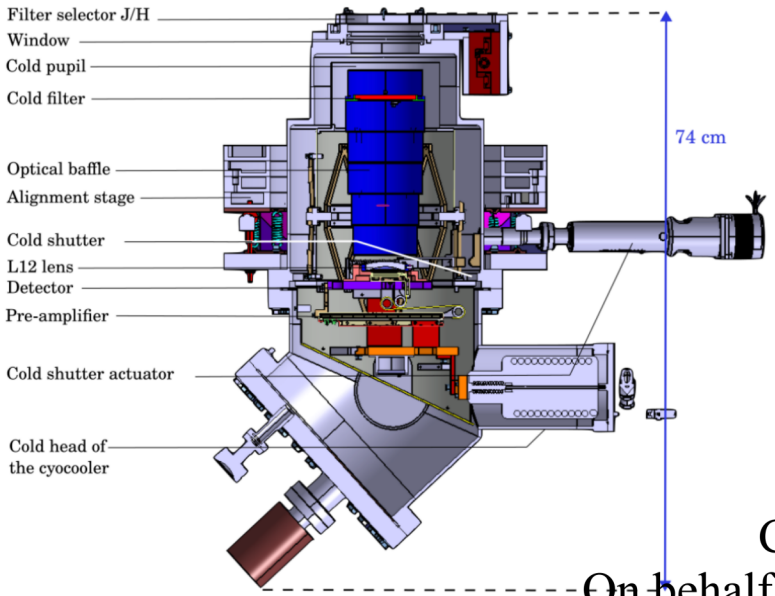
CAGIRE status : What's new in 2025 ?



CAGIRE

Francis Fortin
CNRS Postdoc Fellow
On behalf of the CAGIRE team @ IRAP

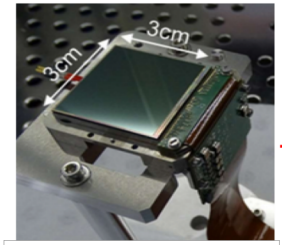
CAtching GRB InfraRed Emission

Goal : detect "obscured" afterglows

→ **First generation of stars (redshift z > 6)**
→ **Massive hosts (galactic extinction)**

- Slew in less than 20s
- Wide field (22'x22')
- Near-infrared (J, H)

