

AHEAD 2020  
WP 5

# TNA activities at the LARIX facility: four years of experiments and international collaboration



L. Ferro<sup>(1,2)</sup>, M. Moita<sup>(3)</sup>, N. Auricchio<sup>(2)</sup>, M. Bulla<sup>(1,4,5)</sup>, E. Caroli<sup>(2)</sup>, F. Frontera<sup>(1,2)</sup>, C. Guidorzi<sup>(1,2,4)</sup>, P. Rosati<sup>(1,2,4)</sup>, J. B. Stephen<sup>(2)</sup>, E. Virgili<sup>(2,6)</sup>

1 - University of Ferrara, DFST, Italy; 2 – INAF-OAS of Bologna, Italy; 3 – CEA/IRFU, Paris, France; 4 – INFN of Ferrara, Italy; 5 – INAF-OAA, Teramo, Italy; 6 - INFN of Bologna, Italy

## The LARIX facility

Multidisciplinary facility for high energy (>15 keV) X-ray physics



Hard X-Ray Astrophysics



Medical Physics

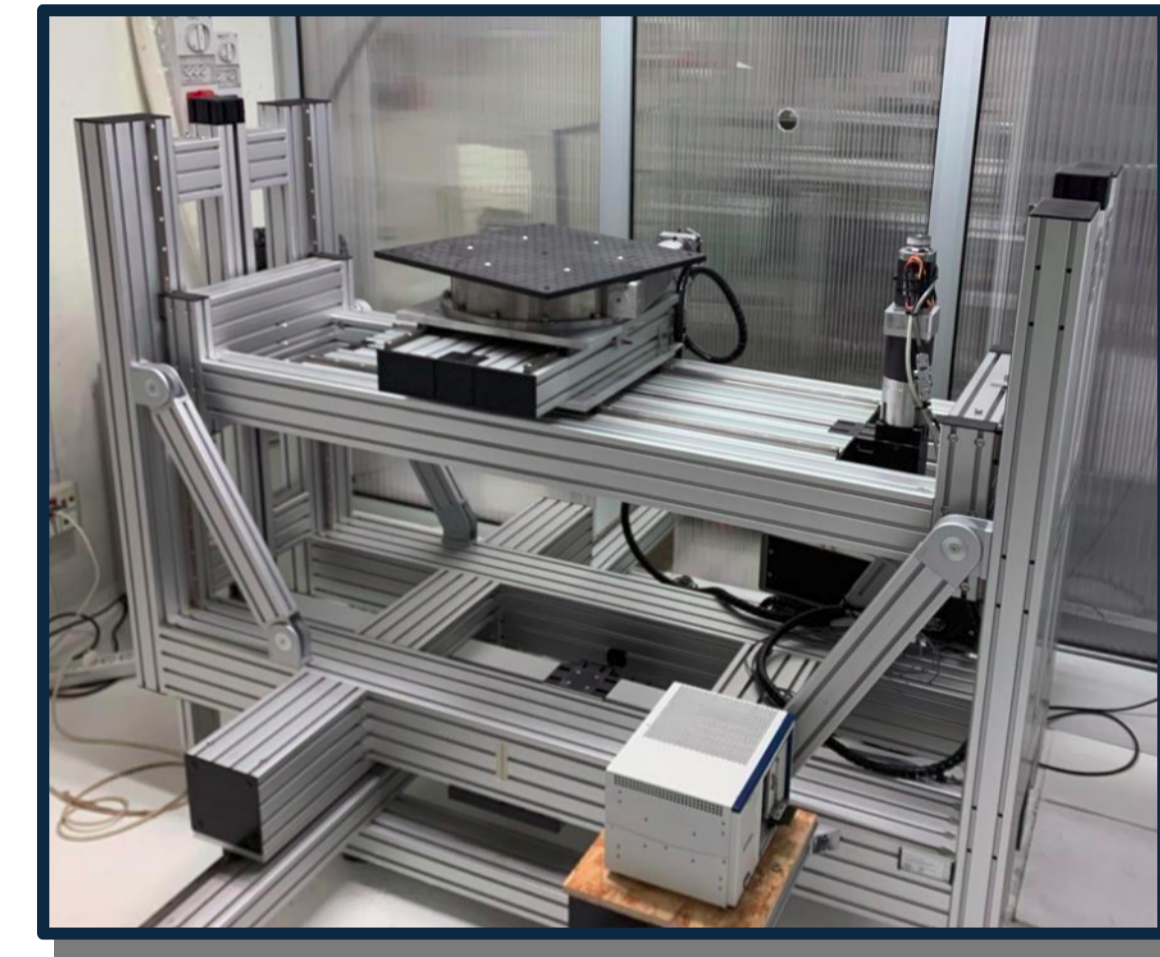
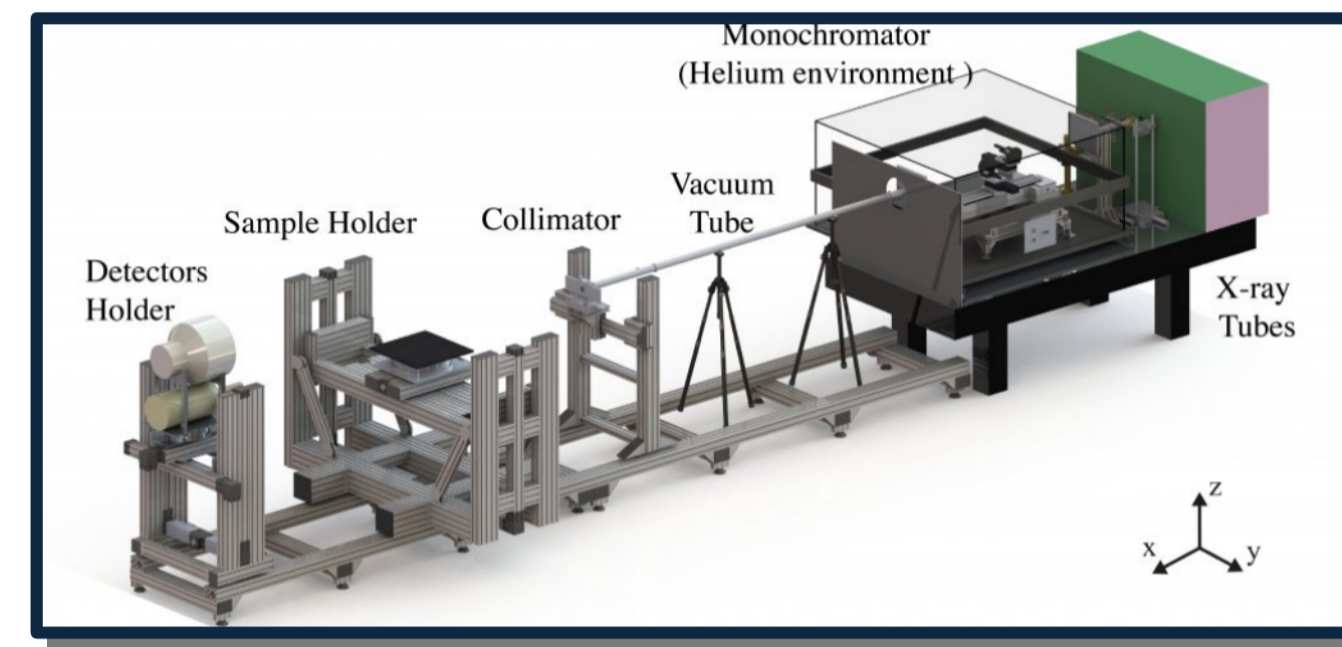


