

Experimental Setups for PDS R&D

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DUNE - IFIC meeting

19/01/2021

Vacuum & very High pressure vessel

Purpose & equipment:

- Designed for scintillation studies of noble gases (Xe, Ar, He) and mixtures (Xe-He, Ar-Xe).
- Portable detector
- No gain, only primary scintillation (could be upgraded for optical gain)
- Two ports : **feedthrough** (20 channels) and **gas/vacuum** (valves for vacuum/gas connection)
- Cold Getter
- Vessel material and thickness optimized for low absorption coefficient for γ rays (gamma spectroscopy for radiological and nuclear emergencies)
- PTFE light tube, electrical feedthrough (withstand up to 70 bar pressure and 10^{-6} mbar vacuum)
- CE certification for pressure safety
- Photon detection: VUV SiPMs or TPB-coated Blue SiPMs
- DAQ : PetSys system, AmpTEk 8000D MCA

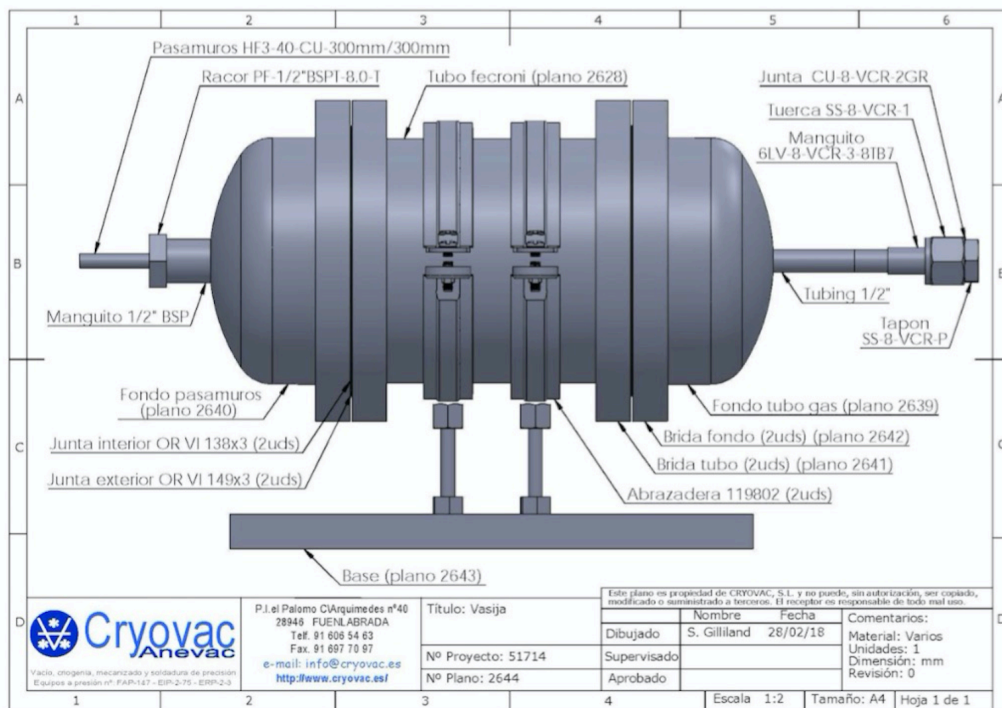
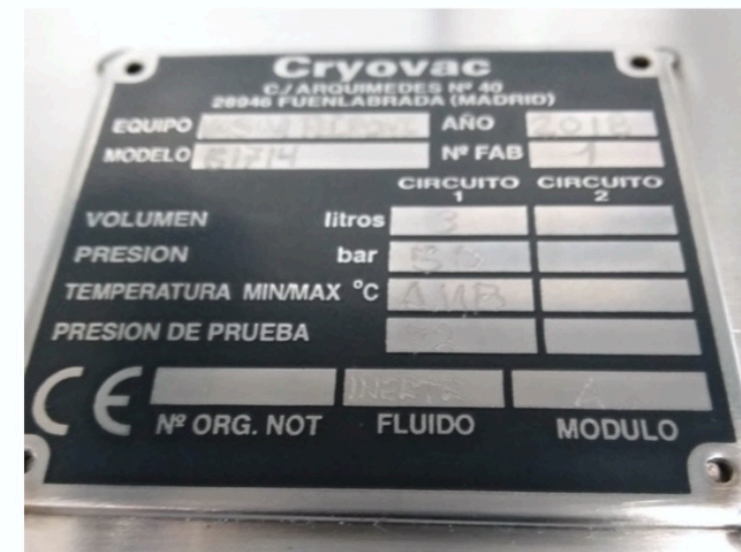
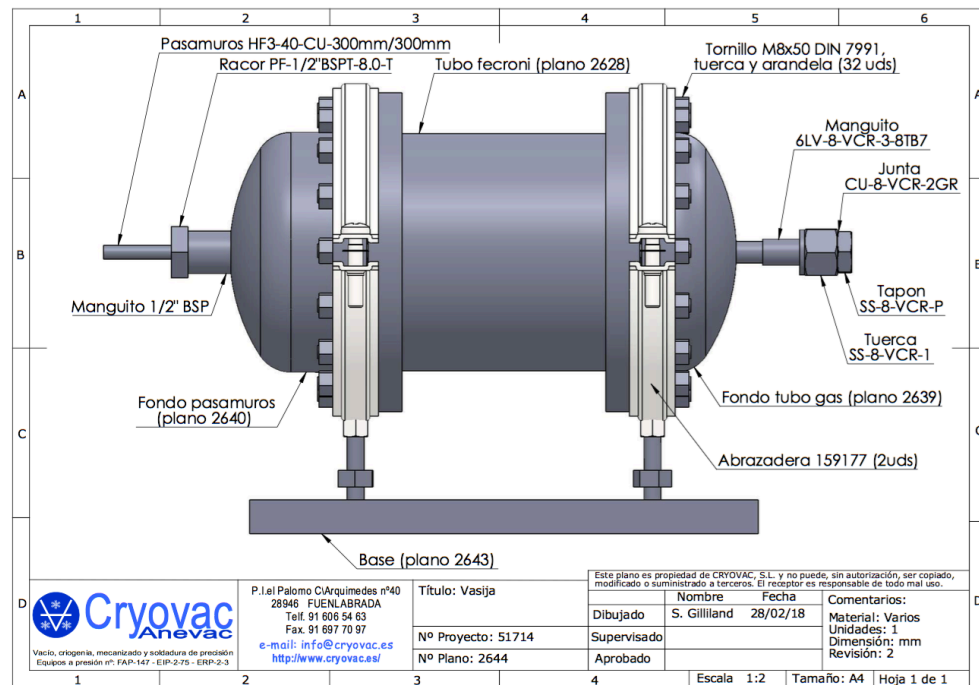
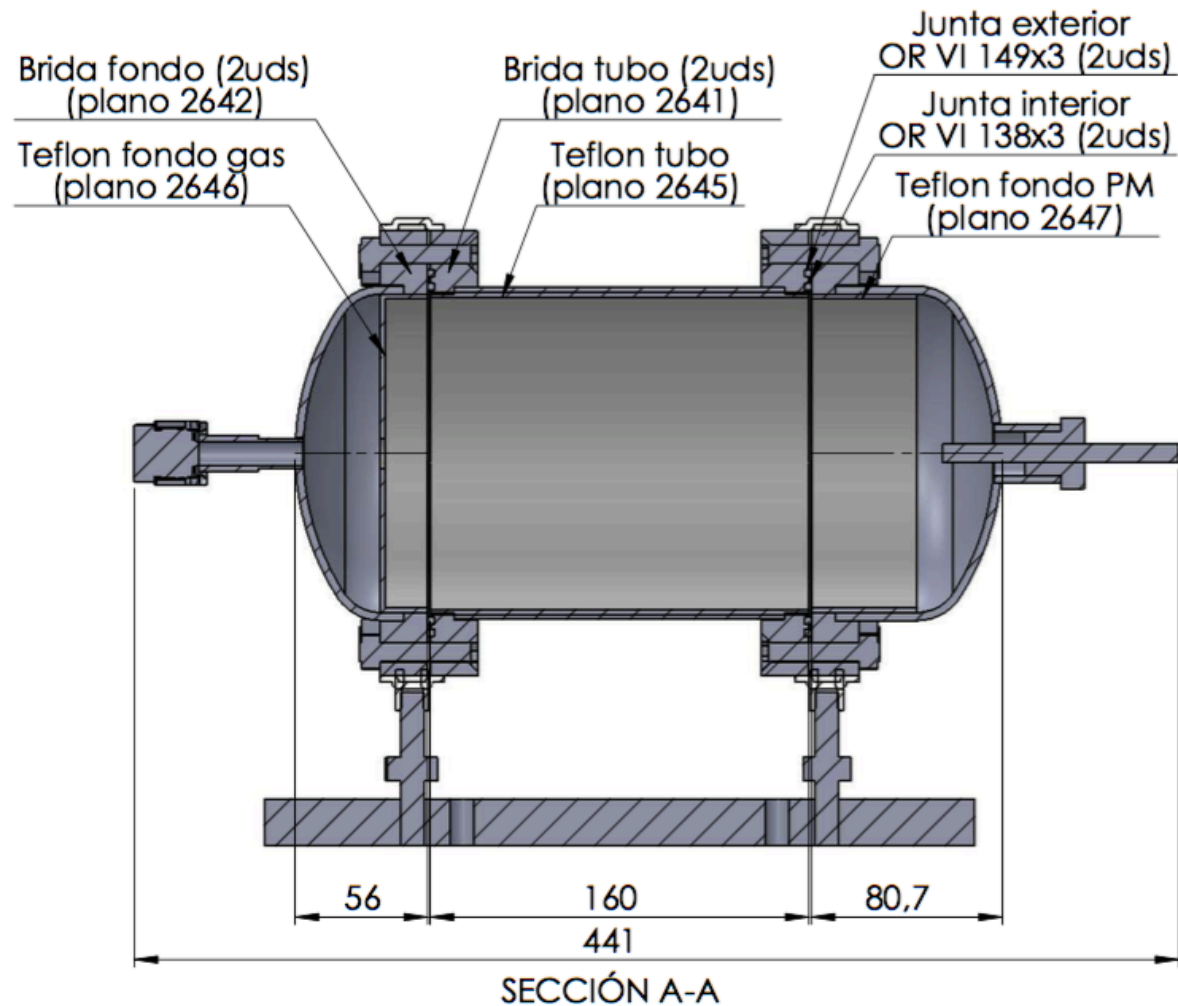
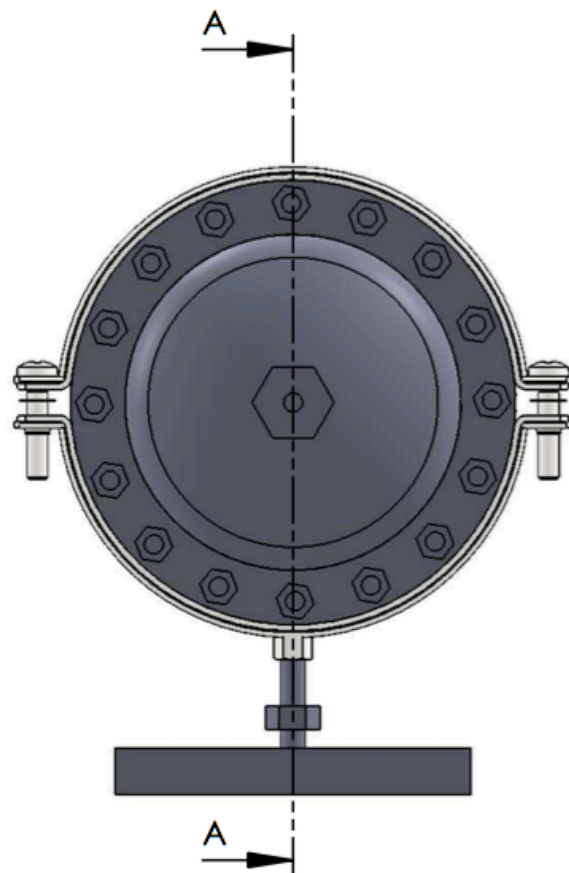


