"Magnetic Metallic Calorimeters: Micromachined Absorbers for CMB detection".

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Institute for Data Processing and Electronics

Karlsruhe Institute of Technology, ALEMANIA

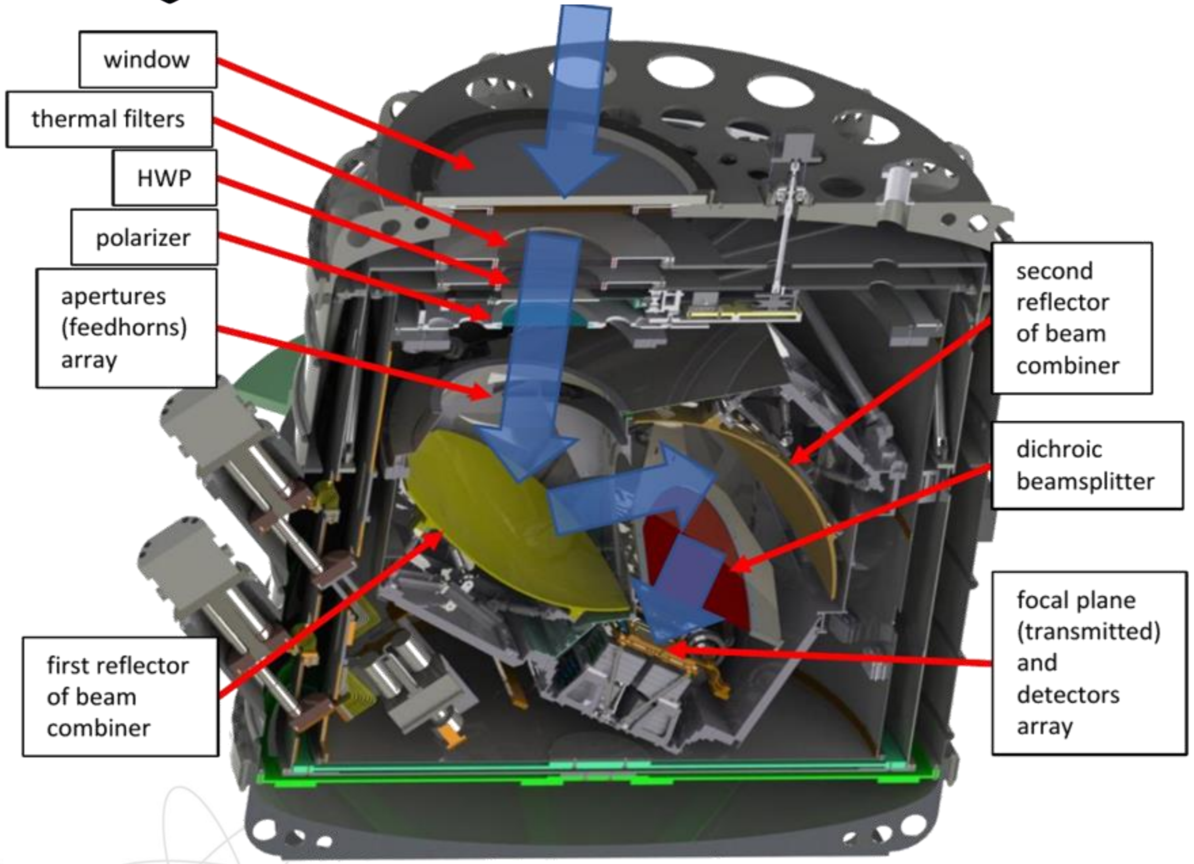
Motivation: QUBIC

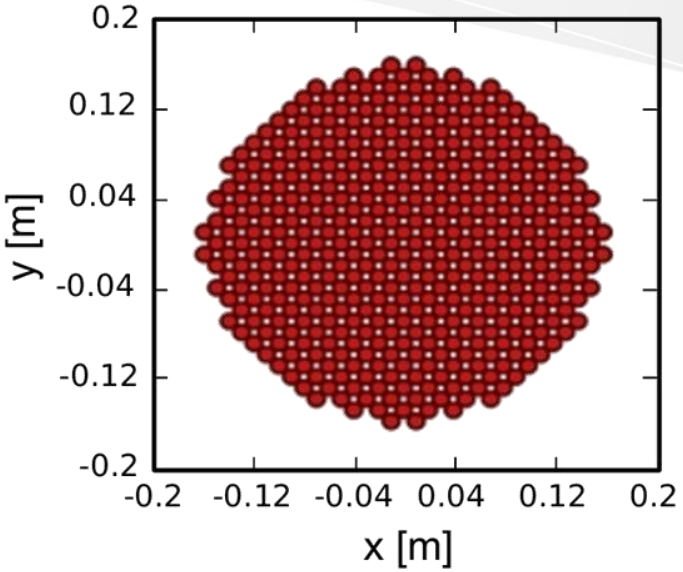
APC Paris, France
C2N Orsay, France
CSNSM Orsay, France
IAS Orsay, France
IRAP Toulouse, France
LAL Orsay, France
Universita di Milano-Bicocca, Italy
Universita degli studi di Milano, Italy
Universita La Sapienza, Roma, Italy
Maynooth University, Ireland
Cardiff University, UK
University of Manchester, UK
Brown University, USA
Richmond University, USA
University of Wisconsin, USA
Centro Atómico Constituyentes, Argentina
GEMA, Argentina
Comisión Nacional de Energía Atómica, Argentina
Facultad de Cs Astronómicas y Geofísicas, Argentina
Centro Atómico Bariloche and Instituto Balseiro, Argentina
Instituto de Tecnologías en Detección y Astropartículas, Argentina
Instituto Argentino de Radioastronomía, Argentina

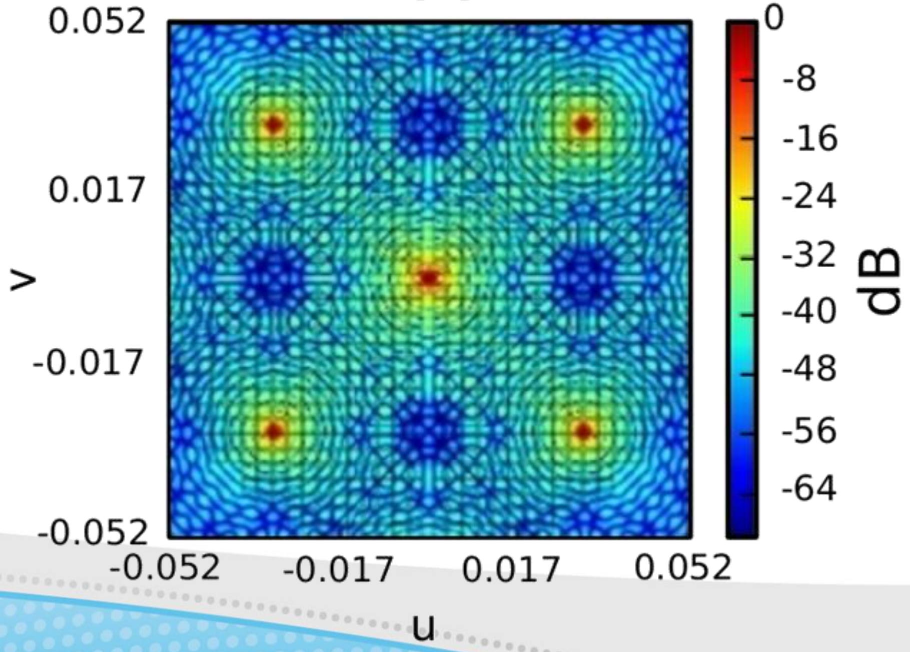
130 Collaborators
22 laboratories
6 countries