Archeometry/Heritage Physics



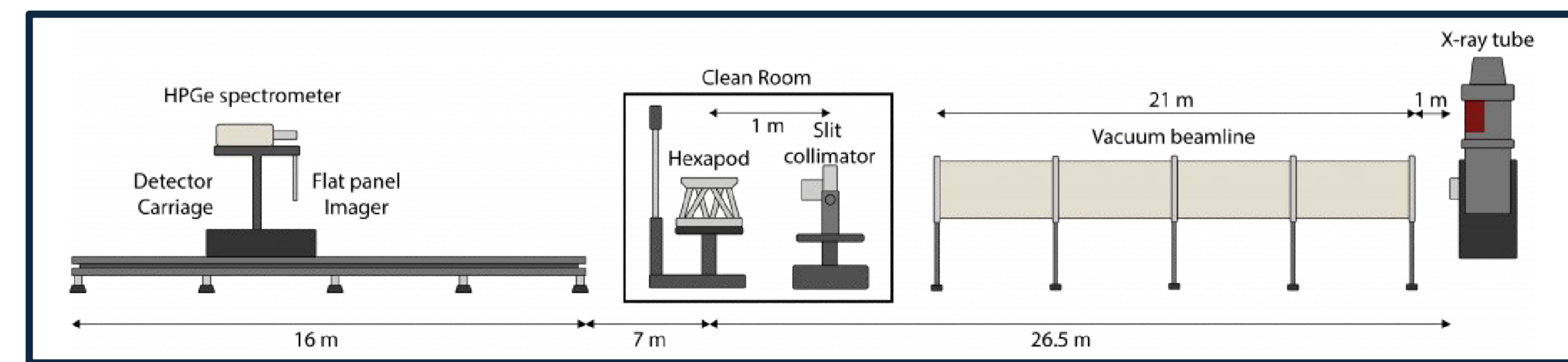
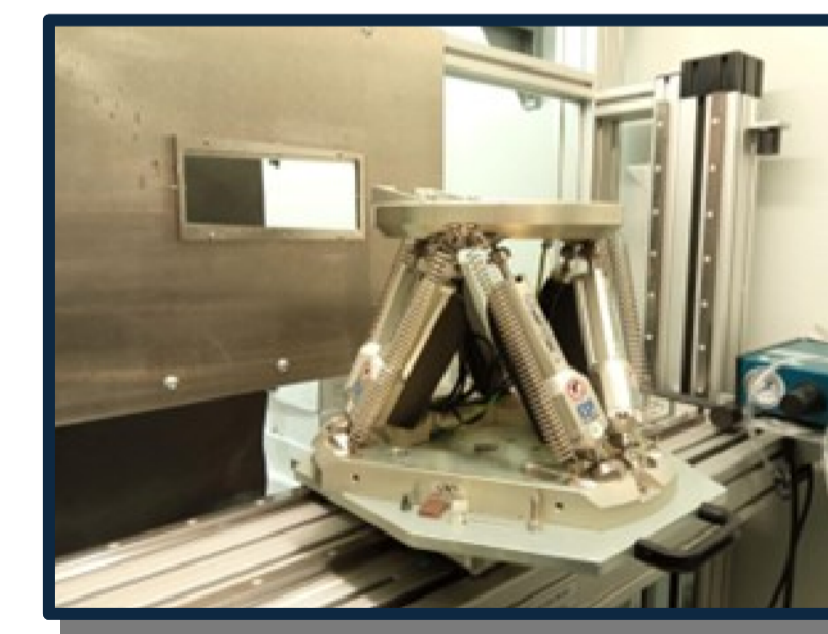
## LARIX - A

X-ray beam (225 kV max, 1.4 kW max) and Bragg-Bragg monochromator (11 – 200 keV). CsI imager (0.3 mm res.) + HPGe detector

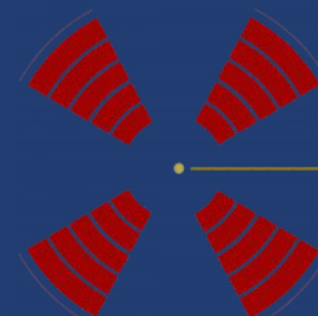


## LARIX - Tunnel

X-ray beam (320 kV max, 800 W max) + portable betatron (2.5 MV max). CsI imager (0.2 mm res.) + HPGe detector



