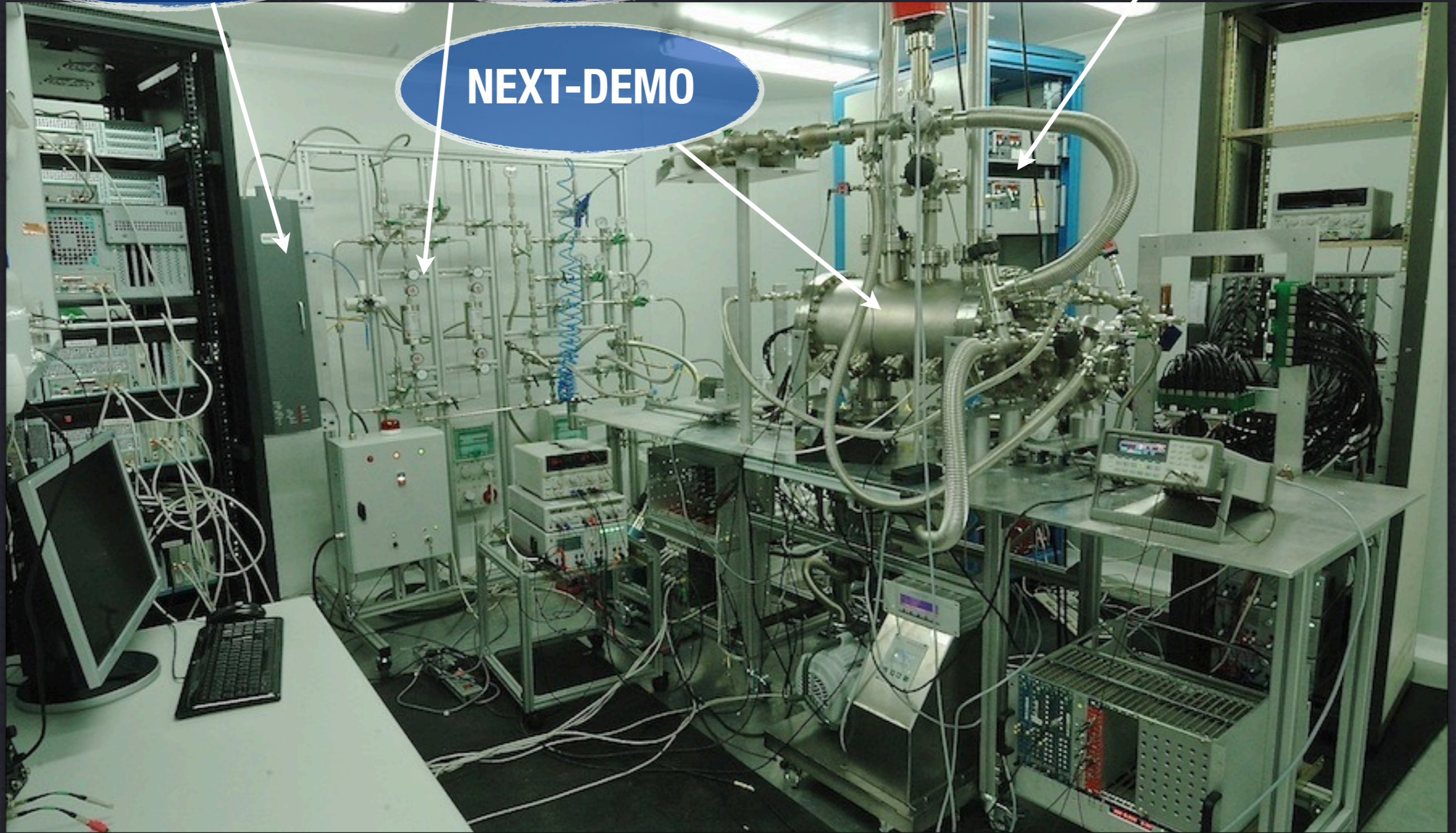


**HOT GETTER**

**GAS SYSTEM**

**HHV MODULES**

**NEXT-DEMO**



**HOT GETTER**

**GAS SYSTEM**