One of a kind

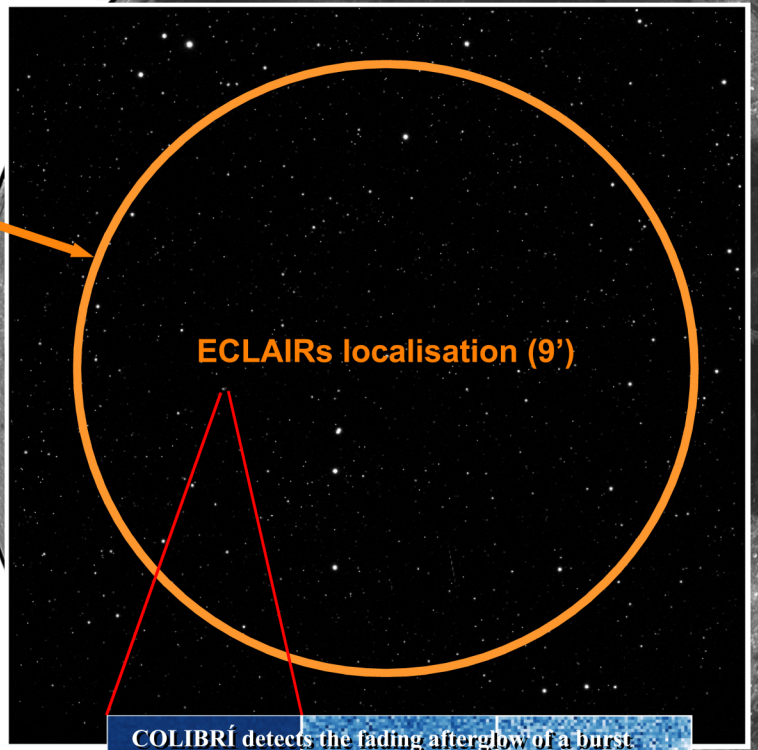


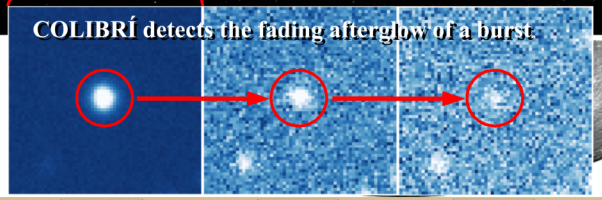
ALFA (2k x 2k)

CAGIRE

COLIBRÍ

An example : GRB 250502A





Context of the CAGIRE project

COLIBRI telescope: funded by LabEx OCEVU and INSU

French-Mexican collaboration:

International Research Program Eridanus

↘ UNAM provides site + building

CAGIRE instrument : funded by CNES, LabEx FOCUS and CNRS (OMP-IRAP)

ALFA detector : lent to FOCUS by ESA, then lent to us by FOCUS…

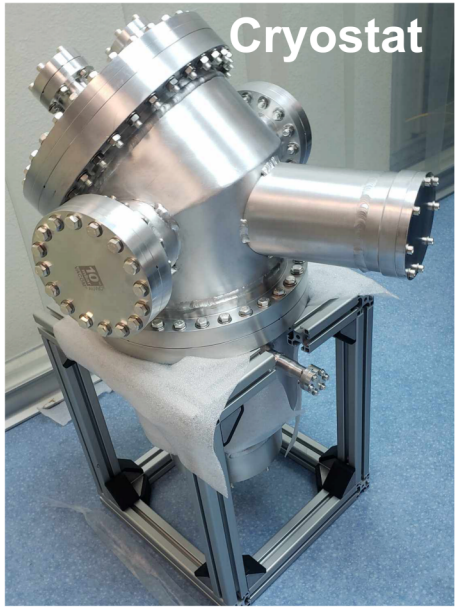
The making of CAGIRE : IRAP + support from CNES, CEA and CPPM

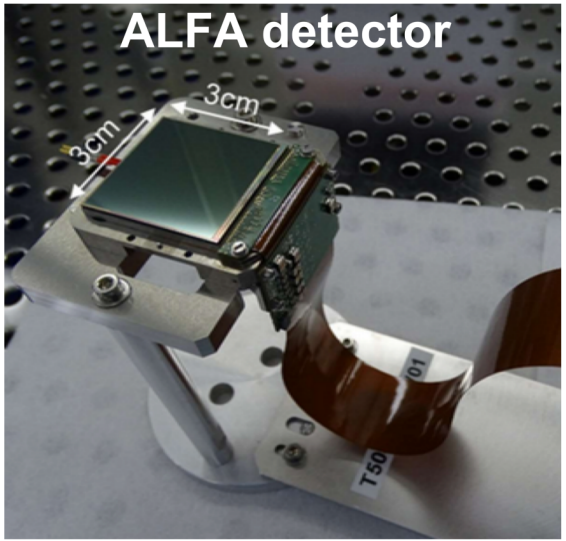
HR funded by CNES : 1 PhD (2020-2023) + 1 postdoc (2023-2026)

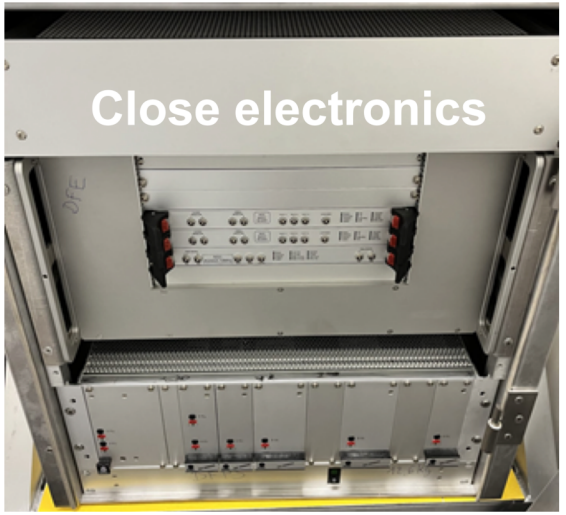
Where we left off in October 2024...