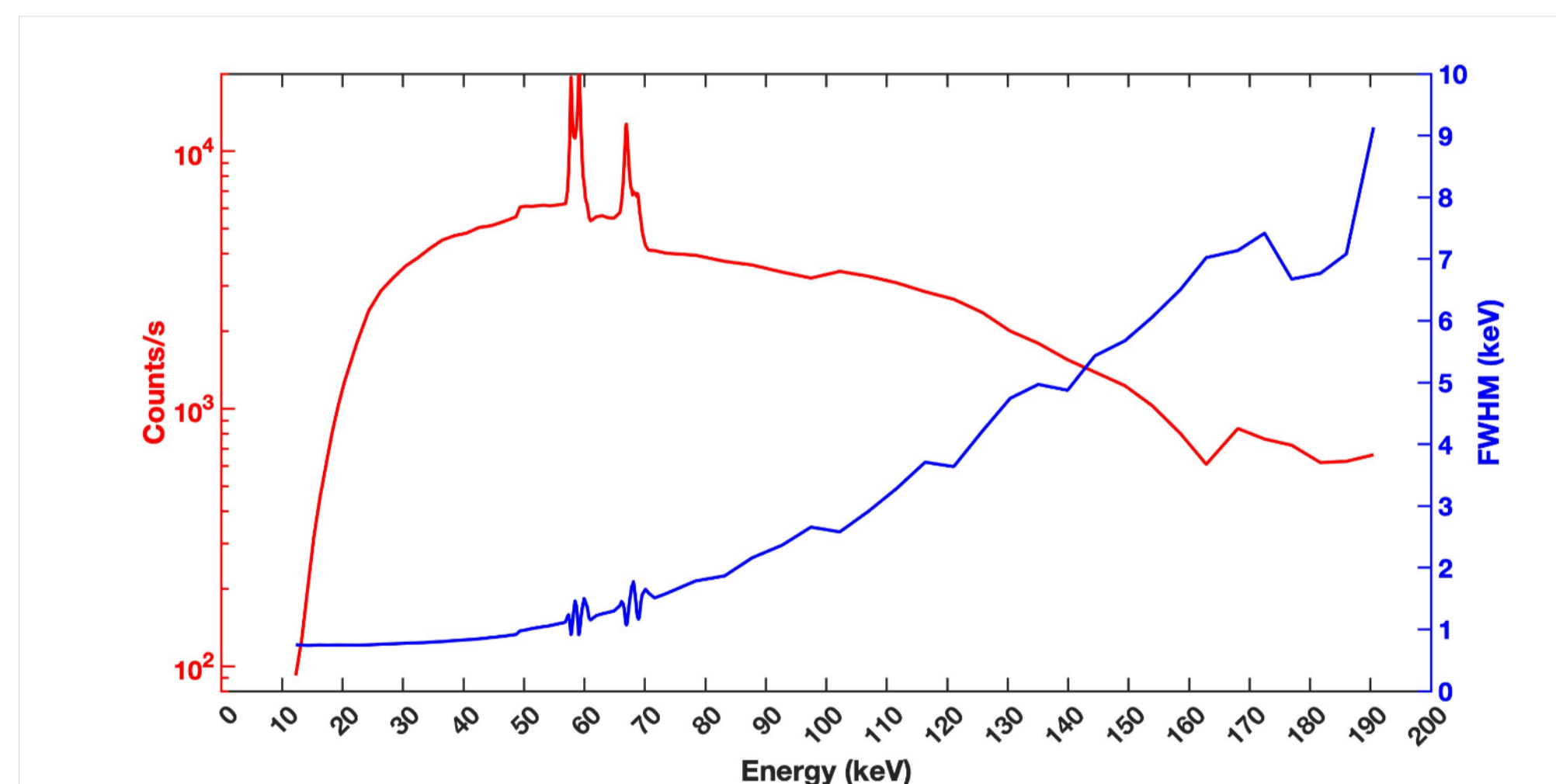
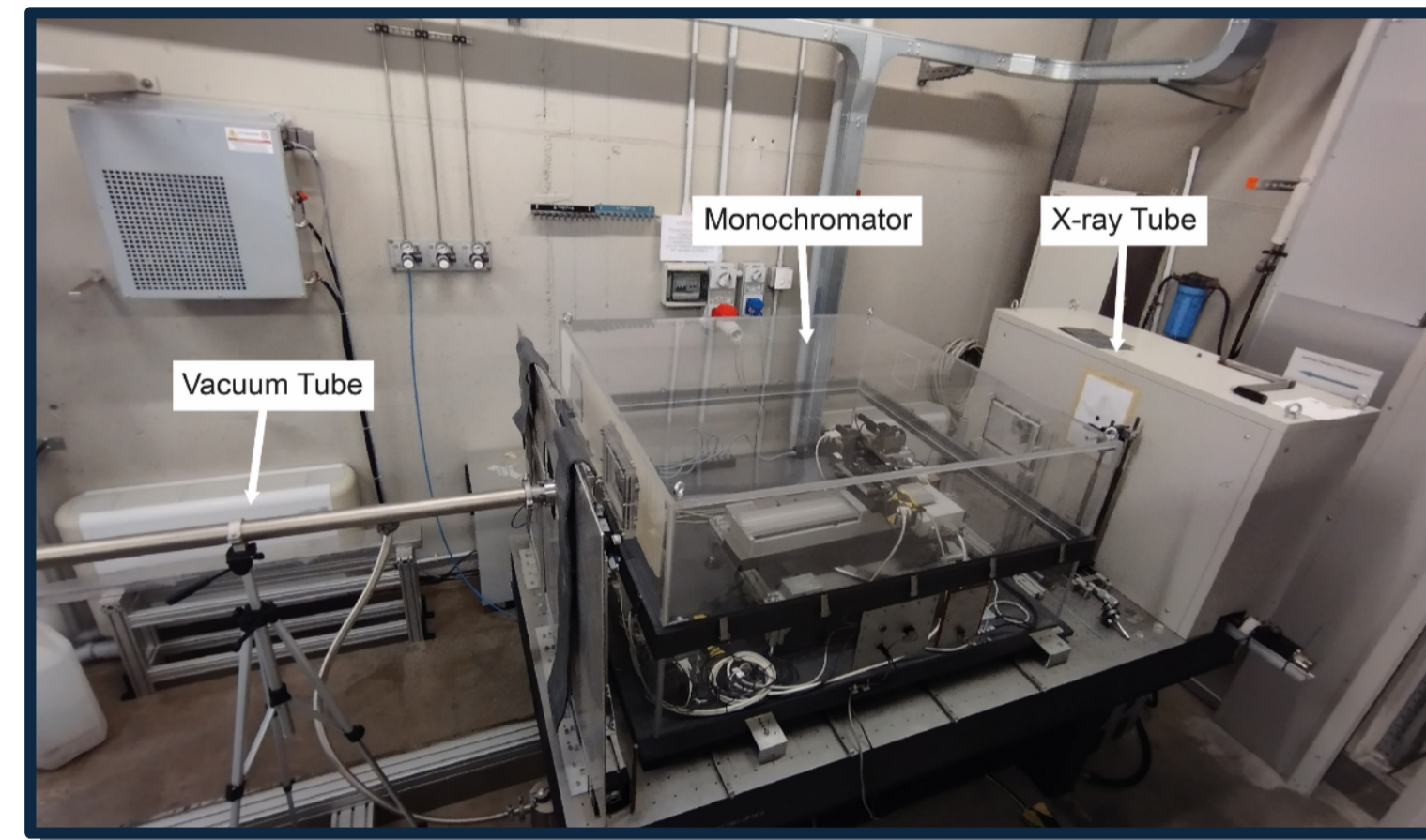