Figura-3: pruebas de presión de la vasija. (izquierda) la vasija con sus puertos amarrada para la prueba hidráulica de presión, (derecha) la vasija amarrada al fondo y el manómetro indicando 70 bar de presión. La presión de trabajo de la vasija es de 50 bar.





Vacío, criogenia, mecanizado y soldadura de precisión
Equipos a presión n°: FAP-147 - EIP-2-75 - ERP-2-3

P.I. el Palomo ClArquimedes n°40
28946 FUENLABRADA
Telf. 91 606 54 63
Fax. 91 697 70 97
e-mail: info@cryovac.es
<http://www.cryovac.es/>

Título: Vasija interior

Nº Proyecto: 51714

Nº Plano: 2648

Este plano es propiedad de CRYOVAC, S.L. y no puede, sin autorización, ser copiado, modificado o suministrado a terceros. El receptor es responsable de todo mal uso.

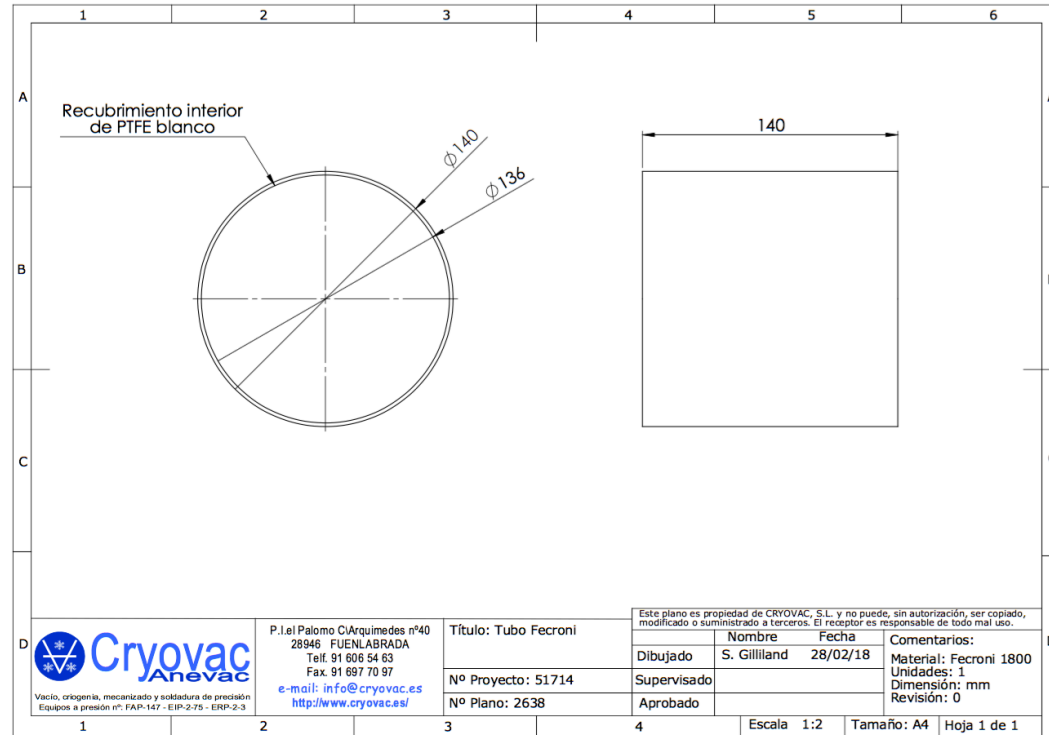
	Nombre	Fecha
Dibujado	S. Gilliland	01/03/18
Supervisado		
Aprobado		