→ Detector was still in Marseille (in good hands :)
→ Calibrated alignment stage using a small SWIR camera
→ Vacuum / Temperature within cryostat: 10^{-7} mbar / 100K (80K for cold finger)

→ Prediction of performances on sky using CEA+CPPM characterisation of ALFA
+ CAGIRE image simulator







What happened since last time we met

Fine tuning of applied voltages
Tests of the NGC controller and cables (electric mass distribution to reduce EMC disturbances)
Refined electrical and thermal insulation of cryostat
Finalization of the acquisition software

Received ALFA at IRAP in June 2025 (some delay due to shipping parts missing)
After checking good health, started integration to the cryostat

First acquisitions with the complete camera during summer 2025

Improvements on the cold shutter mechanism

… and lots of progress on exportation logistics !

Cryostat in shipping crate and test environment

Tests under illumination

CNES provided a controlled black-body surface, positioned right in front of entry pupil of CAGIRE

Blackbody temperature : 0°C → 100°C

Room temperature : 0°c → 20°C
(test of NGC at negative temperatures in a separate room)

→ Goal: measure cosmetic, readout noise, filter response, response to light, impact of the ambiant temperature, instrument background, etc.

Star projector
→ test alignment and focus process, be ready for installation at SPM

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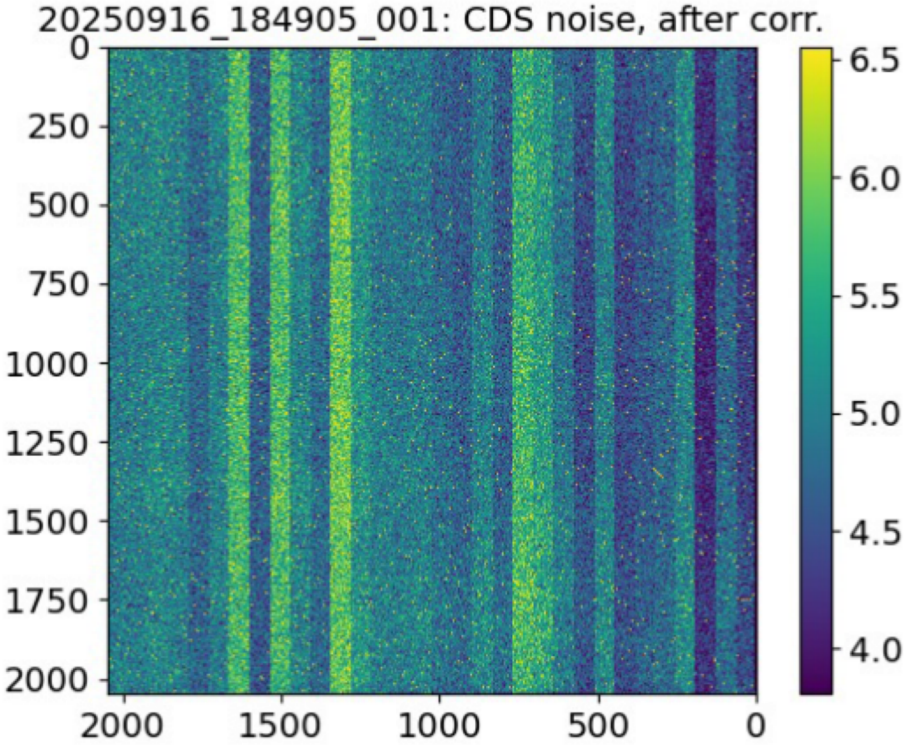
Measuring readout noise after integration