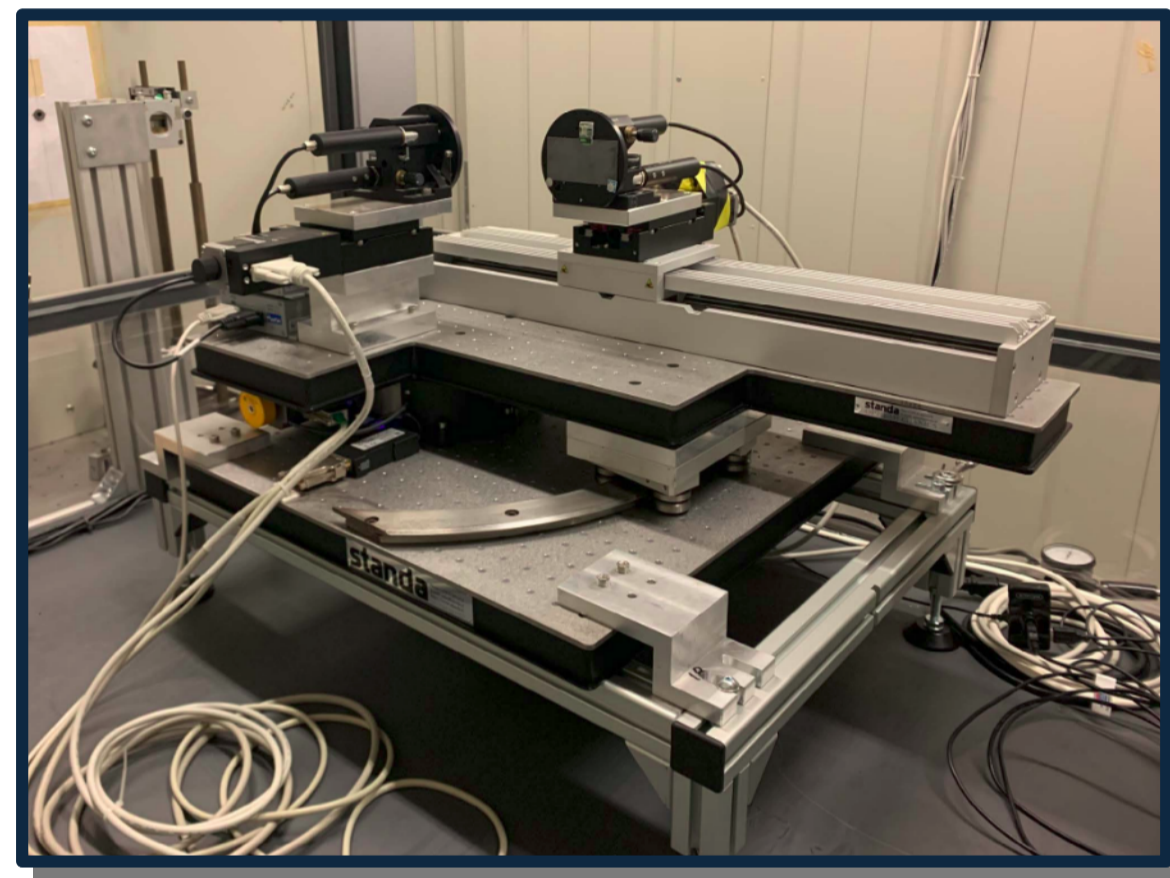
SCAN ME