+SISSA Joined

Motivation : QUBIC

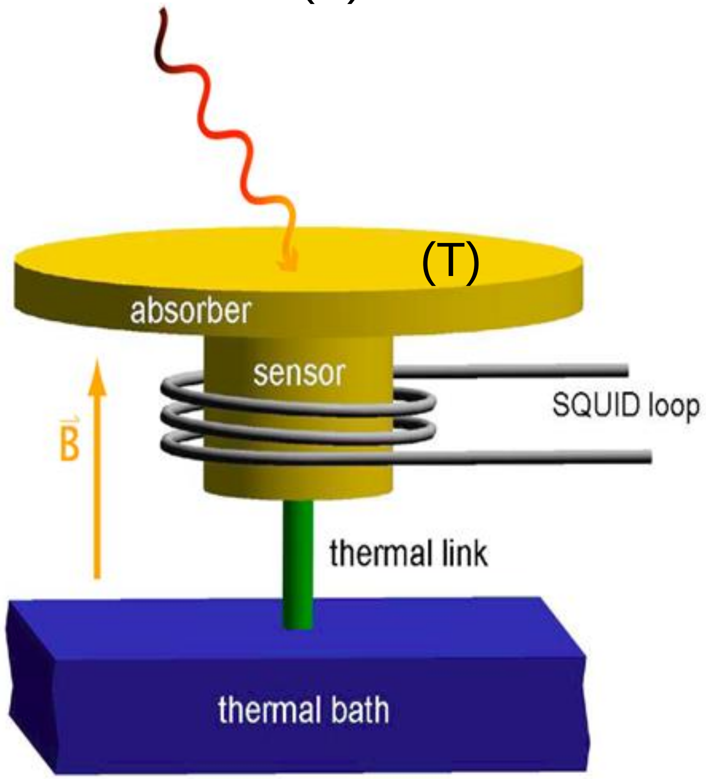


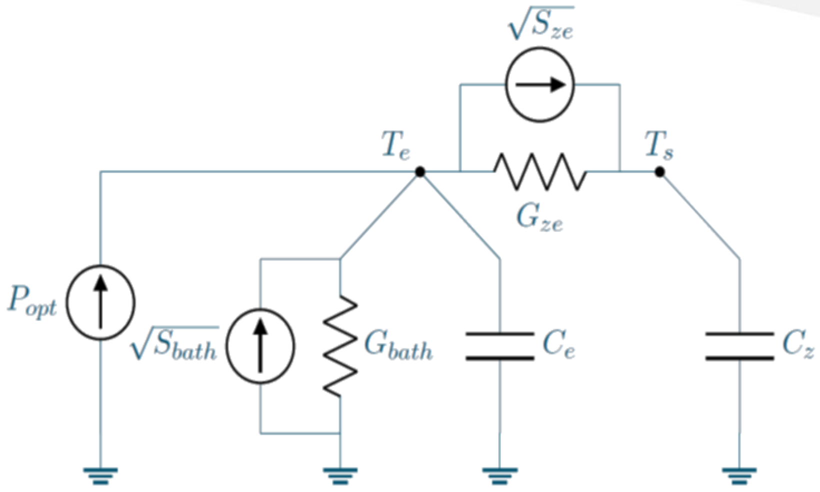




- Bolometric Interferometer
  - *Extreme sensibility with TESs*→MMBs
  - *Low Sistematics due to interferometrics*
  - *Self Calibration and spectroscopic analysis*

MAGNETIC Micro BOLOMETERS, MMBs



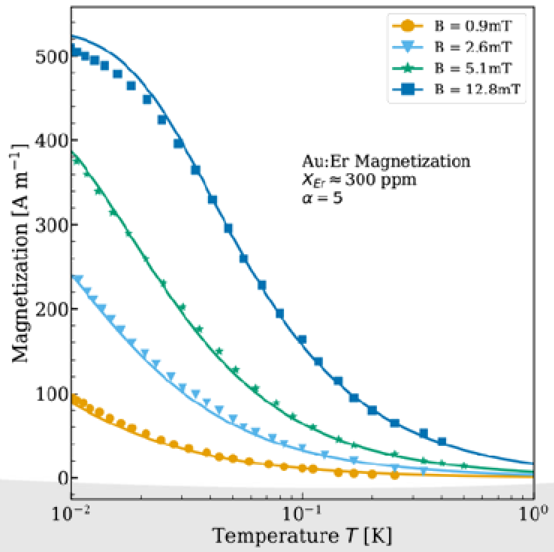


$$\frac{\partial T}{\partial P} = \frac{1}{G_{bath}} \cdot \frac{1}{\frac{C_e+C_z}{G_{bath}G_{ze}} \cdot s^2 + \frac{C_z(G_{bath}+G_{ze})+C_eG_{ze}}{G_{bath}G_{ze}} \cdot s+1}$$

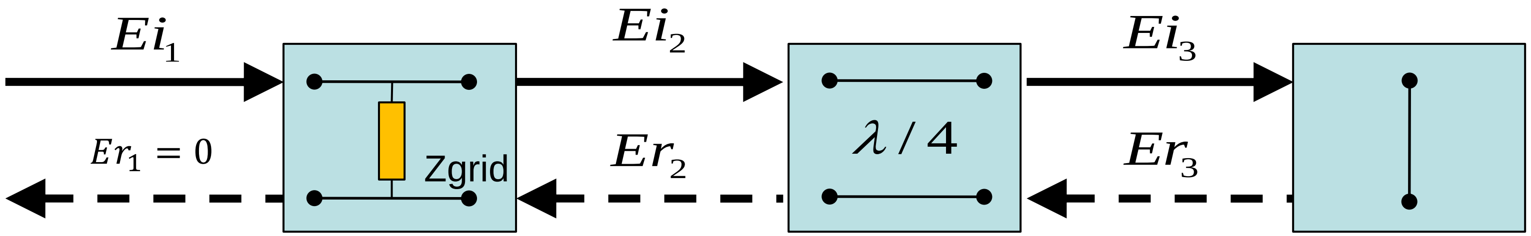
$$\frac{\partial \Phi}{\partial T} = \sum \frac{\left|\overrightarrow{B(\vec{r})}\right|}{I_{field}} \cdot \frac{\partial M}{\partial T}\bigg|_{\left|\overrightarrow{B(\vec{r})}\right|} \cdot \Delta V$$

$$\frac{\partial \Phi_{sq}}{\partial \Phi} = \frac{k\sqrt{L_{in}L_s}}{L_m+L_{stray}+L_{in}}$$