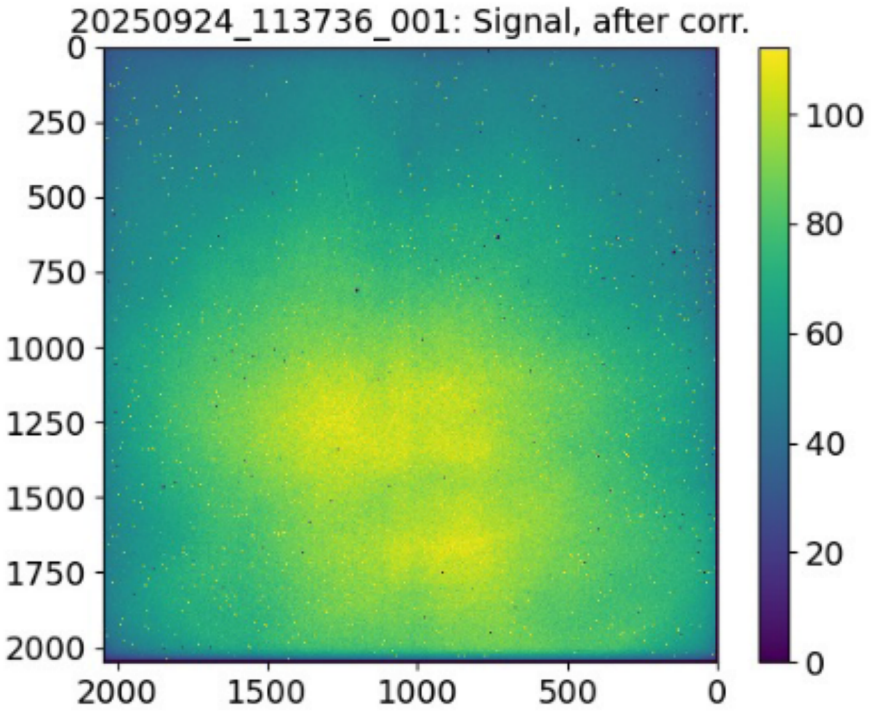


CDS noise : 47 e-
(single readout → 33 e-)

→ Very good news, comparable to CPPM test bench

→ Good electrical environment !

Flat field (sort of, under construction)



Cosmetic is very good
(hot/cold pixels, homogeneity)

→ transportation between multiple labs didn't degrade the detector compared to first measurements by CEA

Some measurements (not final configuration)

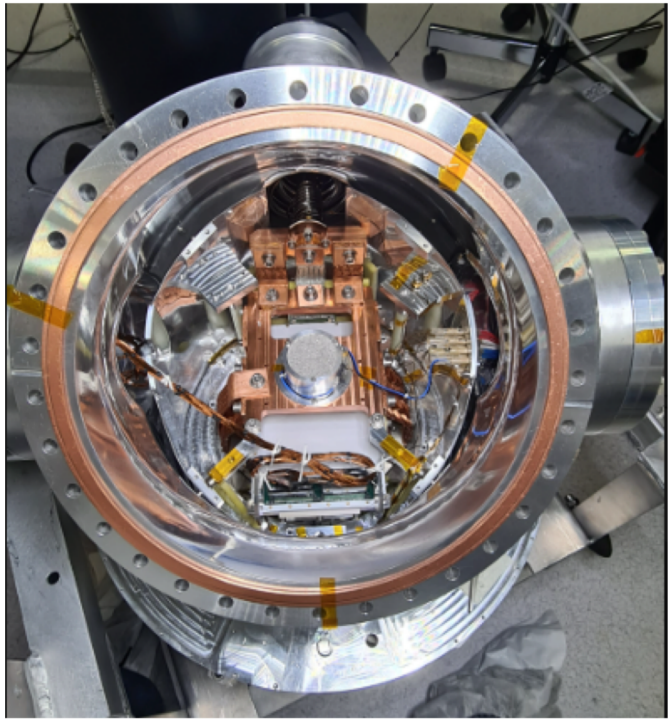
Tenceinte (°C)	Tcorpsnoir (°C)	Signal J (adu/pix/f)	Signal H (adu/pix/f)
BS20	--	78 / 72 /79*/73	--
0	0	13	15
	30	12.5	31
	60	15	245
10	0	35	35
	30	36	56
	60	35	270
	90	60	2030
20	0	78 / 71 / 73**	78 / 71 / 73**
	30	77	95
	60	78	315
	90	94	2080