Comentarios:
Material: Varios
Unidades: 1
Dimensión: mm
Revisión: 1

Escala 1:3

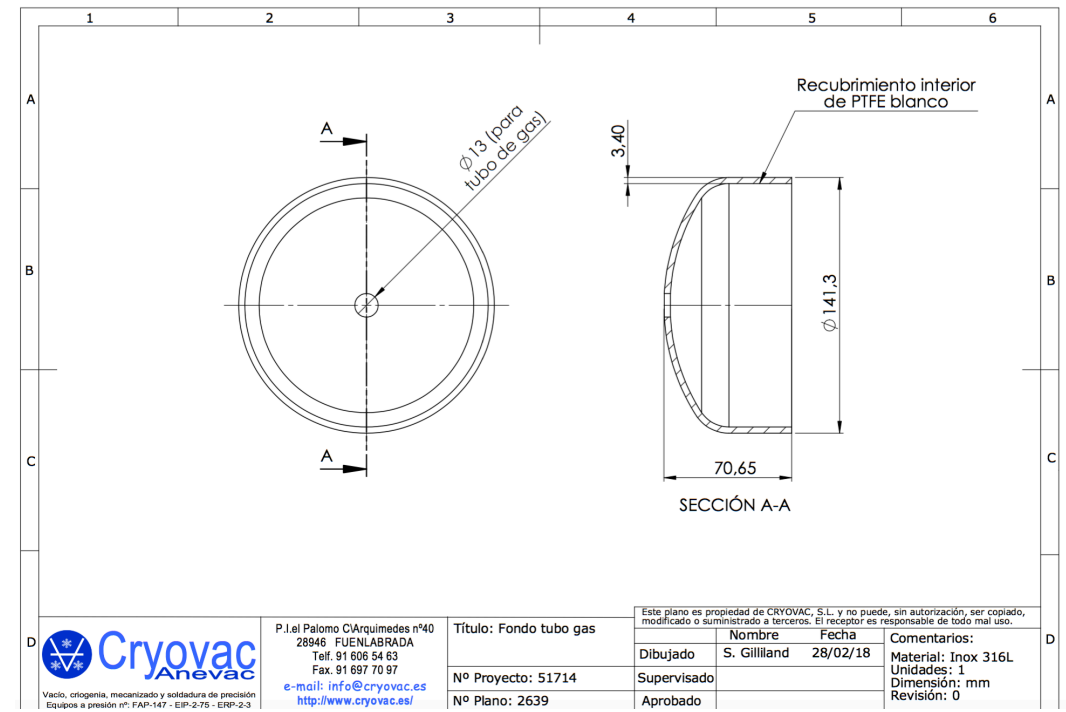
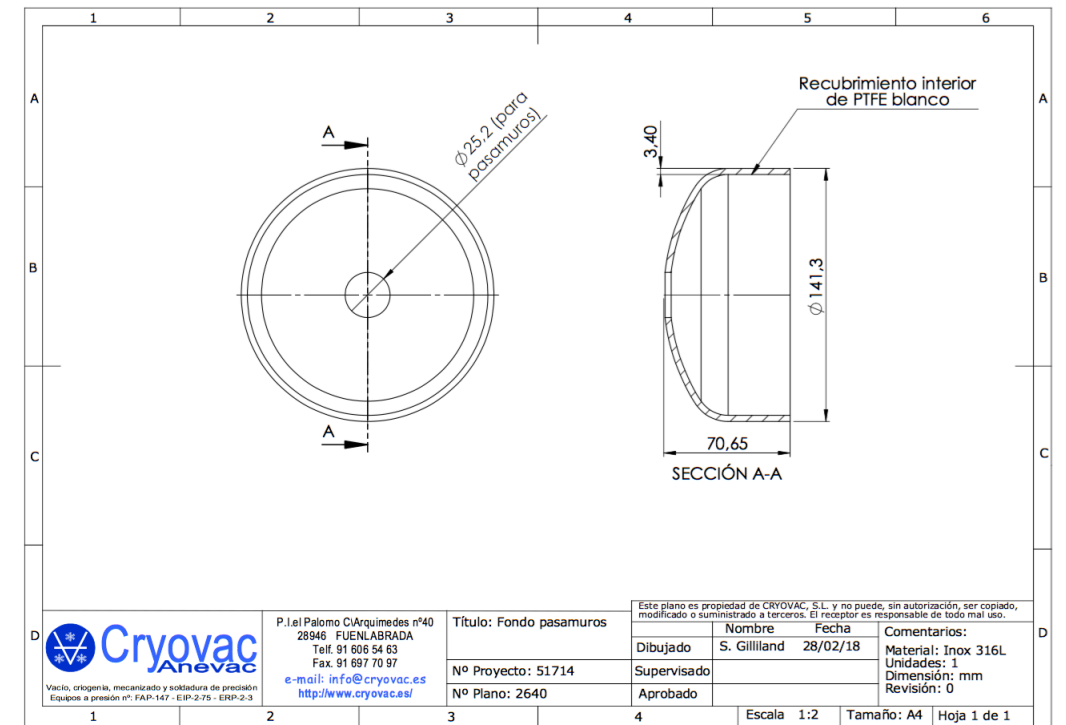
Tamaño: A4