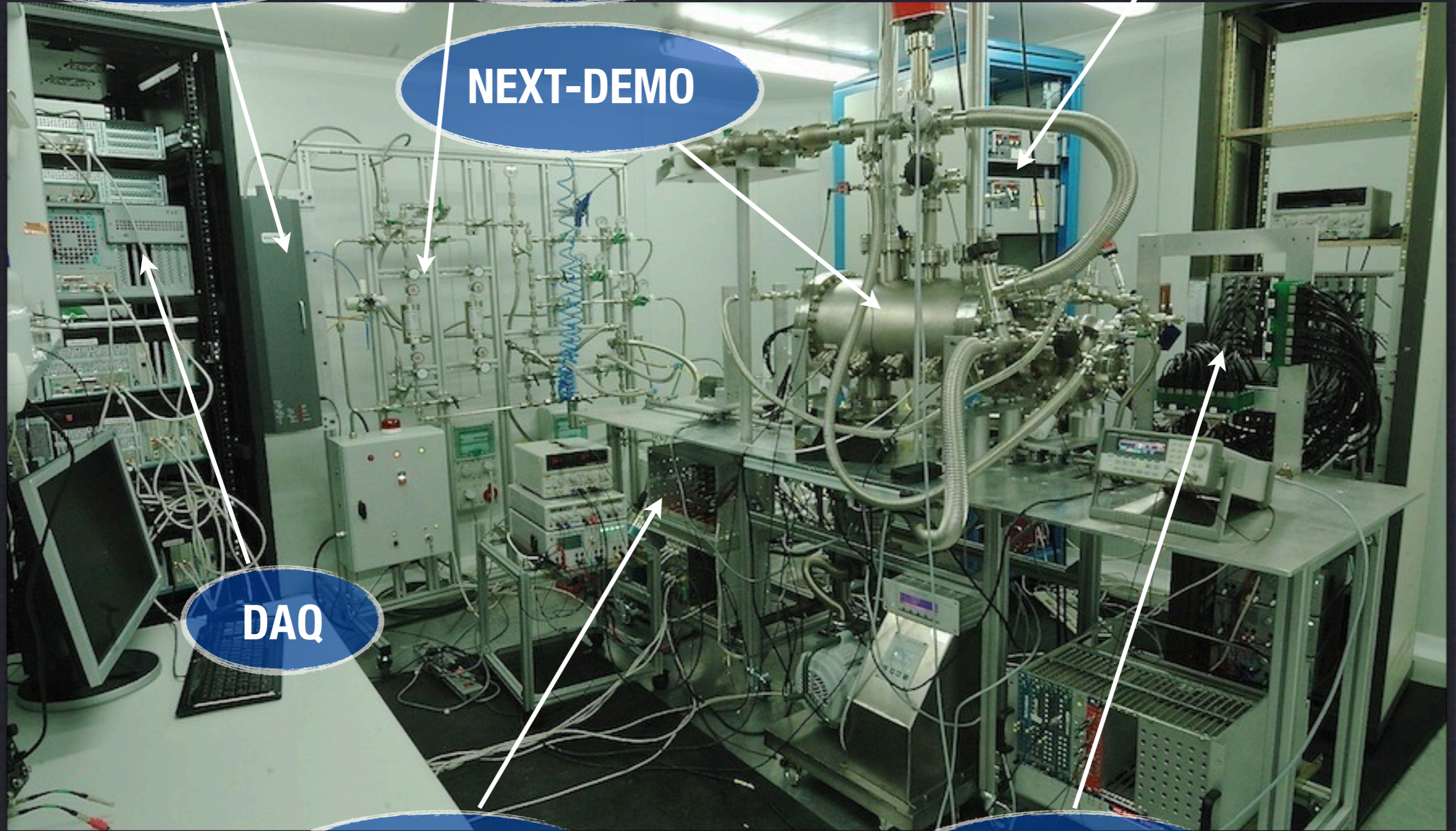
**HHV MODULES**

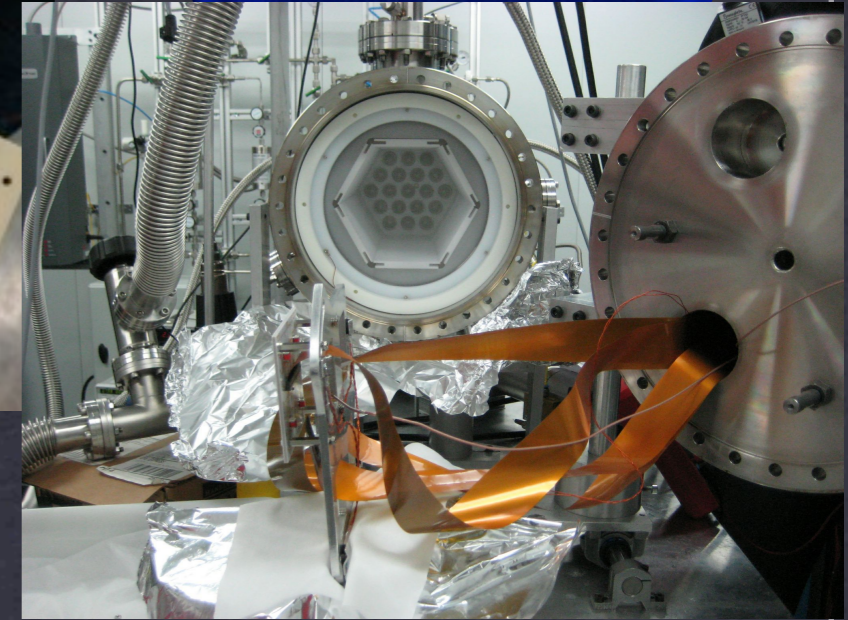
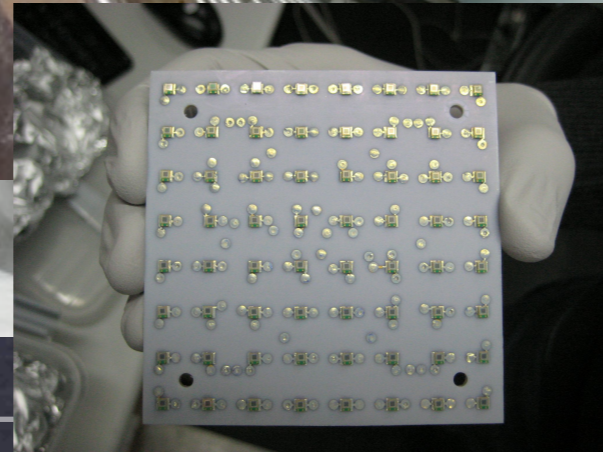
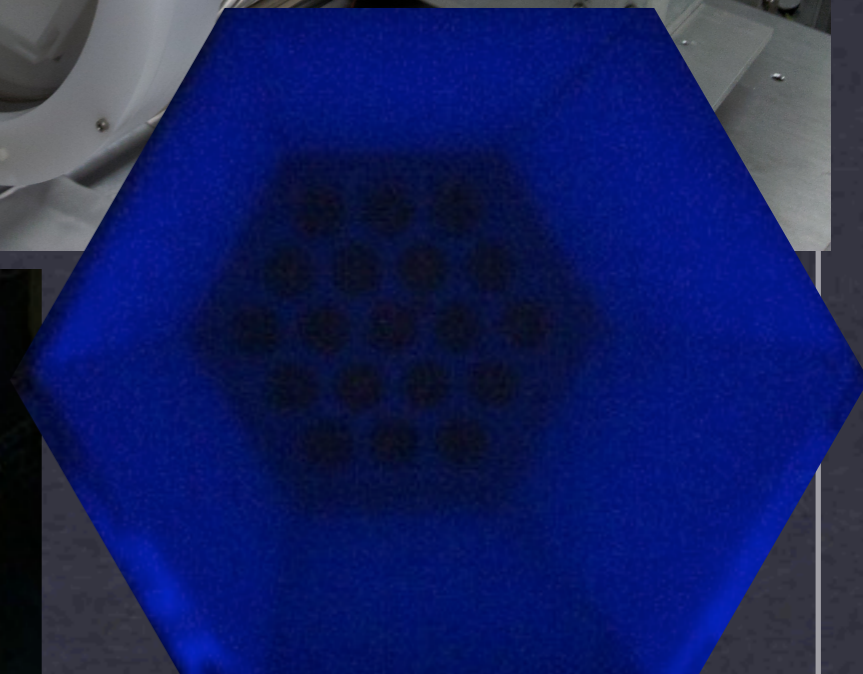