LARIX FACILITY

## Facility upgrade and commissioning

- Bragg-Bragg monochromator Gen 3 installed
- Maintenance and refurbishment of the facility's equipment: monochromator vacuum/helium environment sent back in place, upgrade to the HPGe detectors, updated documentation, etc.

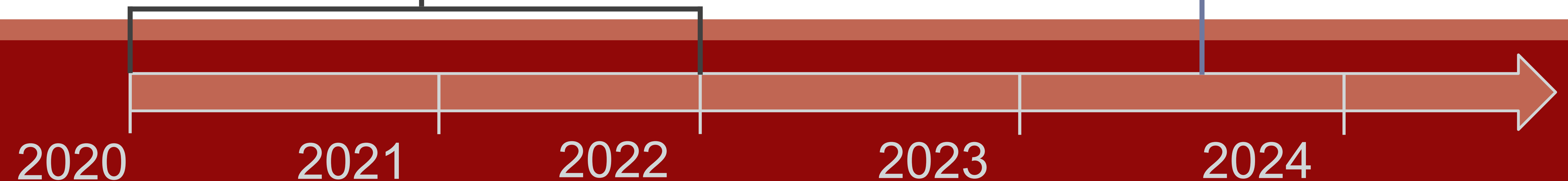
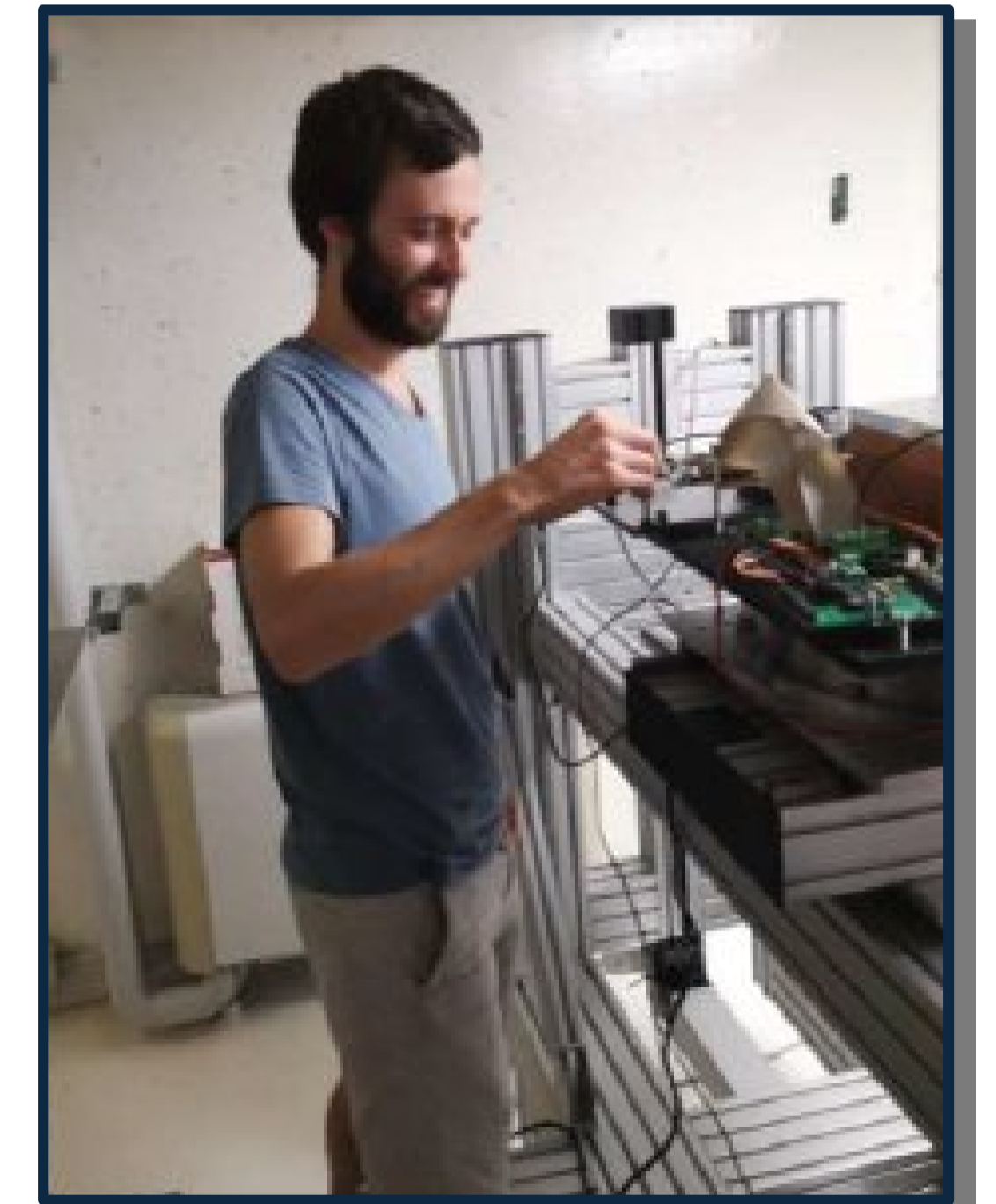
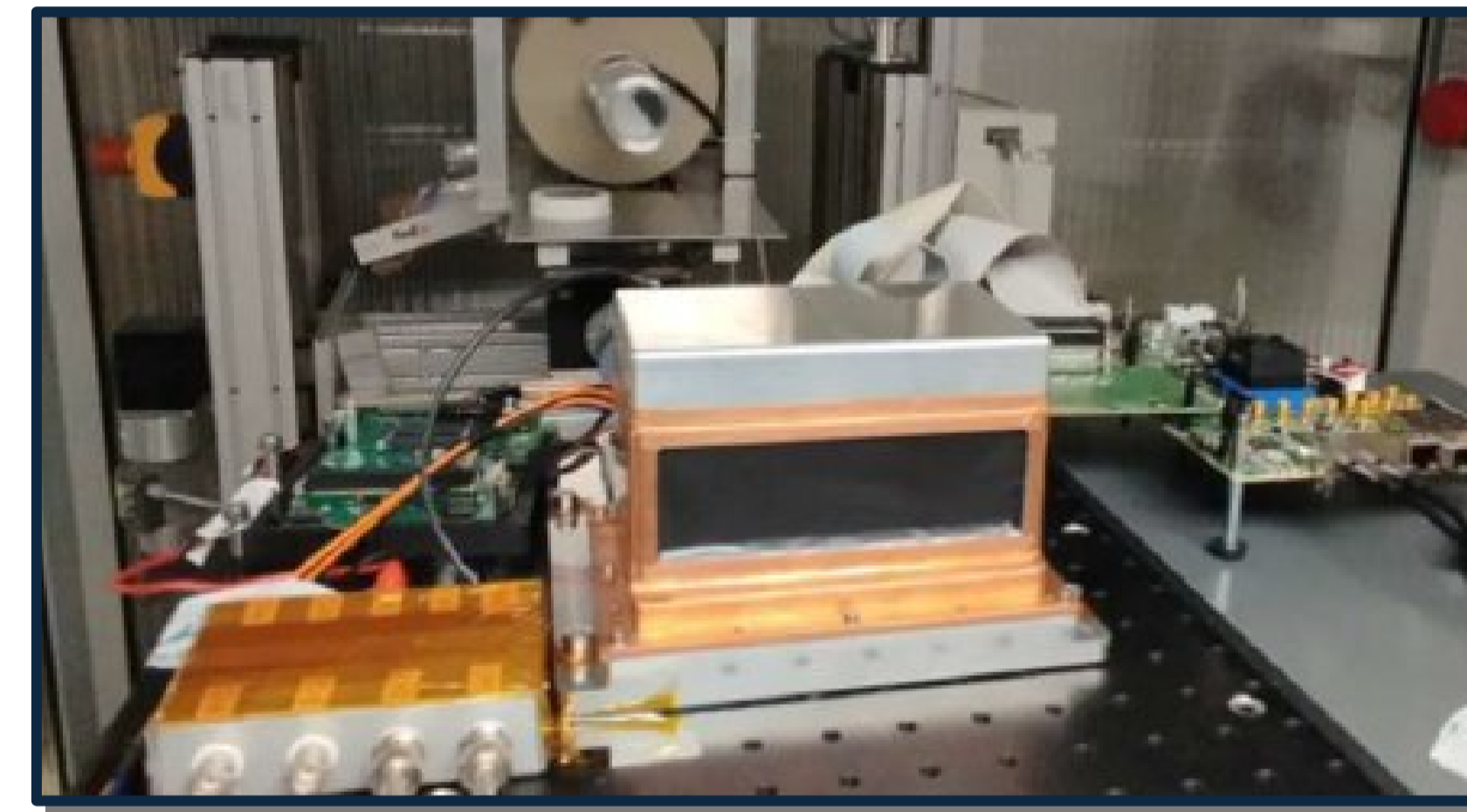