Hoja 1 de 1



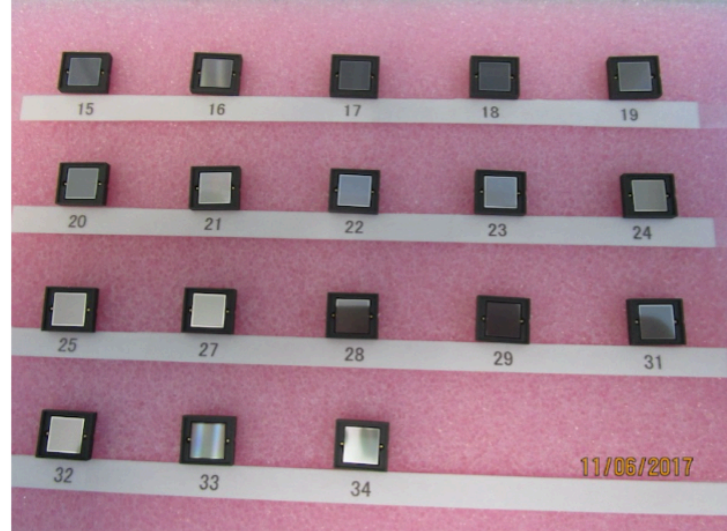
Internal diameter : 140 mm

Useful total length : 280 mm

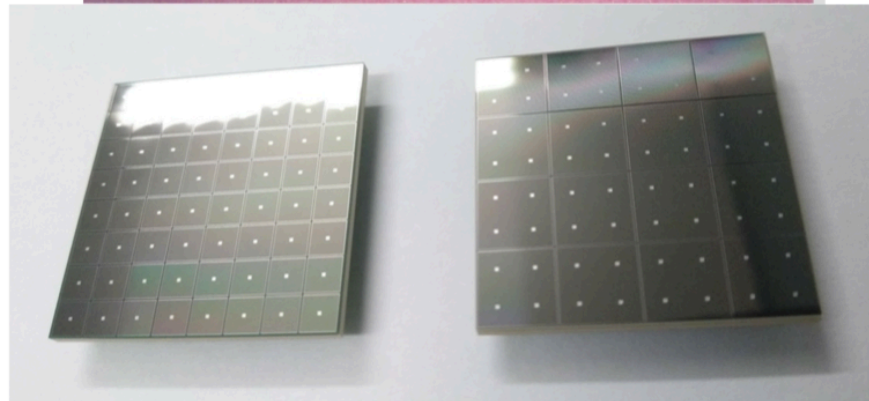


Photon detector available

Missing : readout PCBs



VUV sensitive MPPCs

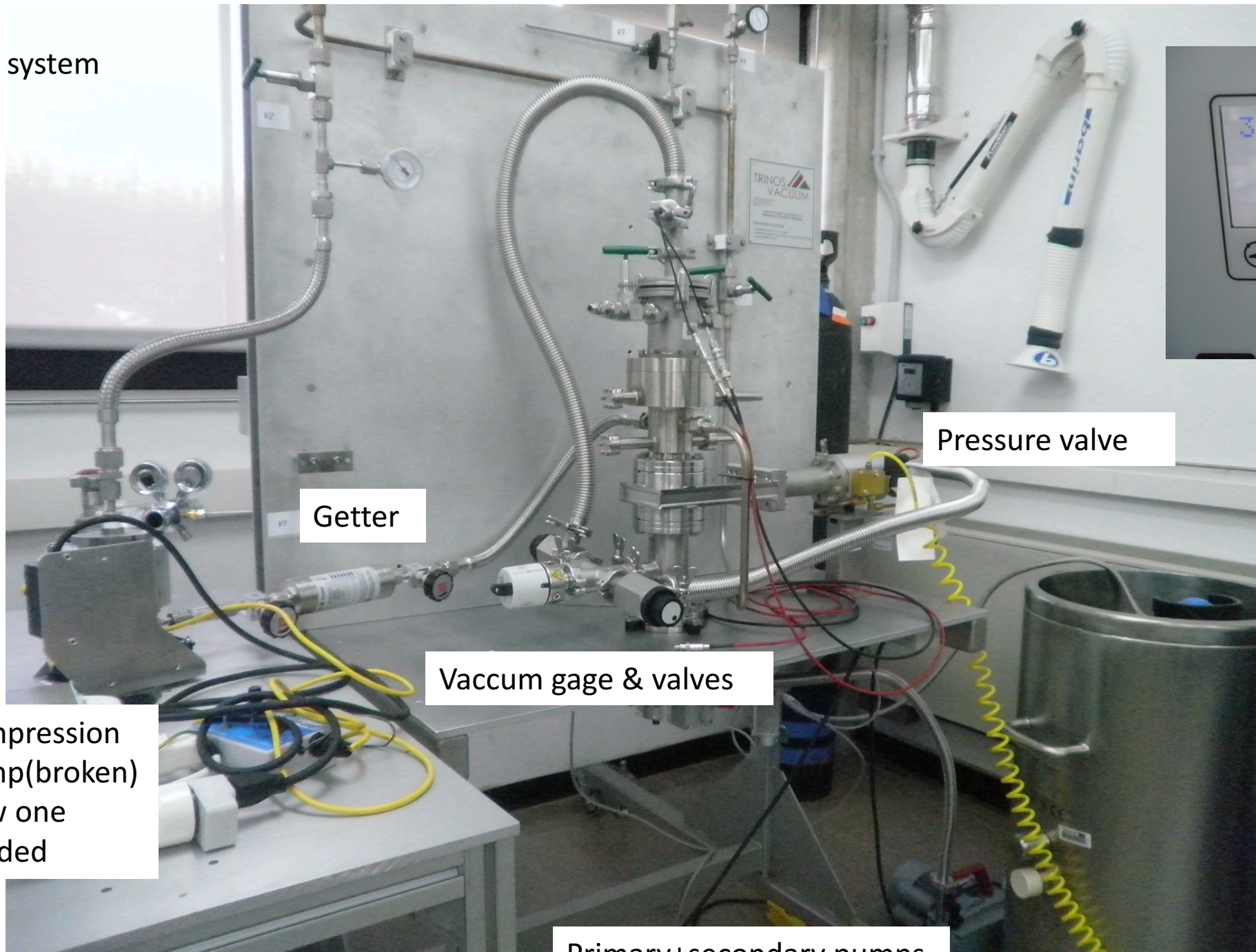


SiPM matrix (blue sensitive



2 Calibrated PMTs