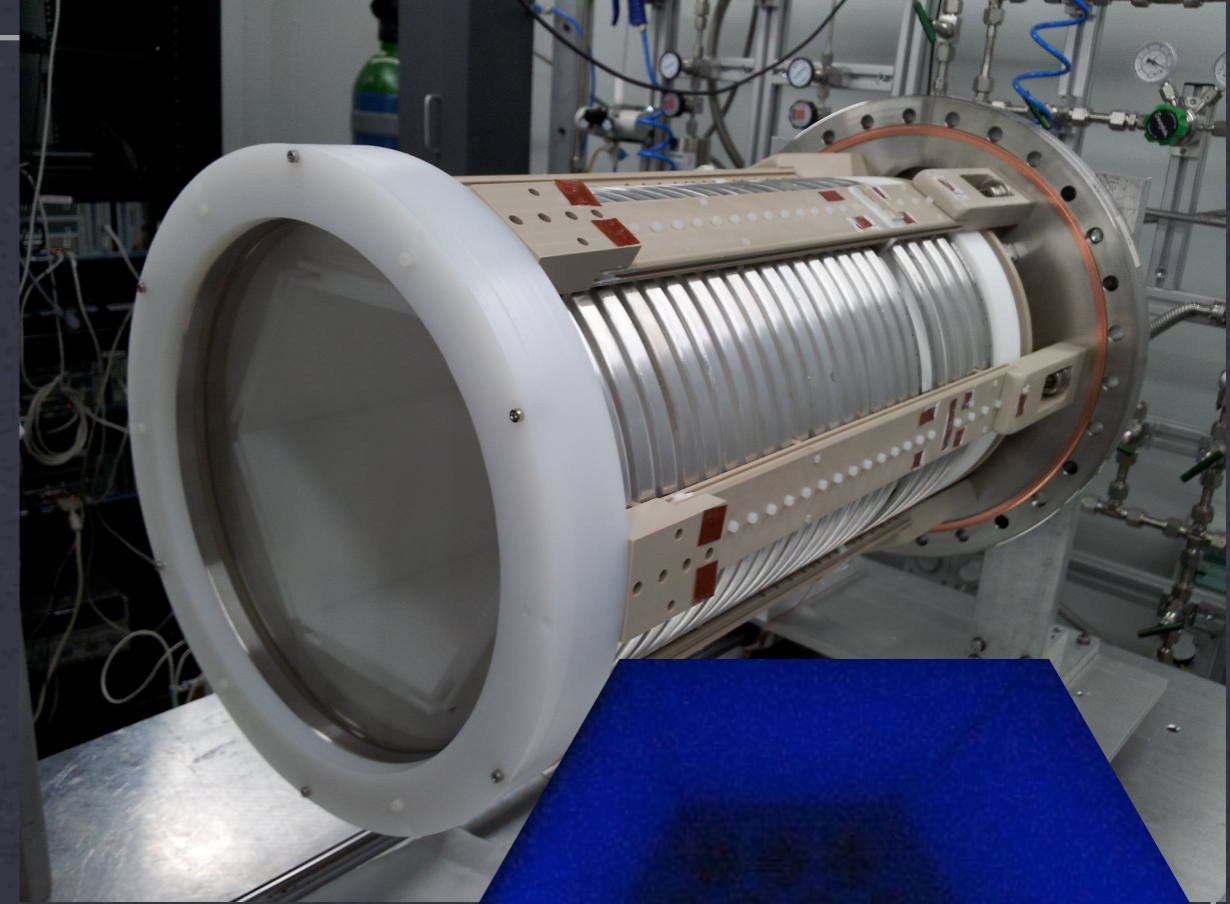
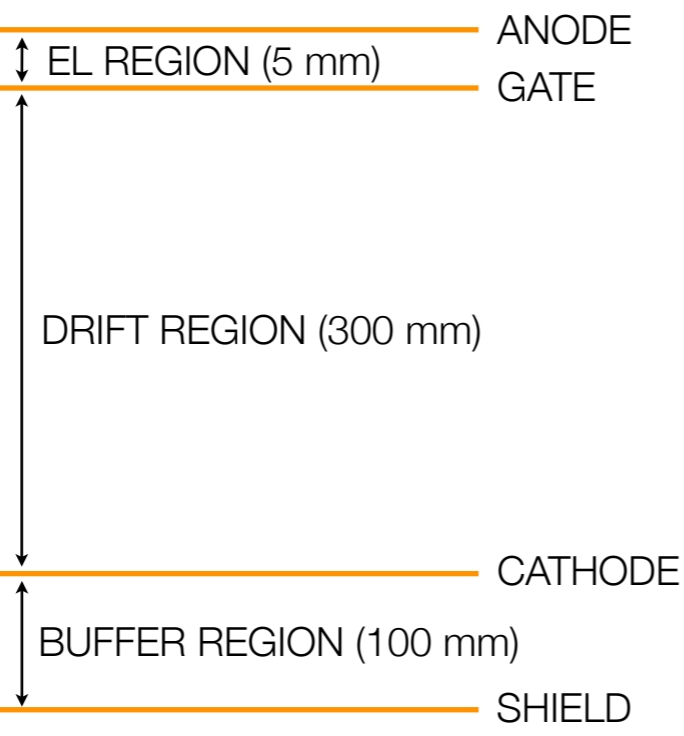
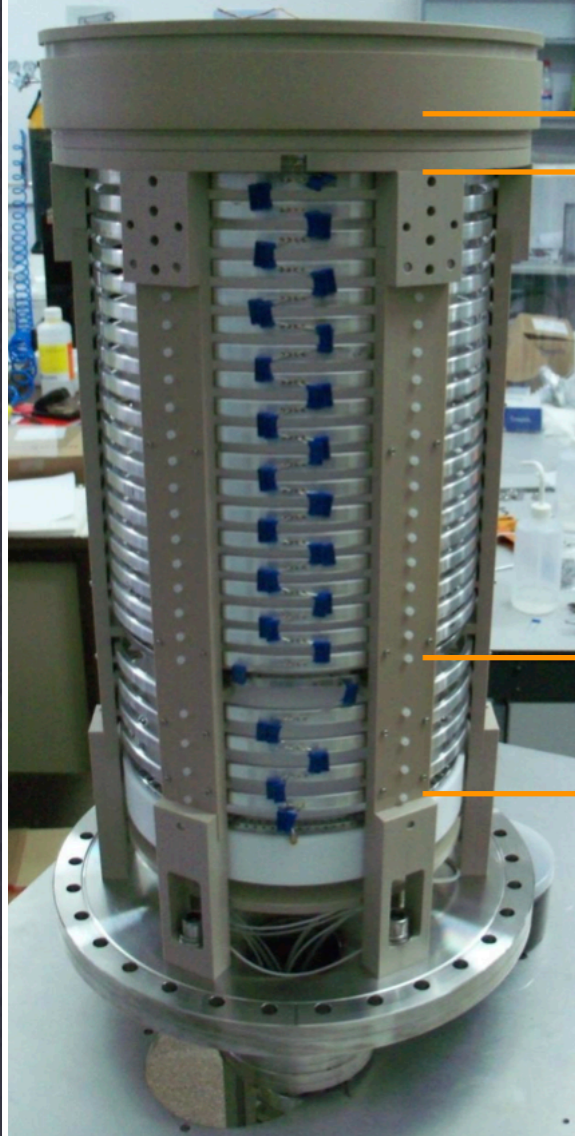
**NEXT-DEMO**