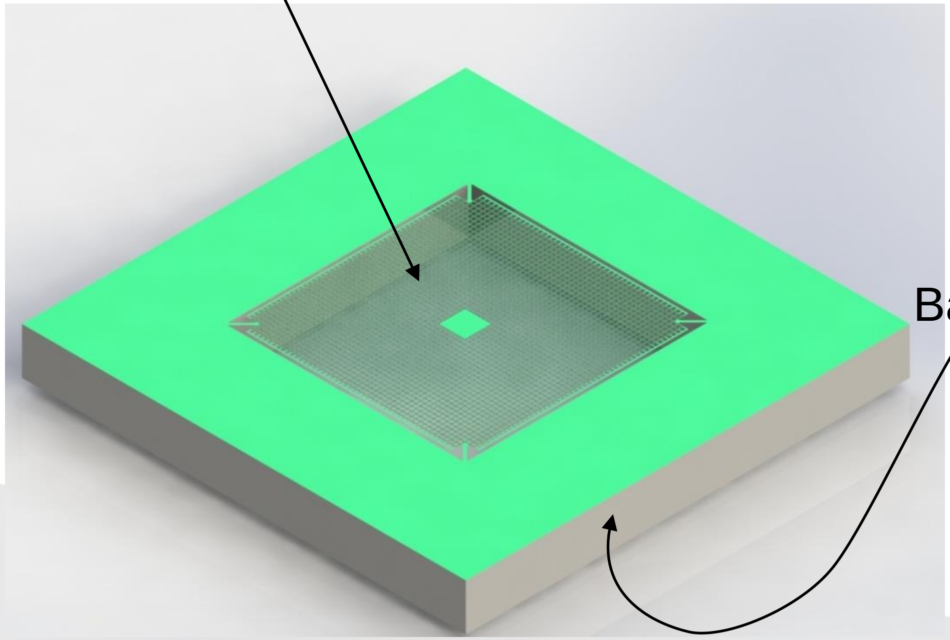
$$\Re_{MMB} = \frac{\partial \Phi_S}{\partial P} = \frac{\partial T}{\partial P}\frac{\partial \Phi}{\partial T}\frac{\partial \Phi_S}{\partial \Phi}$$