(Hamamatu) in the VUV and Visible. Suitable for High pressure (up to 20 bar)

Gas system



Compression
pump(broken)
New one
needed

Getter

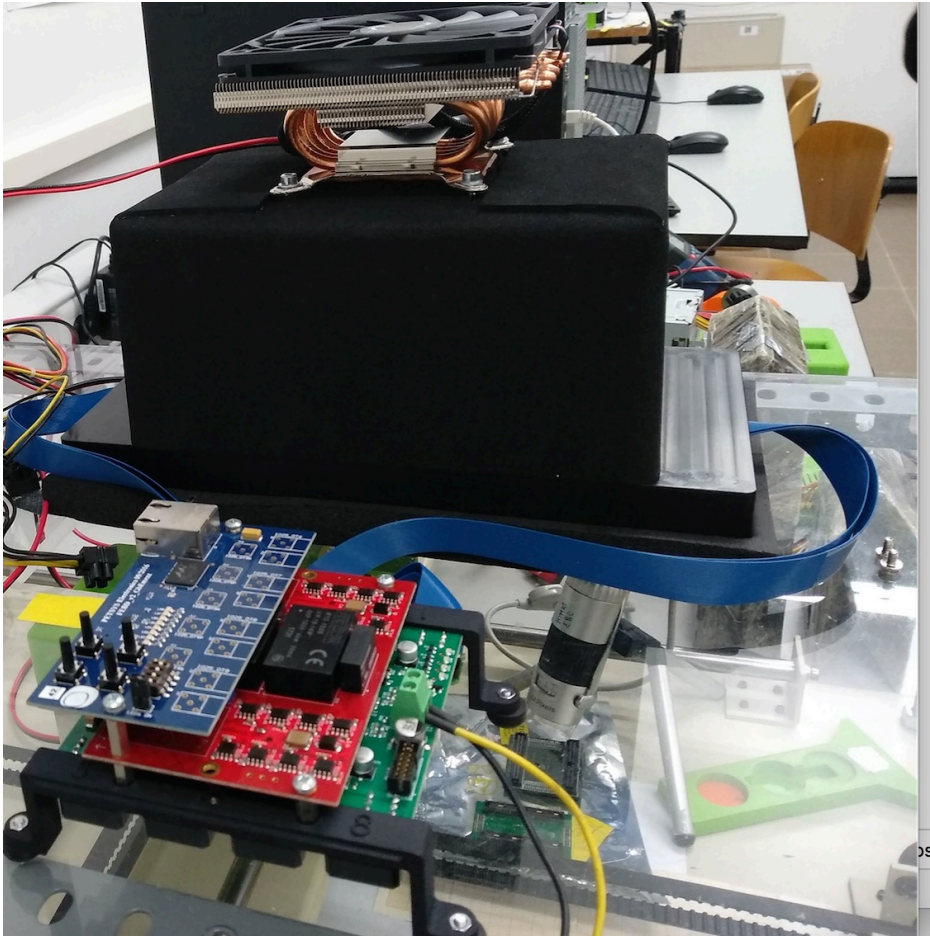
Vaccum gage & valves

Pressure valve

Primary+secondary pumps



Vacuum control unit



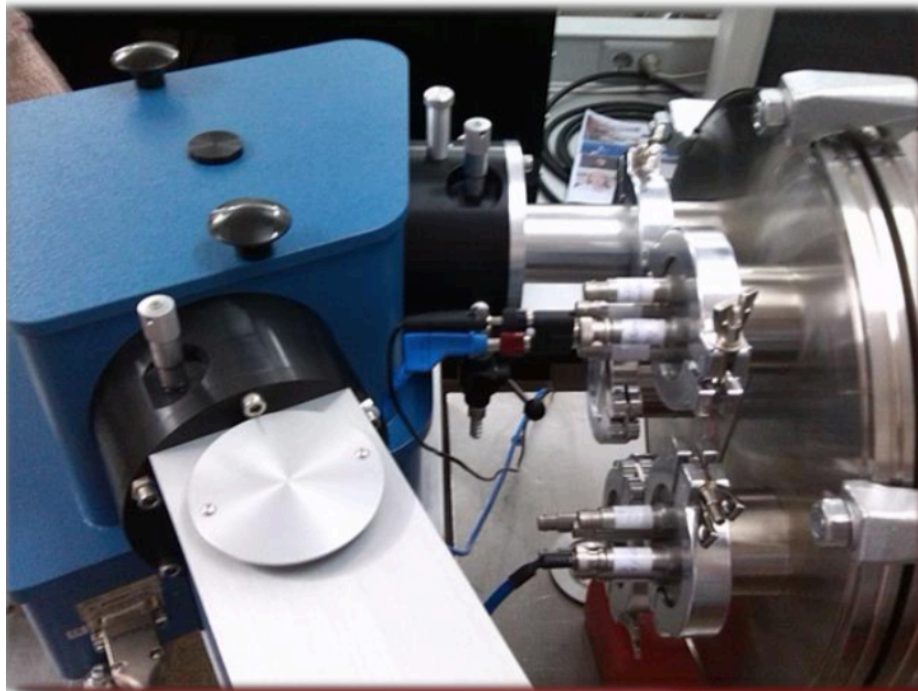
PetSys same as that
used in TRITIUM