**DAQ**

**PMTS FEE**

**SIPMS FEE**



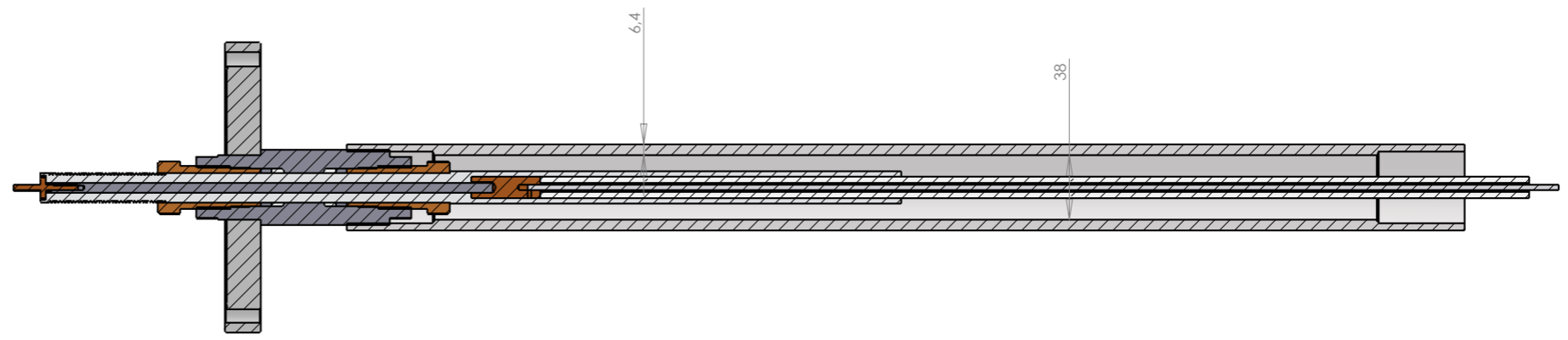
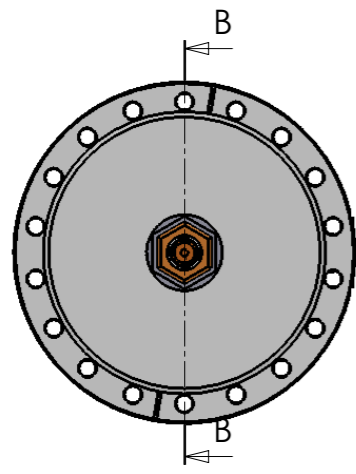


# NEXT-DEMO HHV requirements

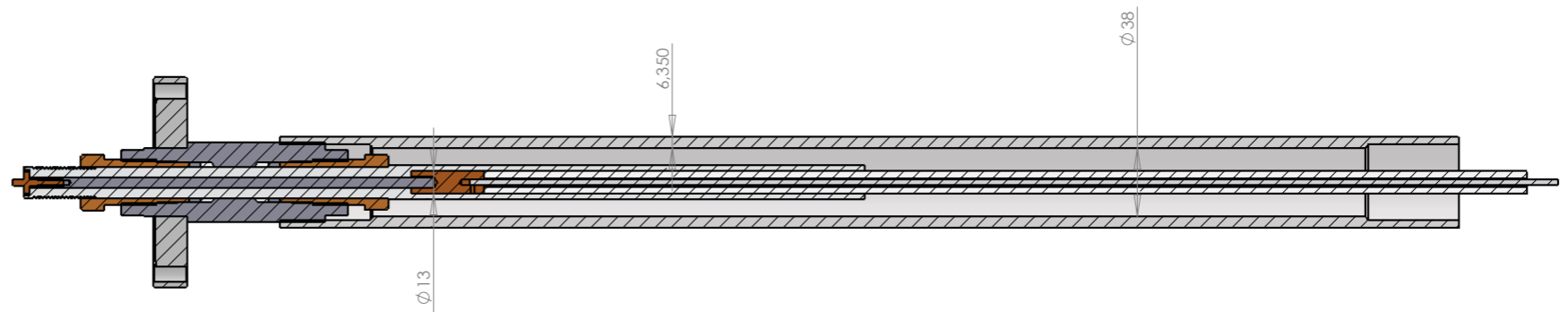
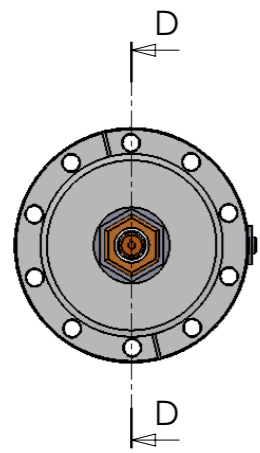
- @ Gate Voltage: 20kV. Electric Field = 40kV/cm
- @ Drift Field: [300-1000] V/cm
  - @ Voltage difference Gate-Cathode = 30kV
- @ Cathode Voltage: 20kV+ 30kV = 50kV
- @ Normal operation: 12kV+15kV = 27kV