MMBs: Coupling to CMB

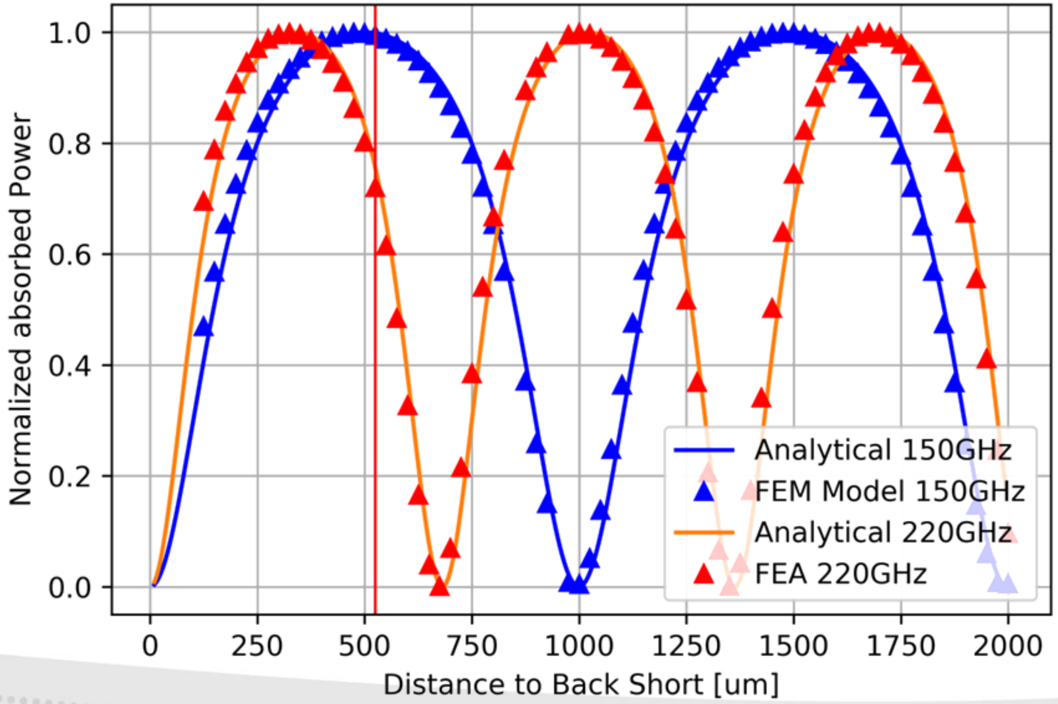


Absorbing grid, Zgrid

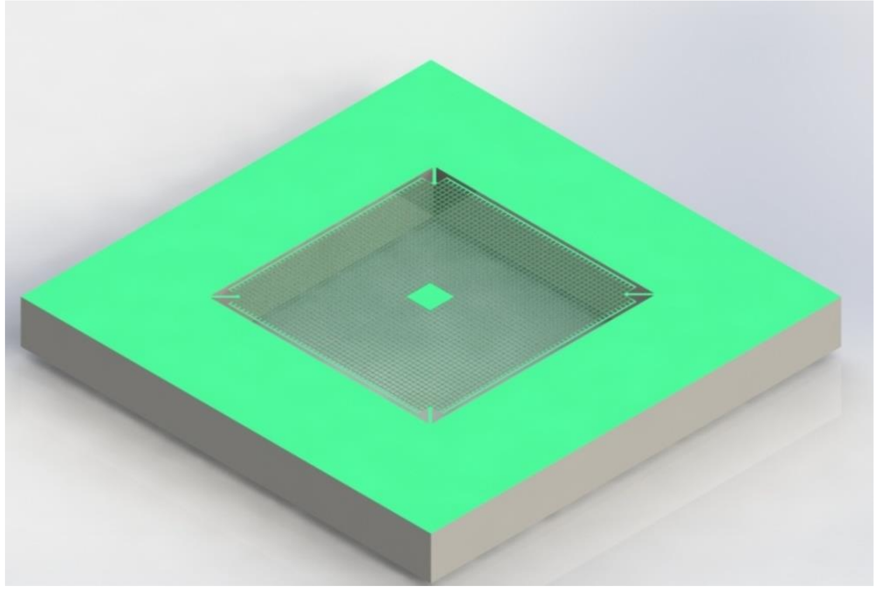


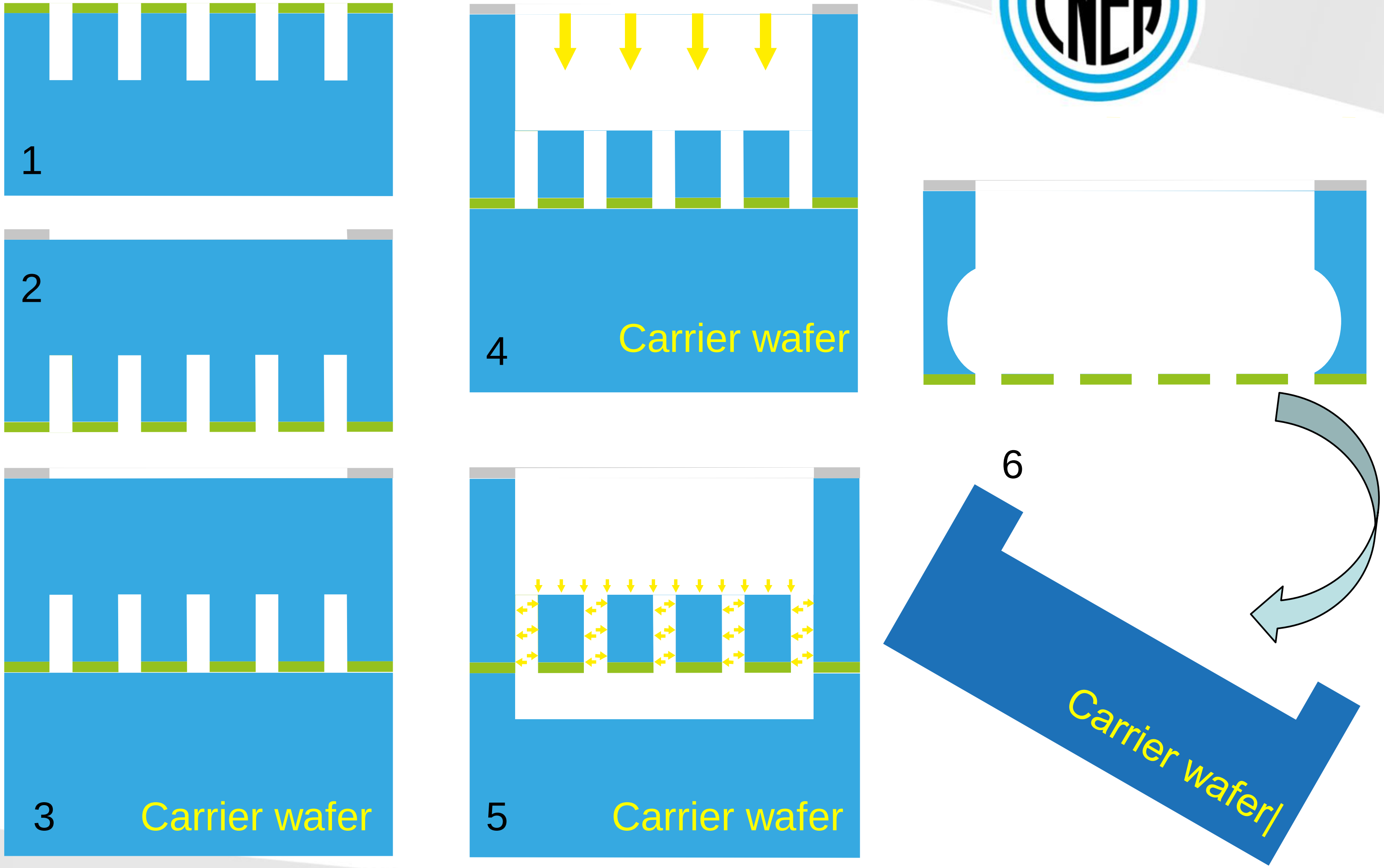
Backshort

Absorción de energía incidente

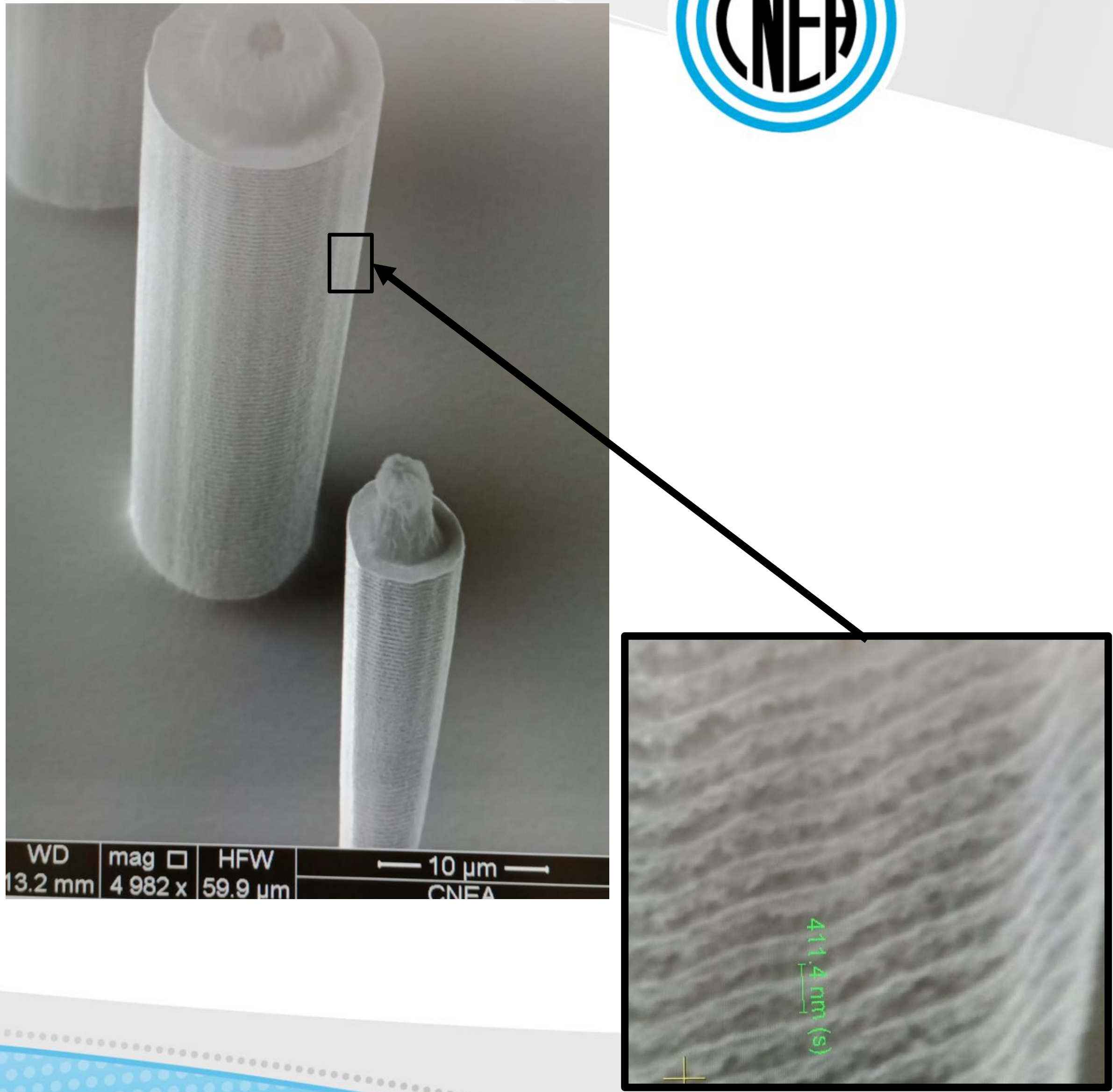


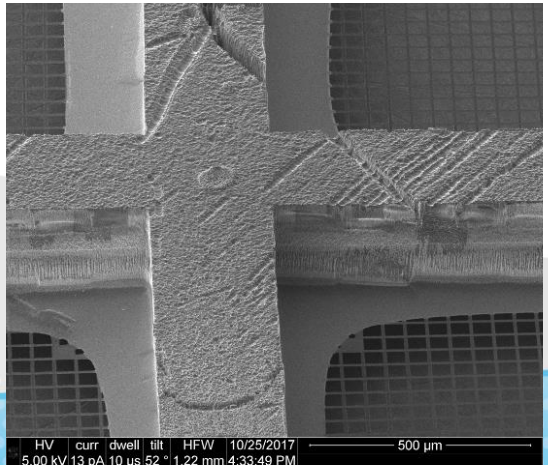
Microfabrication I: Release process

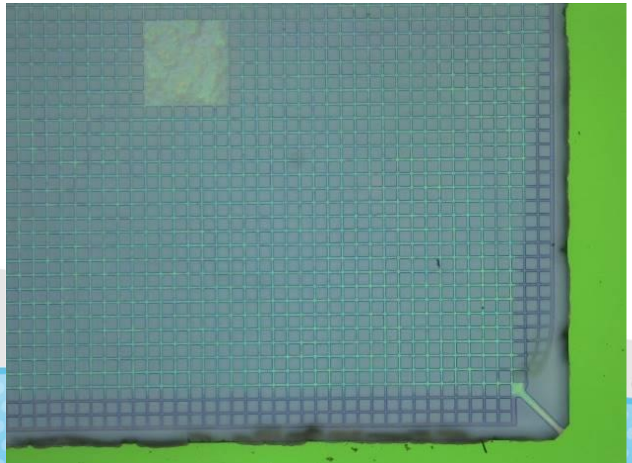