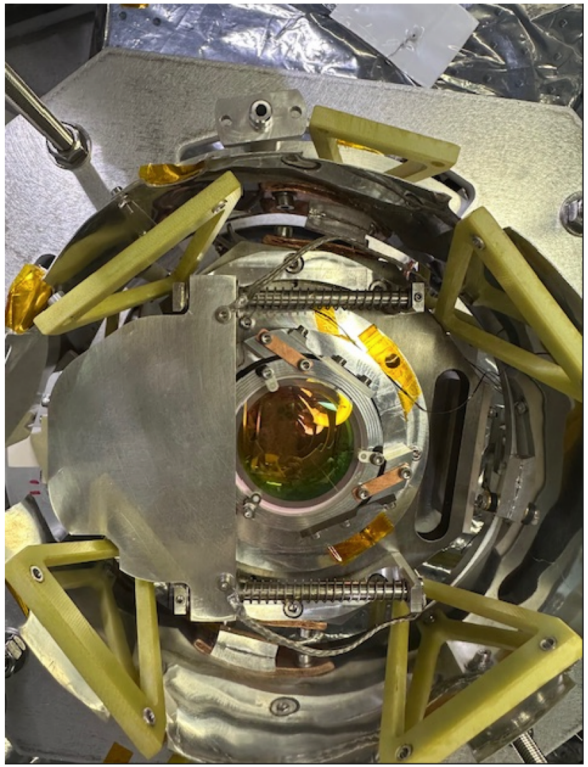
Expected sky contribution:
J ~ 25 adu/fr
H ~ 130 adu/fr

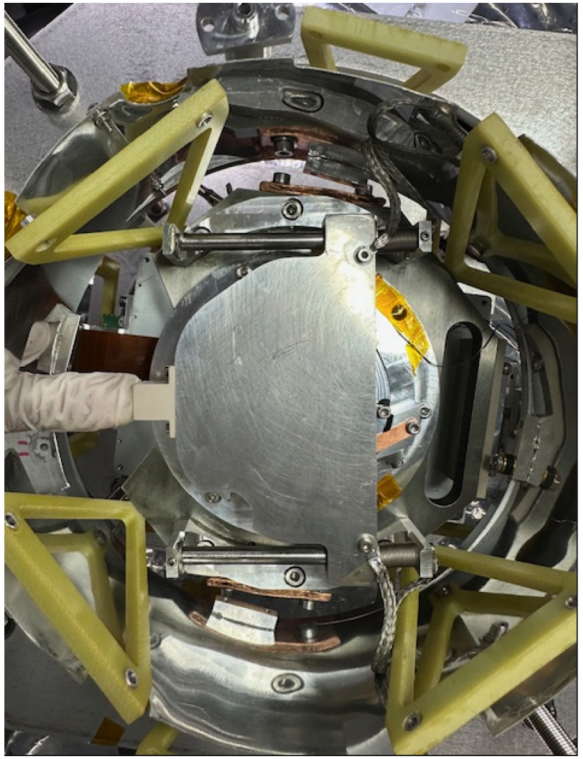
→ We just sealed last week the camera for the last time after upgrading the cold shutter

→ Resuming measurements in final configuration coming during the next two weeks

Mounting the cold shutter







Shipping and delivery

CNES is lending us a hand to organize shipping
→ Make it possible for early 2026 (likely March)
→ First of a series of dedicated meeting to come very soon.

Proposal: a two steps installation…

First step:
- Validate I/F: mechanic ; electric ; fluids ; software
- Long run tests of CAGIRE at SPM before WOB is available

Second step: First light, after the WOB installation

This is only the cryostat...
There will be 3 more boxes,
containing the close electronics,
the main electronics (a rack) and tools