9	10	11	12
Revision	Description	Date	Approved
0	Se lanza el plano		




SECCIÓN B-B  
ESCALA 1 : 2

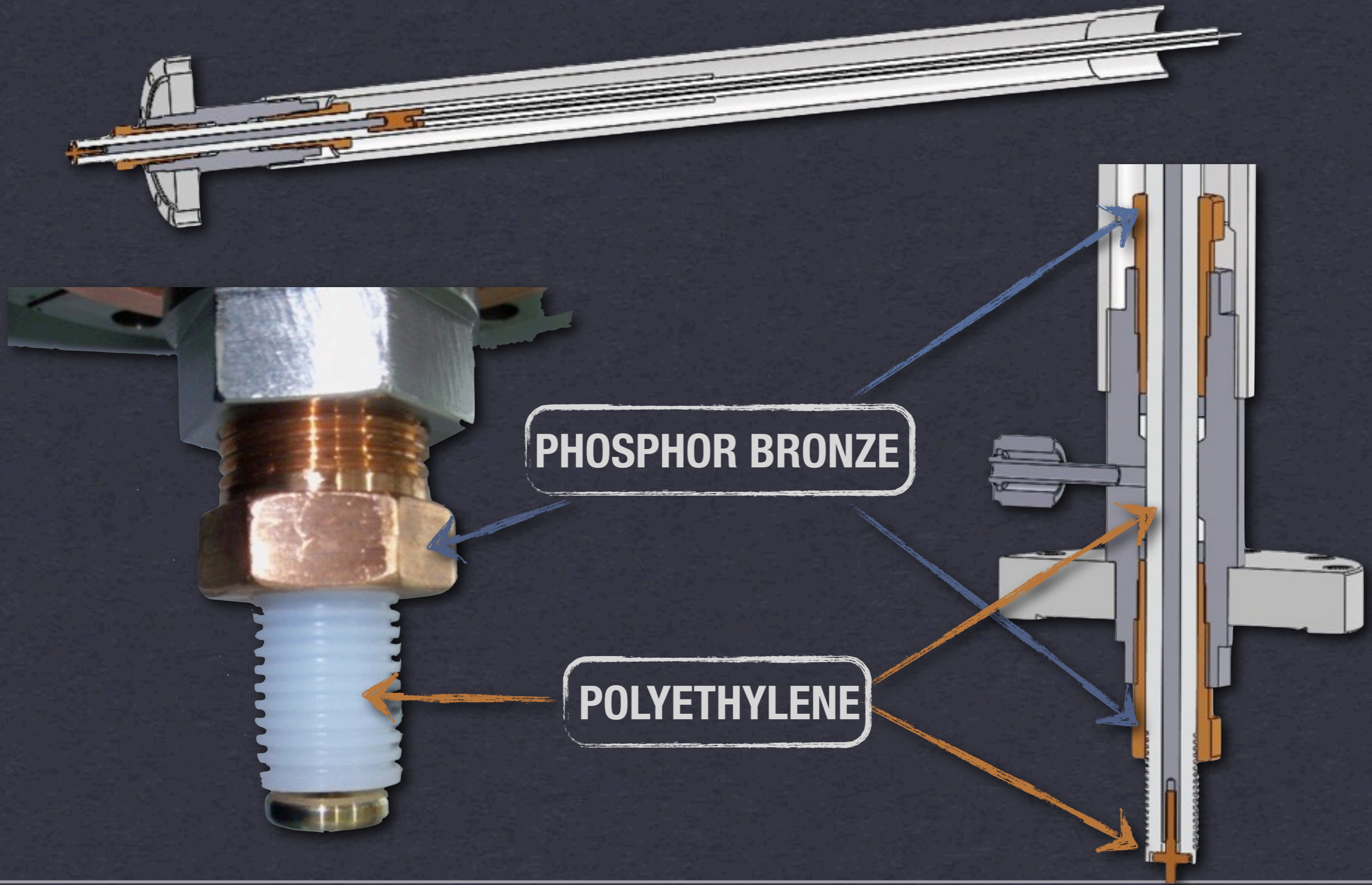


SECCIÓN D-D  
ESCALA 1 : 2

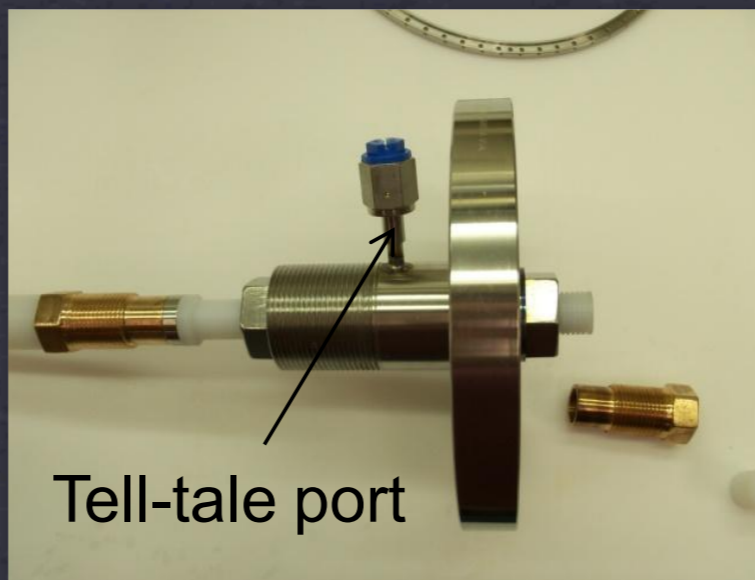
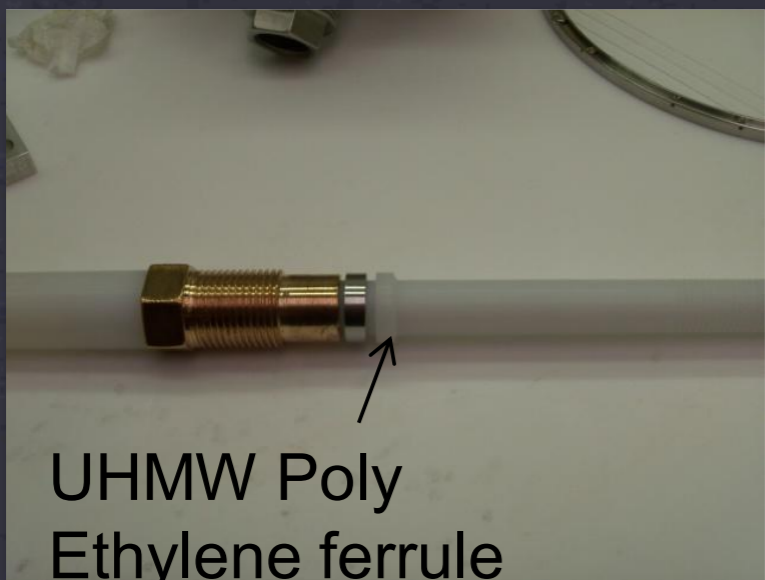
TOLERANCIAS GENERALES: + 0.1 (NO ACUMULABLES)  
NO TOMAR MEDIDAS DIRECTAMENTE DEL DIBUJO  
DIMENSIONES EN MILIMETROS

NEXT01		MATERIAL		PROCESSING/FINISH		WEIGHT	
PROYECT	NORM	MATERIAL	PROCESSING/FINISH	WEIGHT	SCALE 1:5		
DRAWN slnk	CHECKED sara	APPROVED sara	DATE 16/09/2010		SHEET SHEET 1 OF 1		
 <b>I.F.I.C.</b> INSTITUTO DE FÍSICA CORPUSCULAR		TÍTULO <b>NAME</b>		DWG NO. <b>DRWP0001</b>		EDITION FORMAT A2	

# FEEDTHROUGH DESIGN



# FEEDTHROUGH DESIGN



# FEEDTHROUGH ASSEMBLY

# NEXT-DEMO Spark test

@ C. Sofka @ IFIC





**CATHODE SPARK TEST:**  
@SPARKS WITHOUT THE  
FIELD CAGE.  
@SPARKS STARTED  
@36KV

**NEXT-DEMO SPARK TEST**

C. SOFKA @ IFIC



## GATE SPARK TEST:

@SPARKS WITHOUT THE  
FIELD CAGE OR MESH.