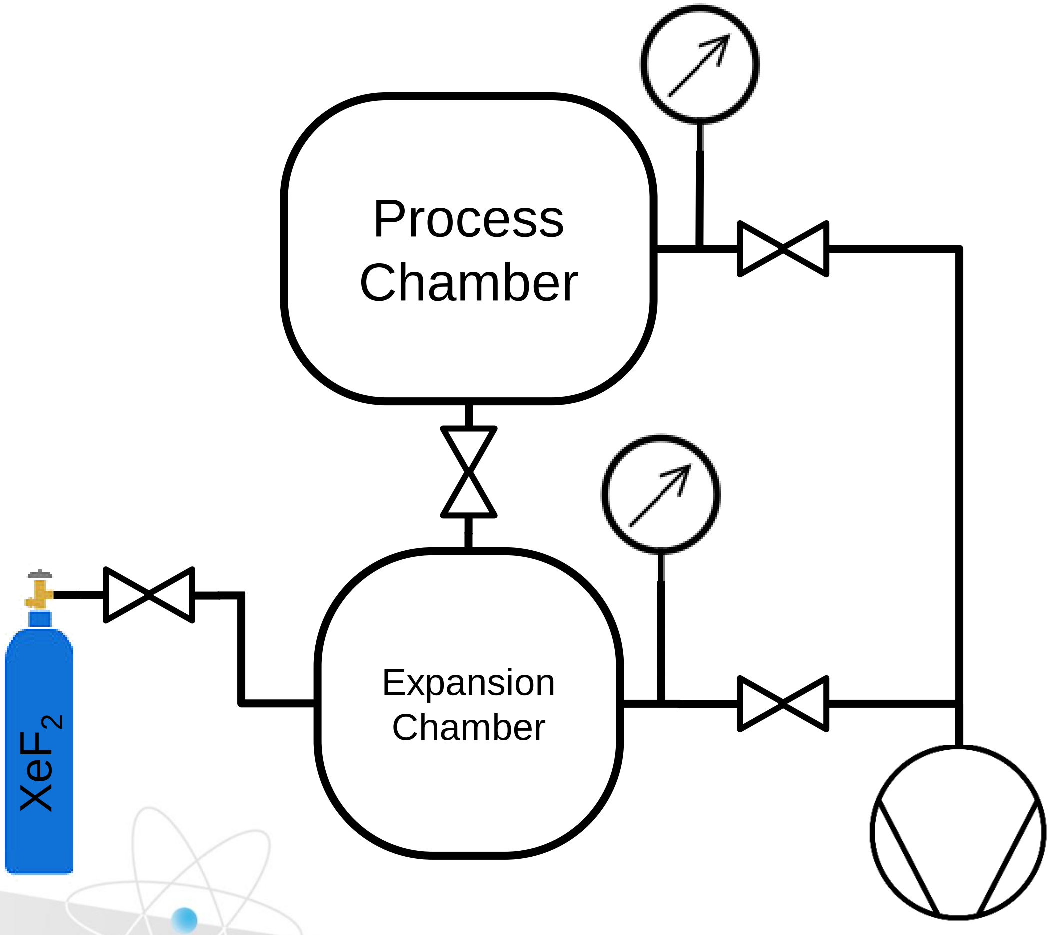
Microfabrication II: Release process

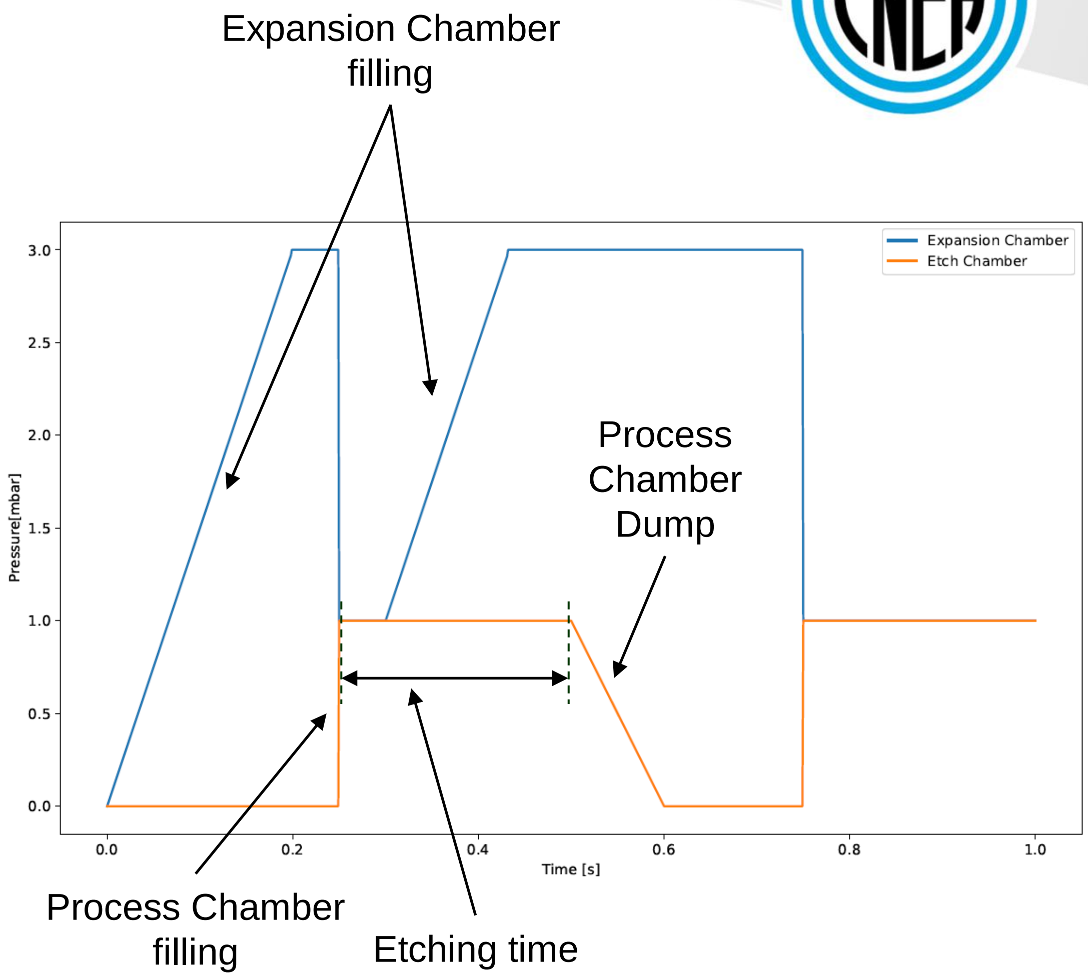




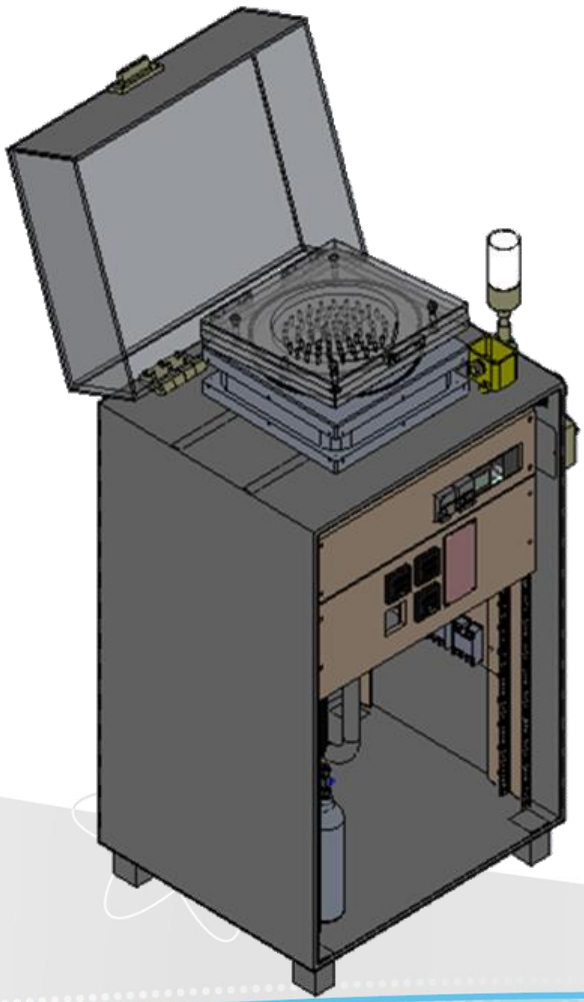


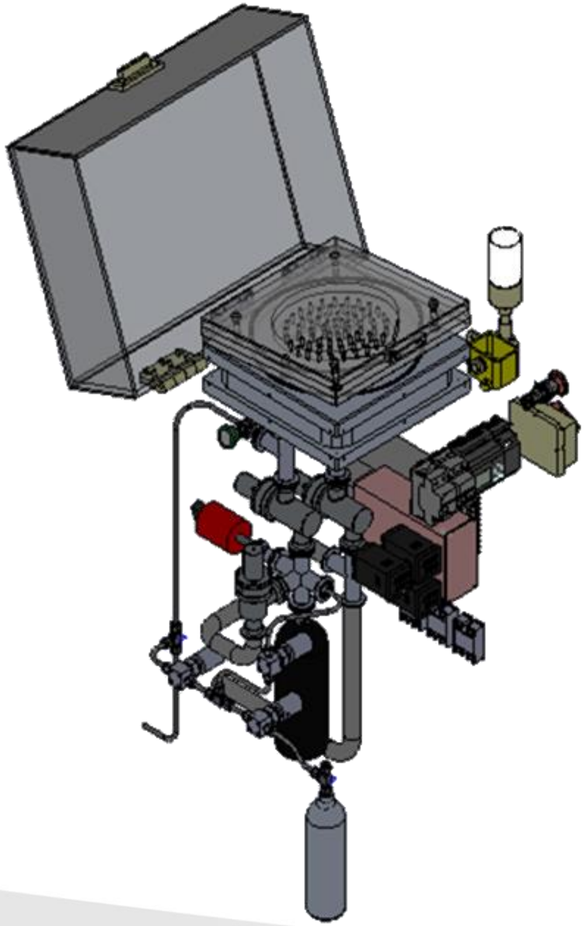
Microfabrication III: XeF_2

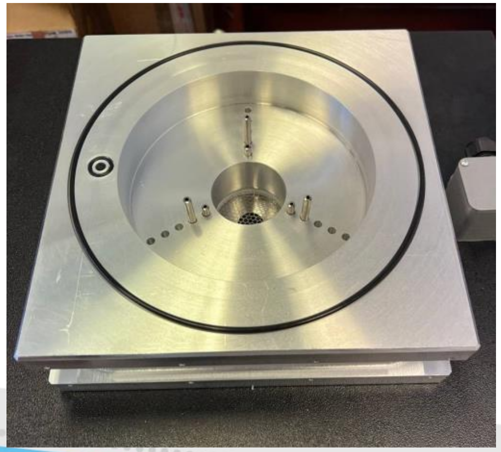


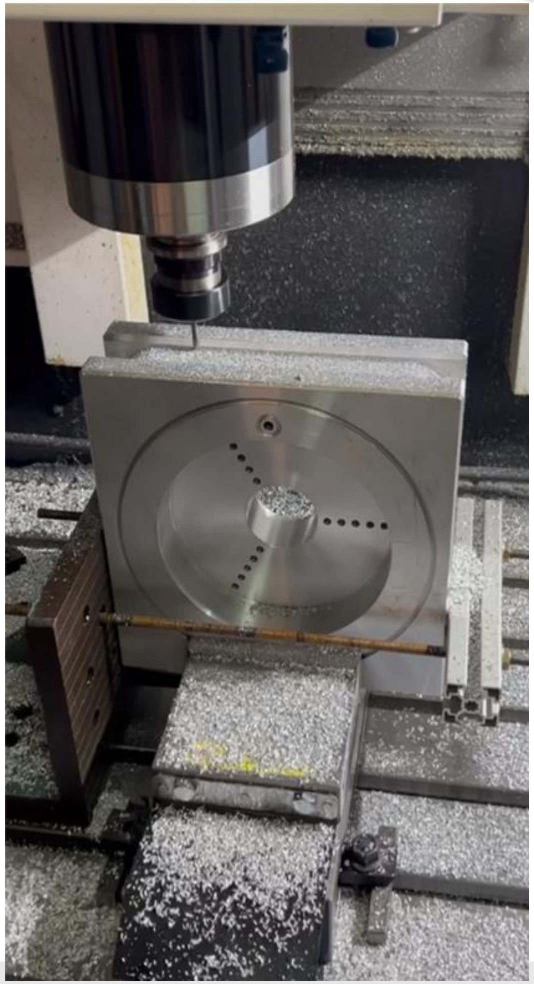


Microfabrication IV: XeF_2

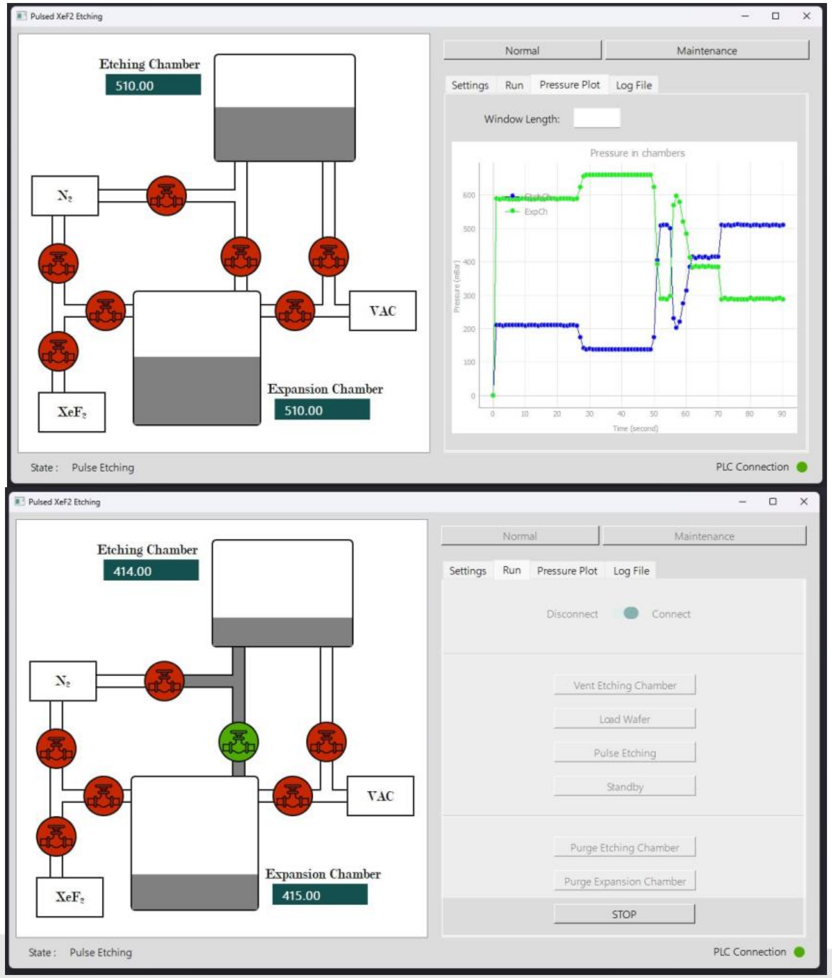