## POLTFH #1

Visitors' institutions: TUM (Munich, GE), CEA (Paris, FR)

**Objective:** characterisation of the POLTFH experiment, path-finder and ground demonstrator for the COMPOL (COMpton POLarimetry cubesat)

- Energy calibration and detector response
- Compton polarisation efficiency test



## THOR #1

Visitors' institutions:  
University of Coimbra/LIP  
(Coimbra, PT)

**Objective:** test of one CZT detector composing the THOR experiment, GRB and TGF detector to be put on the Space Rider

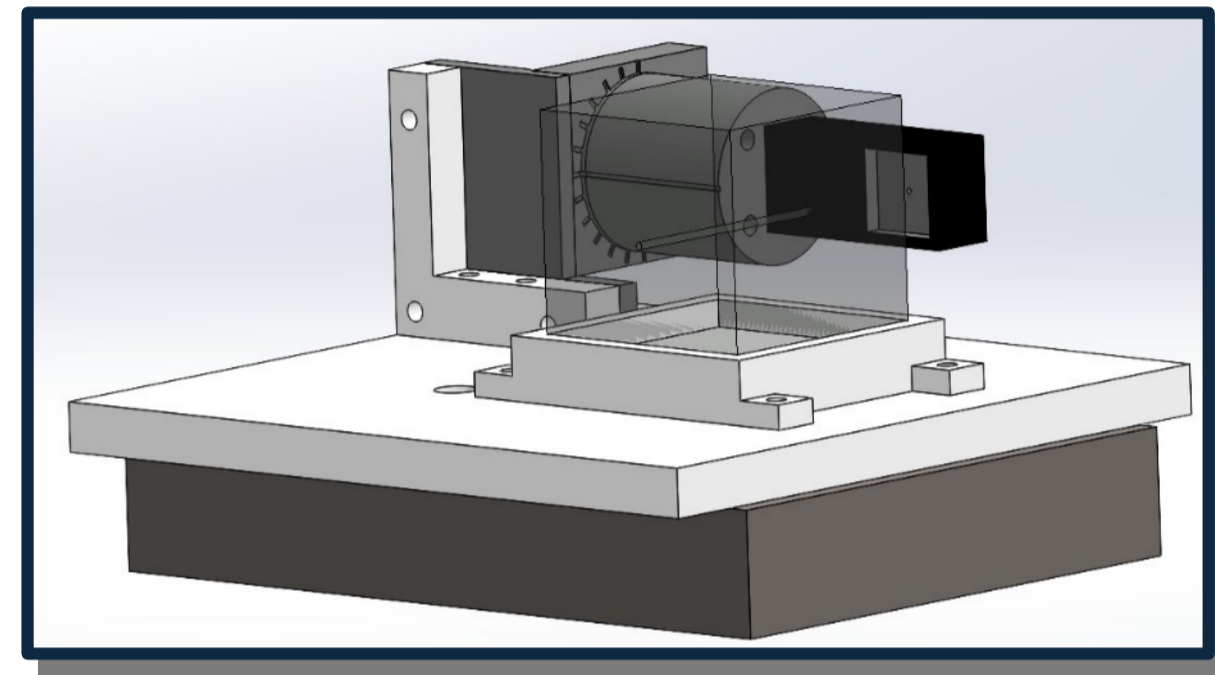
- Spectral response of the detector
- Compton polarisation efficiency tests

## POLTFH #2

Visitors' institutions: TUM  
(Munich, GE), CEA (Paris, FR)

**Objective:** second run of tests for the POLTFH experiment

- Energy calibration and detector response
- Off-axis response
- Compton polarisation efficiency test



## THOR #2

Visitors' institutions:  
University of Coimbra/LIP  
(Coimbra, PT)

**Objective:** test of a stack of 4 CZT detectors composing the full THOR experiment

- Spectral response of the detector, from low to high energy (50 keV to 2 MeV)
- Imaging capabilities

## Novel scintillators light distribution + GRAPE

Visitors' institutions: Max Planck Institute  
(Munich, GE), University of Genève (CH),  
University of New Hampshire (US)

**Objective:** test of CeBr3 and GAGG:Ce scintillators coupled to SiPM (developed for POLAR-2). Test of the GRAPE detector

- Scintillation light distribution in CeBr3 and GAGG:Ce
- Imaging capabilities and energy resolution of the GAGG:Ce
- Instrument asymmetry, detection efficiency and event reconstruction accuracy of GRAPE