@SPARKS STARTED  
@25KV

# NEXT-DEMO SPARK TEST

C. SOFKA @ IFIC

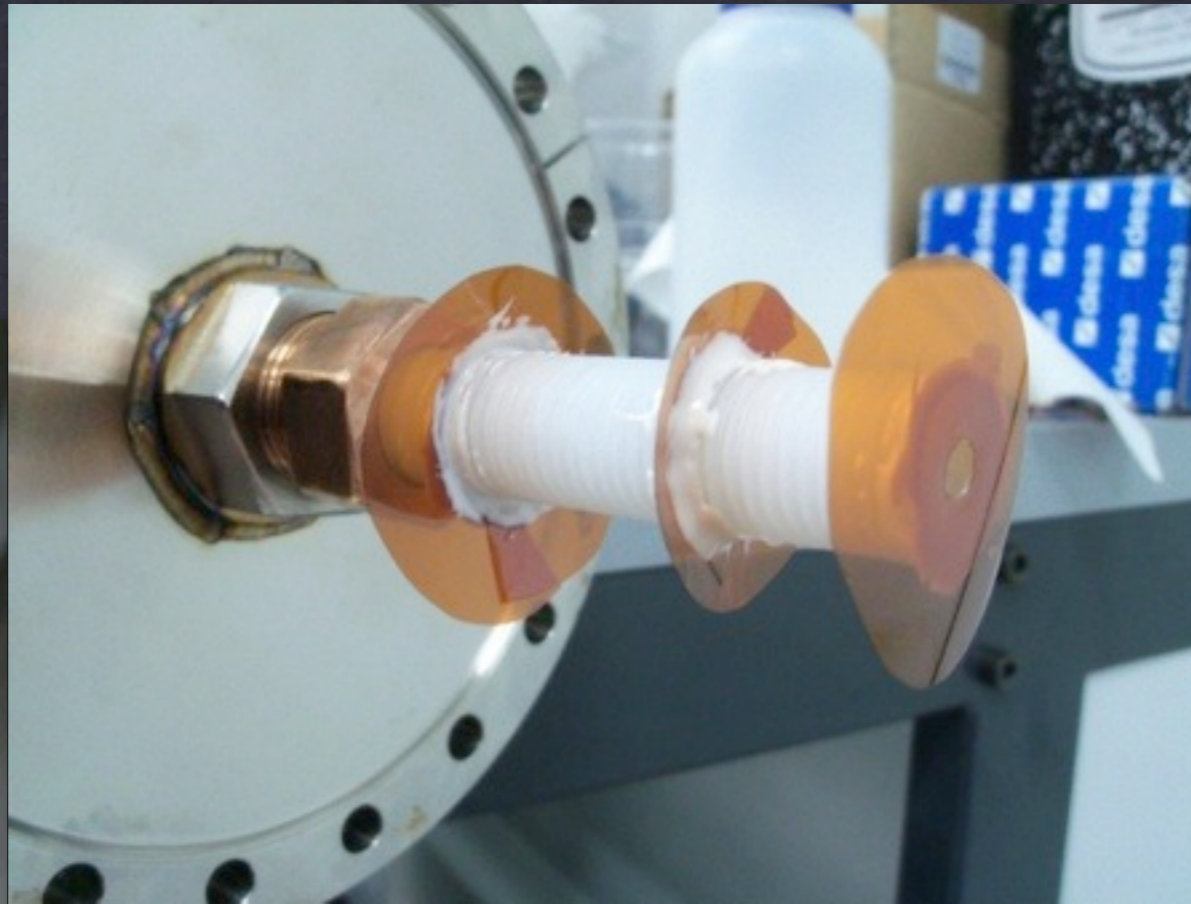
# NEXT-DEMO SPARK

## Test results

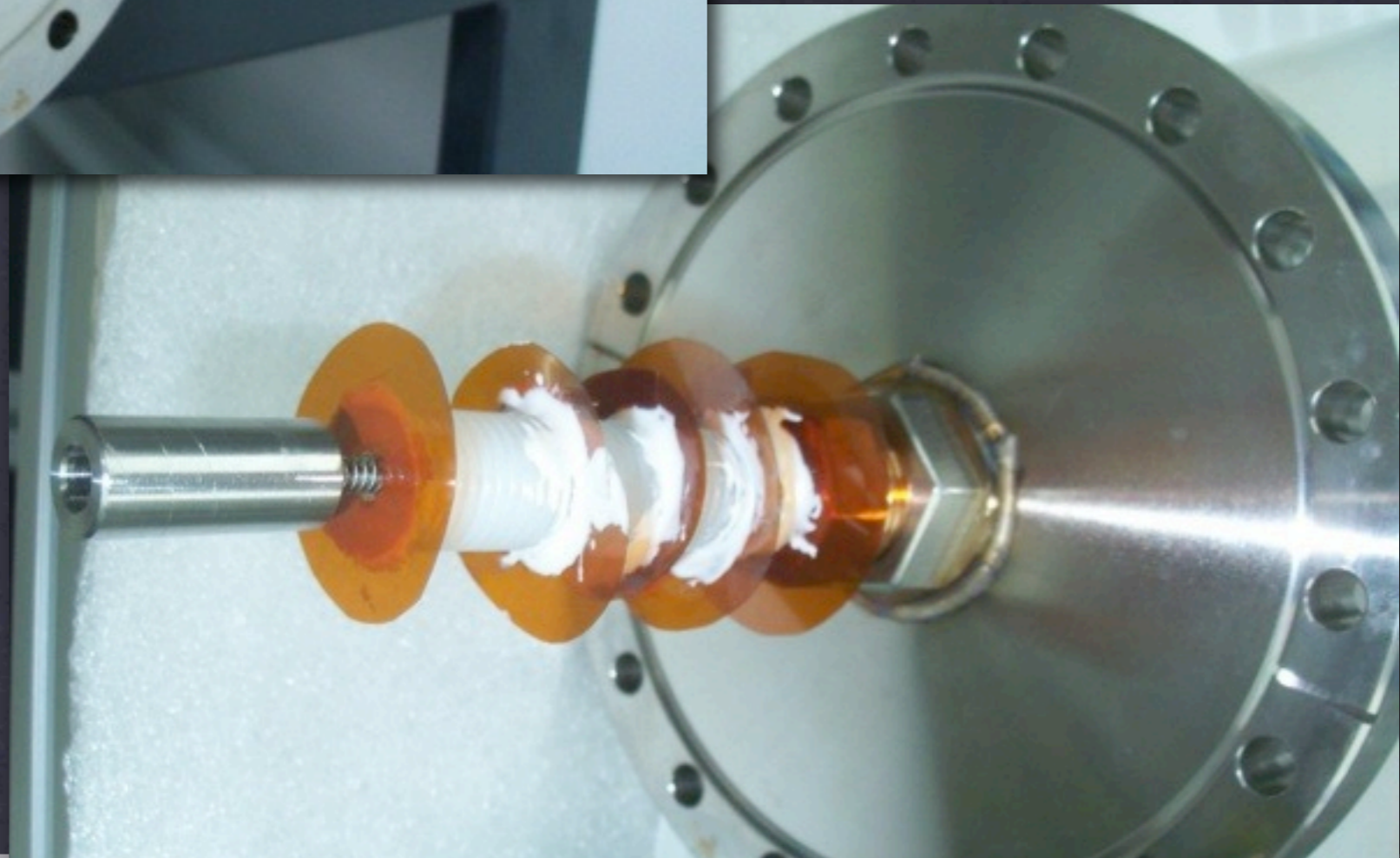
- @ Some carbon tracks in the feedthrough
- @ Gate: 20kV
- @ Cathode Voltage: 45kV