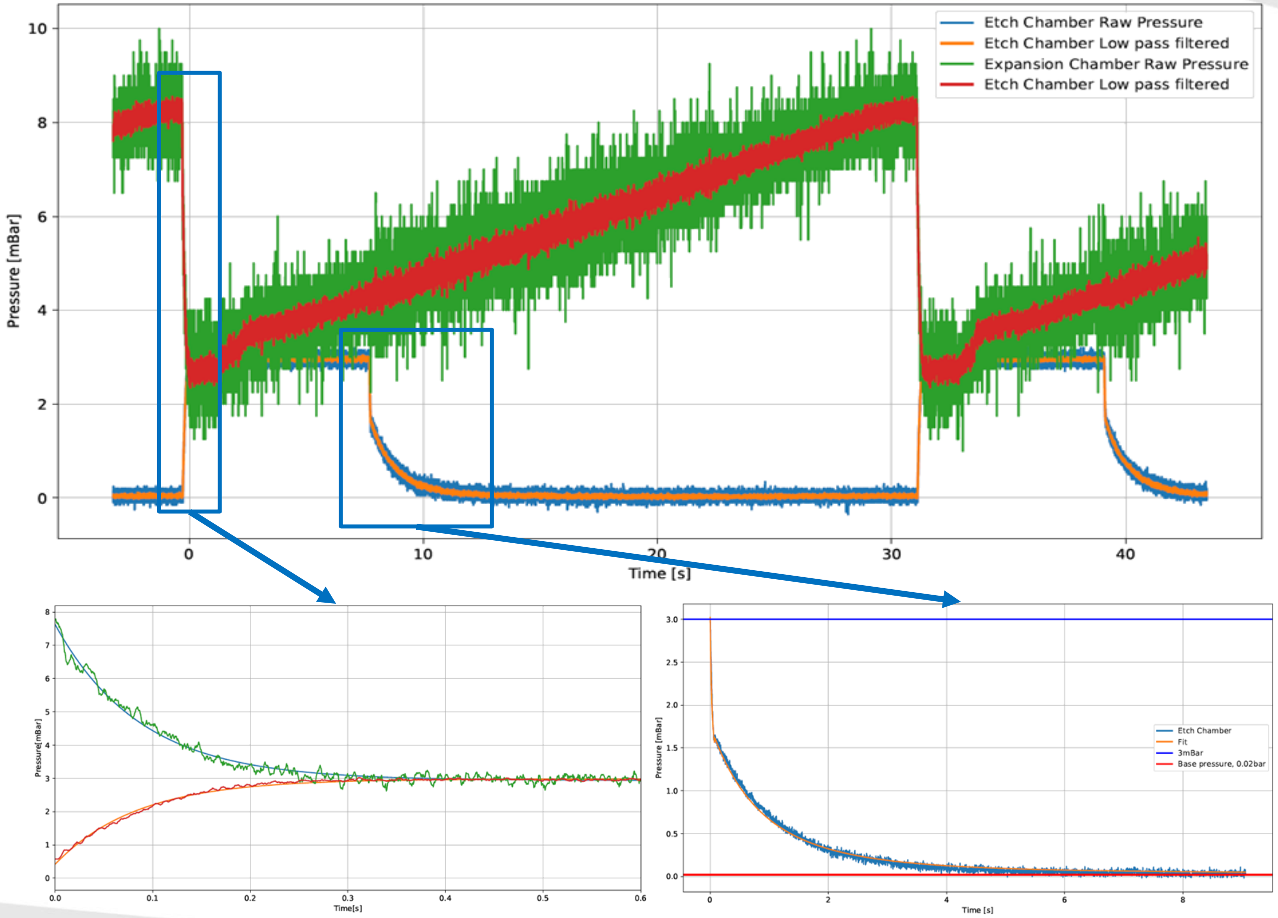


Microfabrication V: XeF_2



Software: Lucía Sucunza

Microfabrication VI: XeF_2



Llenado de la cámara 114ms

Vaciado de la cámara 2,650s

EQUIPMENT I

He3/He4 Dilution Fridge
Bluefors LD250
Arribo: Octubre 2022

AJA ATC2400 Sputter
Arribo: Marzo 2023

Keysight PNA-X
Arrivado: Mayo 2022

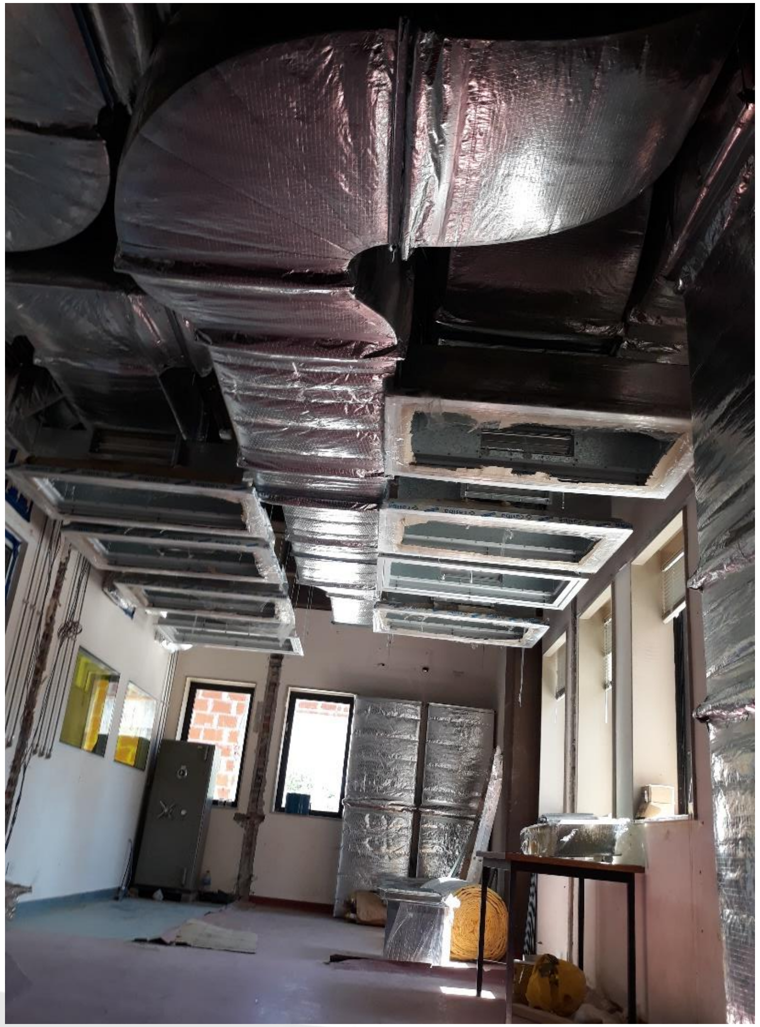
EQUIPMENT II

He3/He4 Dilution Fridge
Bluefors LD250
Operativo desde Marzo 2023

AJA ATC2400 Sputter
En proceso de ensamblado
Arribo: Octubre 2023

Keysight PNA-X
Operativo junto al criostato
desde Marzo 2023

NEW LABS, AND OLD ONES REBUMPING



Estado de avance

Courses :

Introducción a Microscopías de Barrido por Sonda, Inst. Sabato, 2022
Cosmología, ITeDA, Agosto 2022

Publications, as co-autor.