Long pressure vessel

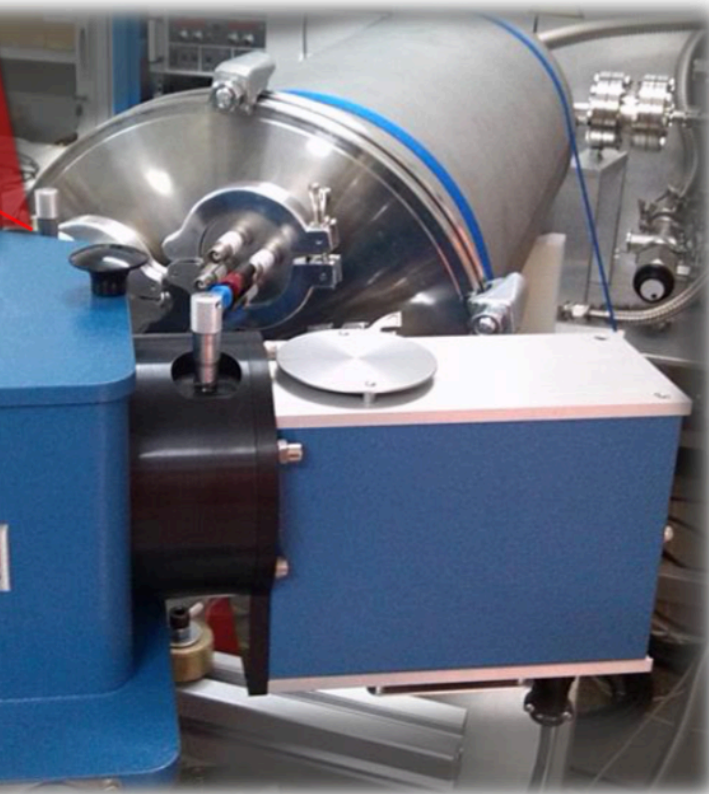
- **Purpose & equipment:**

- 1 m long, Aluminium body and Steel flanges with signal and HV feedthrouhs
- Designed for in-vaccum studies of photodetector systems.
- Possible Coupling to monochromator (already done)
- Coupling to vacuum systems
- Movable (on table with wheels)