**CARBON TRACKS  
APPEAR IN THE POLY**



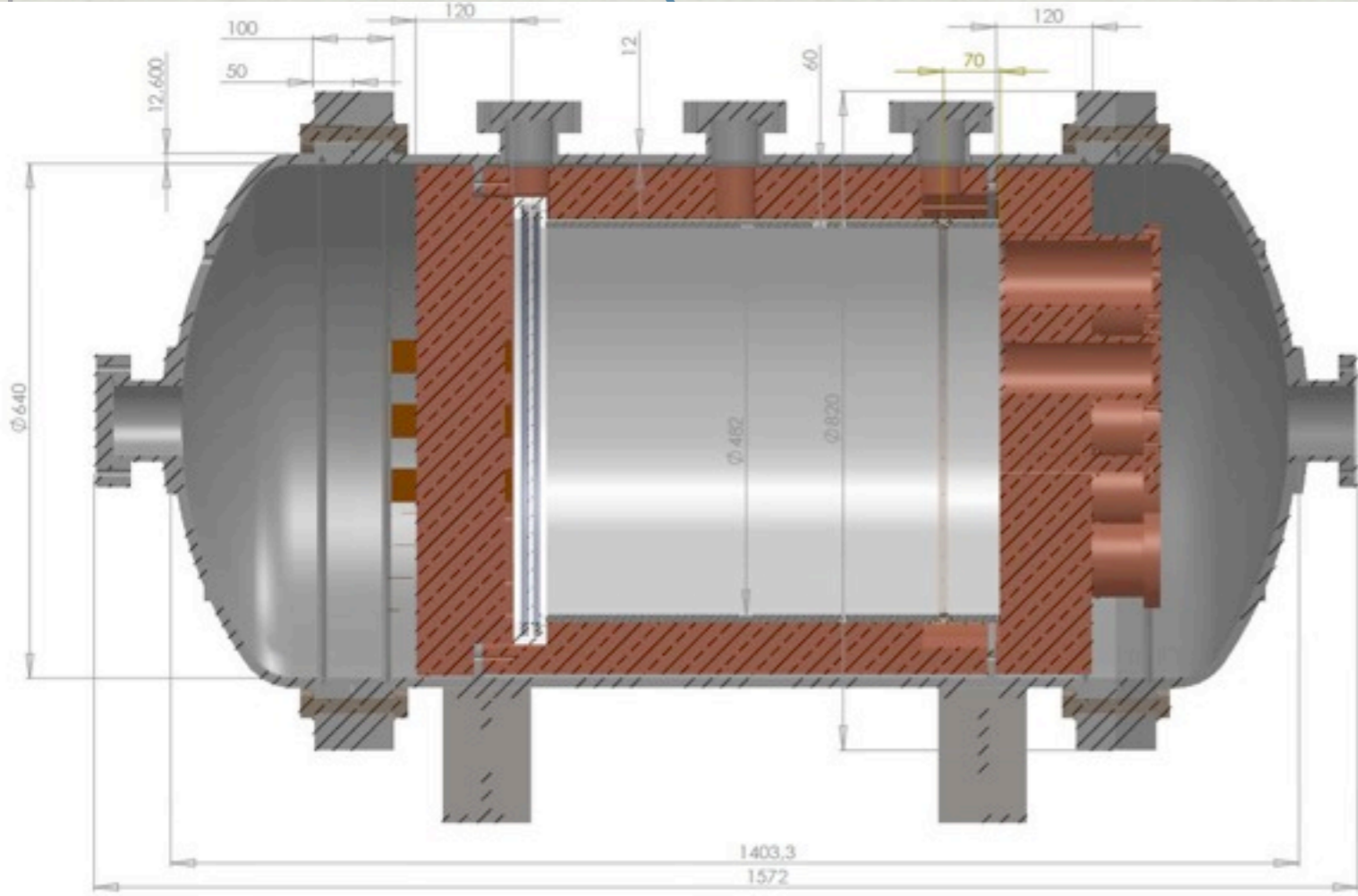
**KAPTON LAYERS  
TO DIFFICULT  
CHARGE MOVING UP**