Ranitzsch, Philipp & Arnold, D. & Beyer, J. & Bockhorn, L. & Bonaparte, J. & Enss, C. & Kossert, K. & Kempf, Sina & Loidl, Martin & Mariam, Riham & Nähle, O. & Paulsen, M. & Rodrigues, Matias & Wegner, M.. (2020). **MetroMMC: Electron-Capture Spectrometry with Cryogenic Calorimeters for Science and Technology. Journal of Low Temperature Physics. 199. 10.1007/s10909-019-02278-4.**

Suitability of magnetic microbolometers based on paramagnetic temperature sensors for CMB polarization measurements
Geria, J.M., Hampel, M.R., Kempf, S., ...Platino, M., Etchegoyen, A.
Journal of Astronomical Telescopes, Instruments, and Systems, 2023, 9(1), pp. 16002

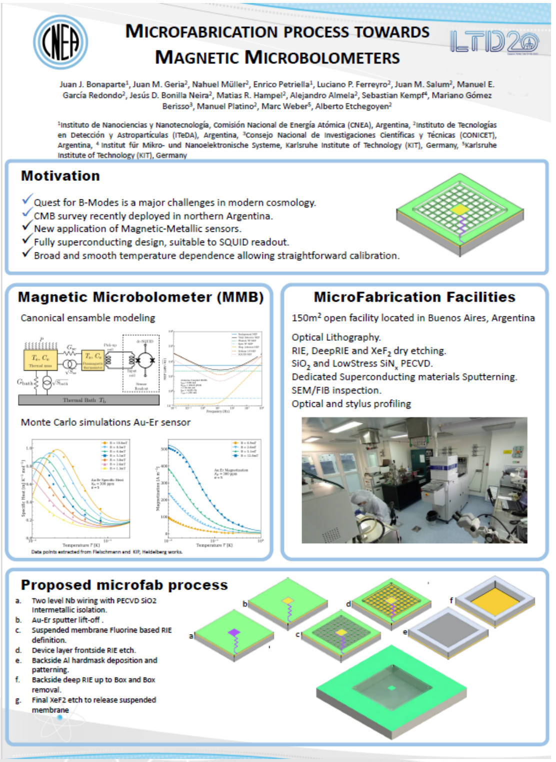
An implementation of a channelizer based on a Goertzel Filter Bank for the read-out of cryogenic sensors
Ferreyro, L., García Redondo, M., Hampel, M., ...Weber, M., Etchegoyen, A.
Journal of Instrumentation, 2023, 18(6), P06009

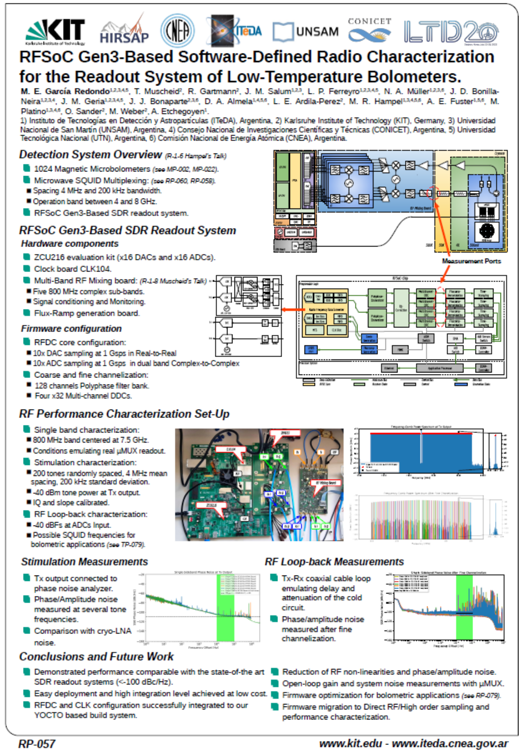
Aliasing Effect on Flux Ramp Demodulation: Nonlinearity in the Microwave Squid Multiplexer
Salum, J.M., Muscheid, T., Fuster, A., ...Sander, O., Weber, M.
Journal of Low Temperature Physics, 2023 (En Prensa)

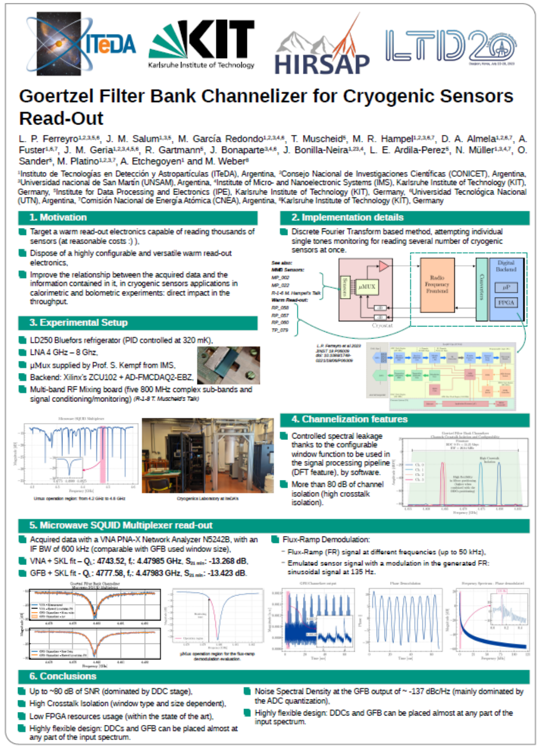
Estado de avance

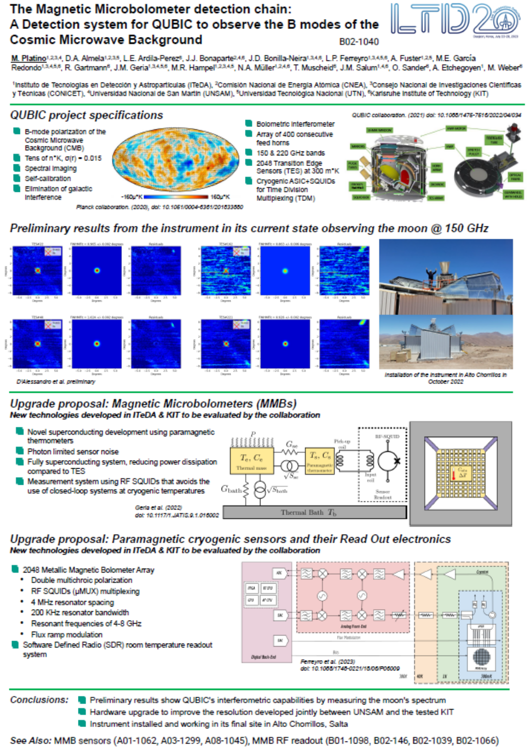
Presentaciones a congresos.

20th International Conference on Low Temperature Detectors, Daejeon, Korea. Julio 2023









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Dr. Alejandro Almela
Dr. Matias Hampel
Ing. Luciano Ferreyro
Ing. Manuel Garcia Redondo
Ing. Juan Salum
Dr. Manuel Platino

Ing. Juan Manuel Geria
Ing. Nahuel Müller
Ing. Andres Didonato
Ing. Claudio Ferrari
Ing. Enrico Petriela
Mg. Ing. Alejandro Fasciswski
Dr. Matias Wegner
Ms. Diego Perez Gagni
Tec. Dante Mercado
Tec. Diego Silva
Lic. Belén Manente
Lic. Micaela Álvarez
Prof. Dr. José F. Bonaparte