Flange coupled to
vacuum
monochromator

Long vacuum vessel



Monochromator

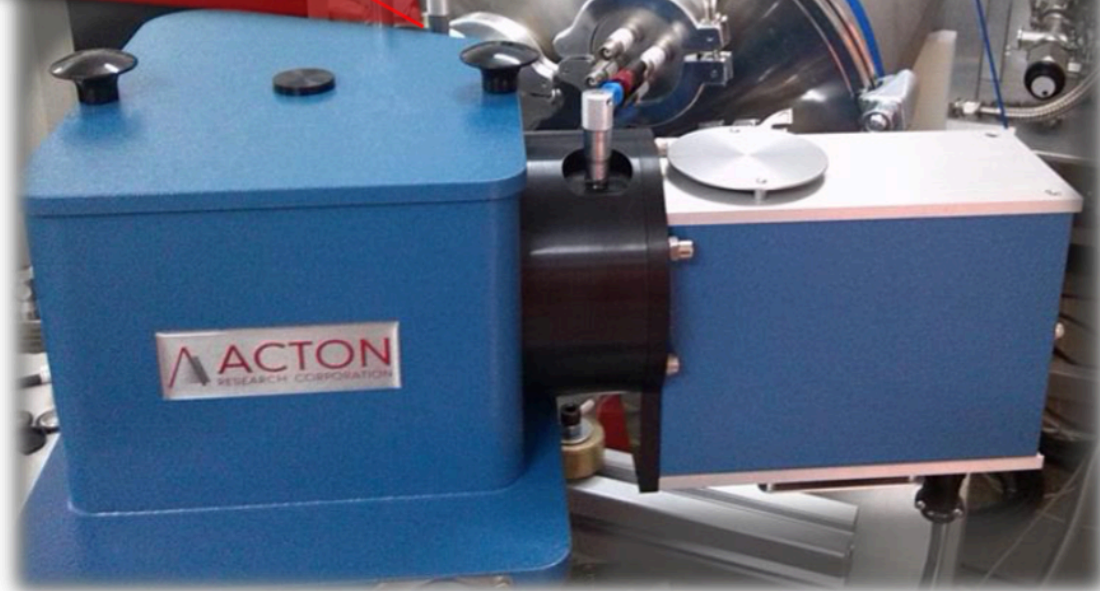
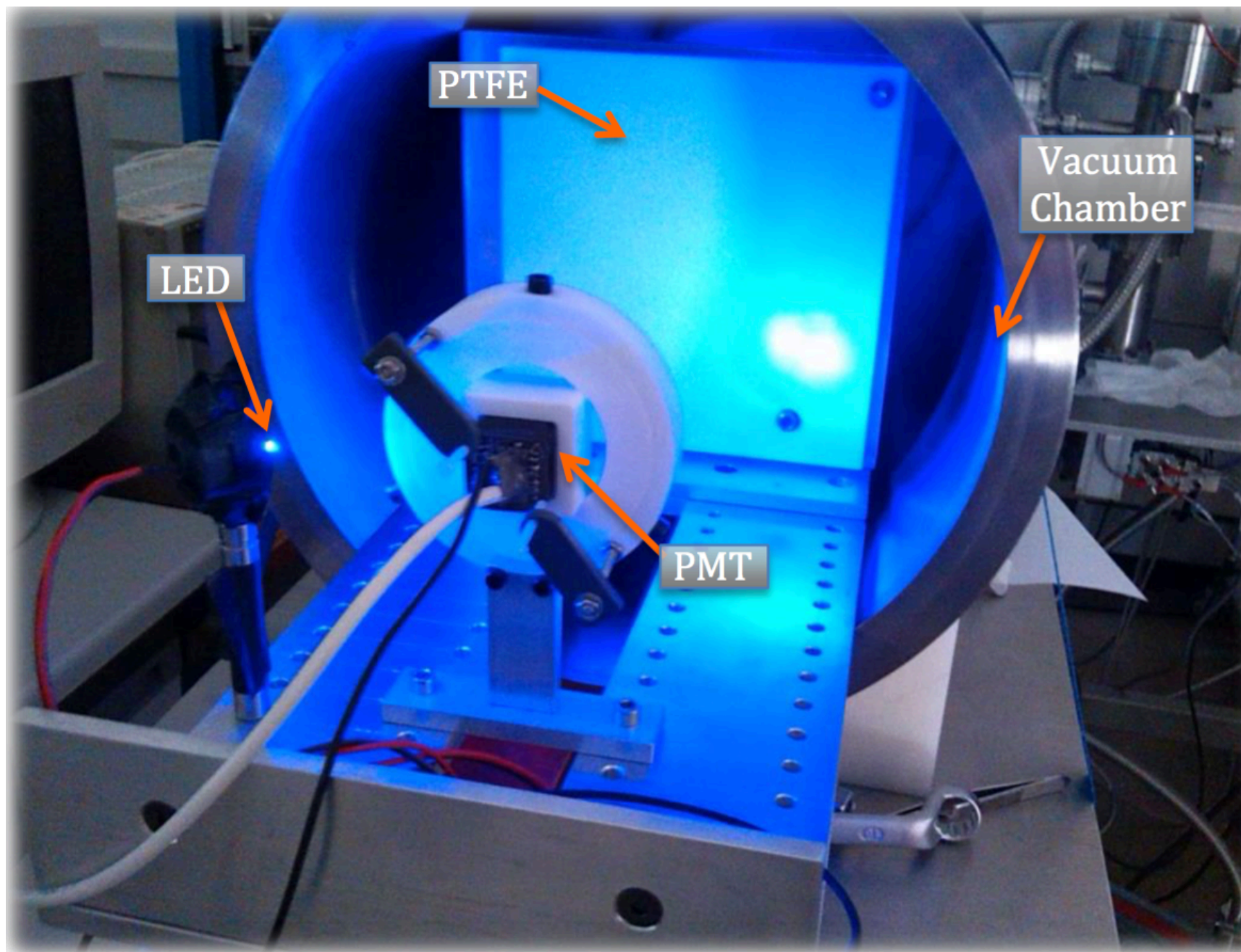


Figure 11. The vacuum monochromator used, coupled to the cylindrical vacuum chamber

Opened vessel
with photon
detection
elements
inside



Optical elements available

- LEDs (UV down to 240 nm, Visible)
- Xe lamp and filter (175 nm)
- Neutral Density Filters (reduce light intensity by known amount)
- Scintillation fibers (1mm diameter, blue and green, single-clad, double-clad, no-clad)
- Optical fibers (clear, 1mm diameter)
- Diffusion lenses and PTFE diffusers
- Source meter for light component polarization and monitoring

Working plan

- Complete the gas system (recirculation pump, pressure/vacuum connexion cross and valves, recovery bottle for gas, pipes ..)
- Commission the vessel: vacuum/pressure studies
- First measurements in-gas with Ar, a radioactive source and a calibrated PMT
- Manufacture SiPM PCB and in-vessel electrical connections to the pressure feedthrough for SiPM measurements
- Define a working plan for DUNE (SiPMs, small ARAPUCA proto ...) as indicated in National project and Prometeo.
- Study the possibility to operate in cryogenic conditions (small HP vessel)

Manpower

- Nadia, Marcos Martínez, Mireia Vinaixa, Miguel, Justo, Anselmo ...
- Ali Saadana (Engineer/ Master degree, ERASMUS. 20/02 to 20/07)
- Sara Carcel (starts the present week), Marc Querol
- Faeq Abed (PhD student with funded grant, starting November 2021)