**NEXT-DEMO SPARK TEST RESULTS**



# NEXT next steps NEW (NEXT-White) Detector

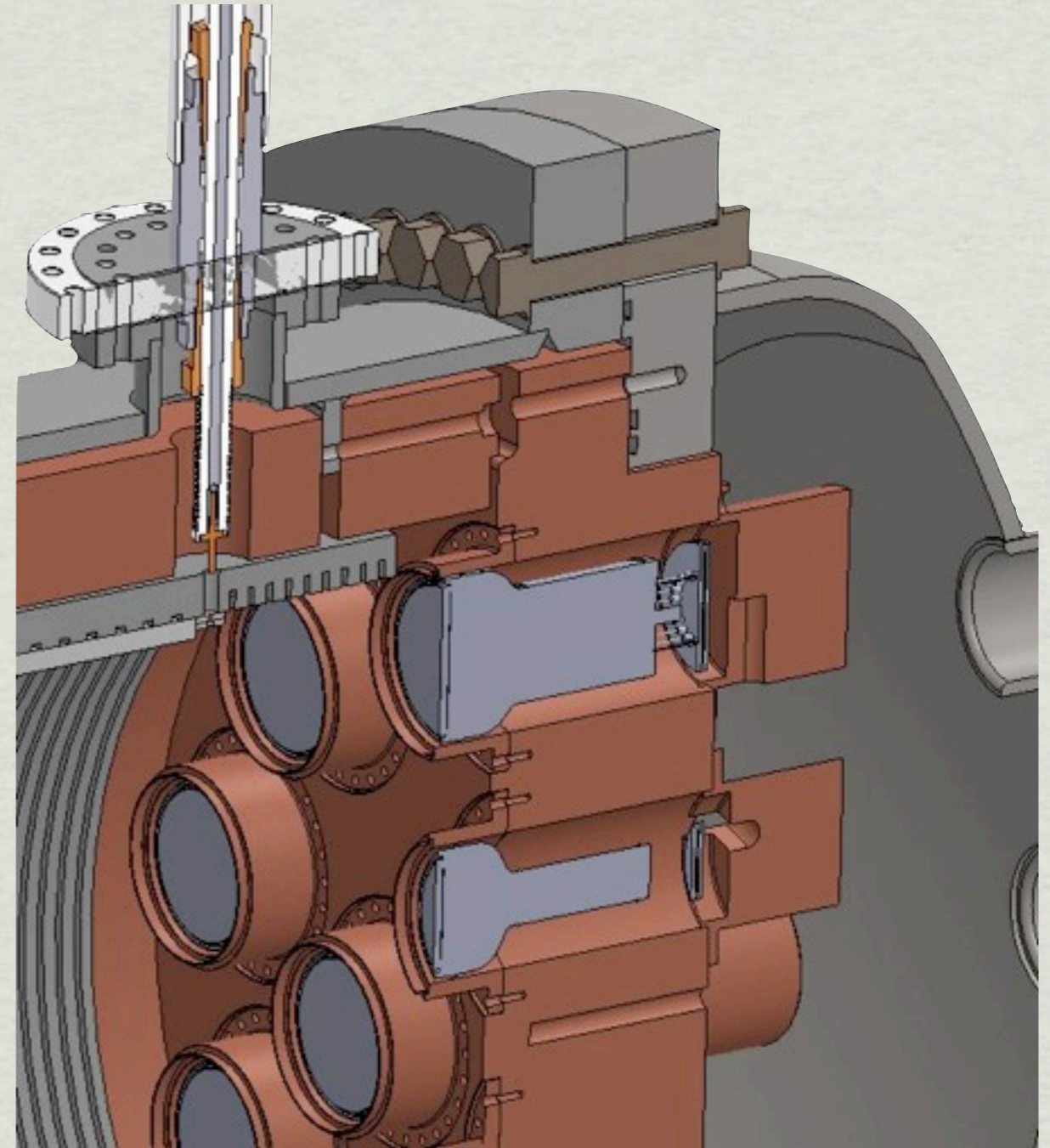
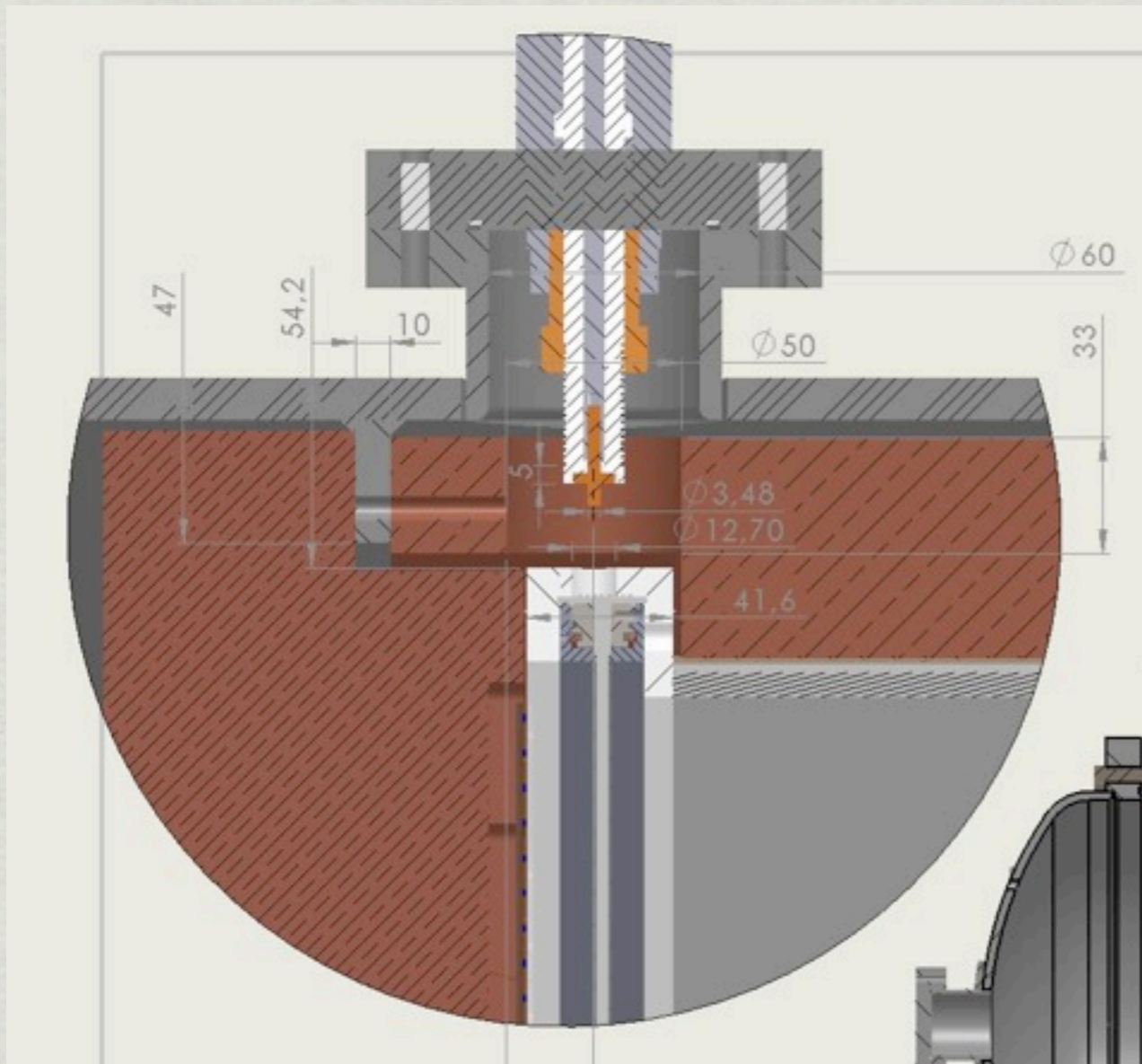


Detector with  $\sim 10\text{kg}$  of enriched Xe to operate in Canfranc

In memoriam of J. White

(<http://next.ific.uv.es/next/index.php?start=8>)

# NEW Feedthroughs



**<10 MILLIMETERS FROM THE  
COPPER SHIELD.**

# NEW vs 100 detectors

	NEW	NEXT-100
Length	50 cm	120 cm
Drift Field	300-600 V/cm	300V/cm
Gate	~20 kV	~20kV
Cathode Voltage	35-50 kV	~60kV

# NEXT-100 HHV requirements

- @ Gate Voltage: 20kV.
- @ Drift Field: 300 V/cm
  - @ Voltage difference Gate-Cathode ~40kV
- @ Cathode Voltage:  $20\text{kV} + 40\text{kV} = 60\text{kV}$

# Conclusions

- ① DEMO detector operating for 2 years with-out major problems.
- ① Similar design could be used for NEXT-100.
- ① NEW detector to be installed in Canfranc, final design to be tested there.