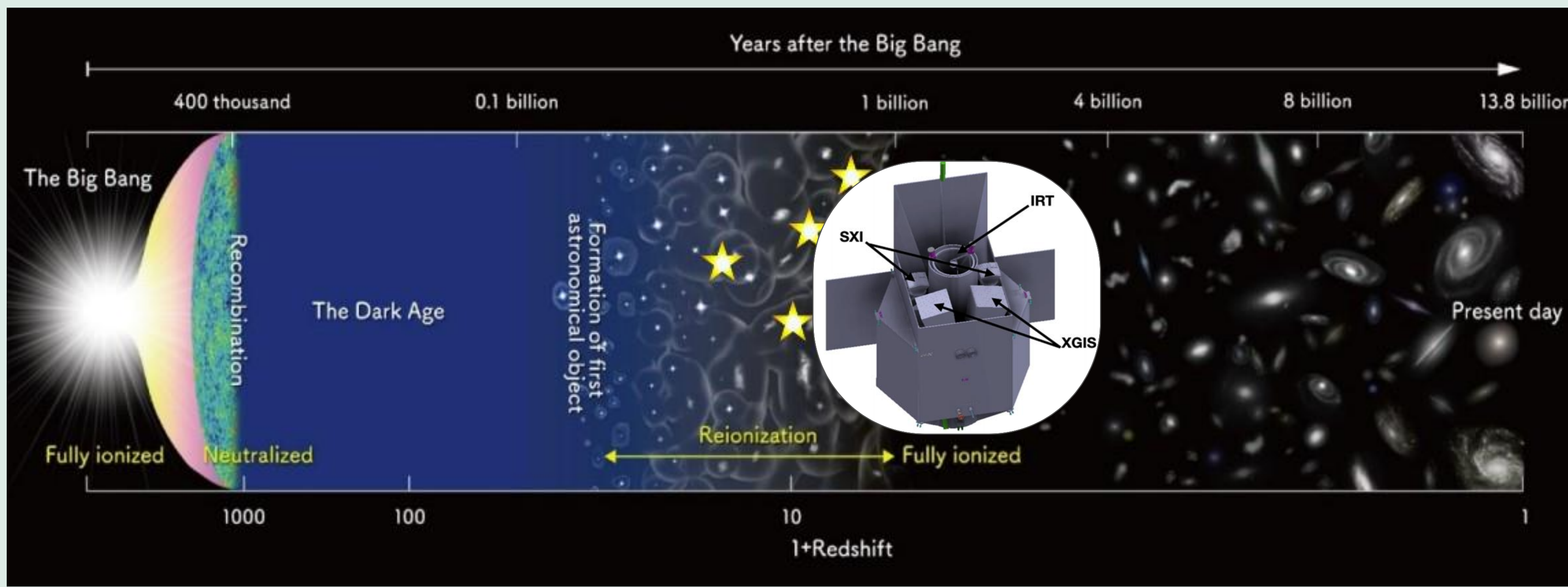


S. Srivastava, C. Labanti, L. Amati, R. Campana, E. Virgili, E. Marchesini, E. Borciani
On behalf of the THESEUS Consortium, INAF/OAS Bologna via P. Gobetti 101 Bologna (Italy)
Contact us at: smiriti.srivastava@inaf.it



THESEUS, a multi-instrument mission concept, ready to shed light on early universe through **High Redshift Gamma Ray Bursts (GRBs)**: the unique tools for Cosmology and Multimessenger Astrophysics!

X and Gamma Imaging Spectrometer (XGIS):
2 keV - 20 MeV
Soft X-ray Imager (SXI):
0.3-5 keV
InfraRed Telescope (IRT):
> 700nm-2000nm [1]



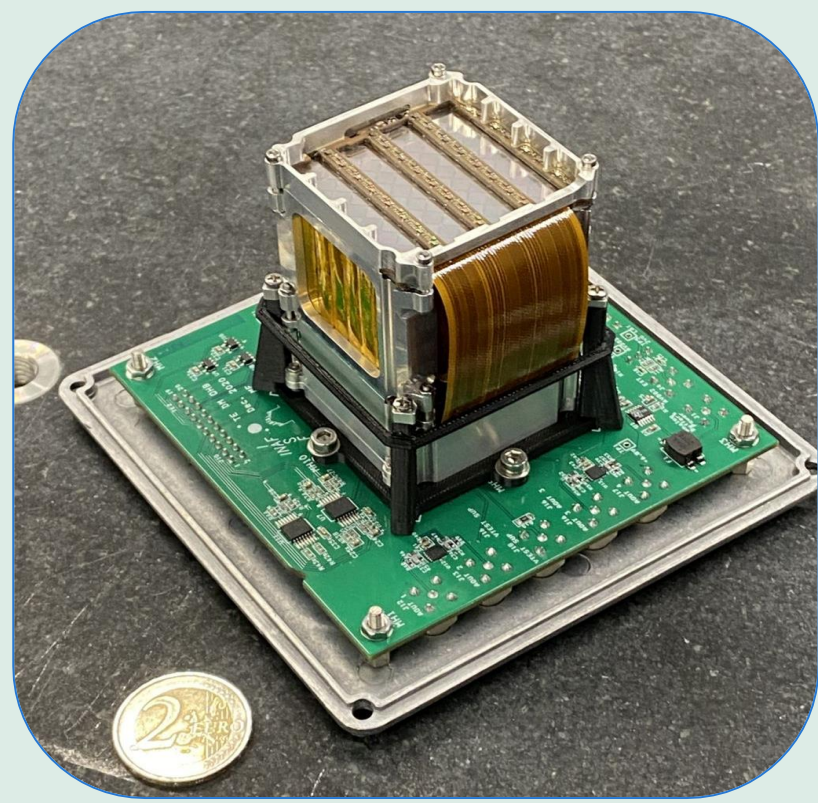
Learn more

ESA-M7 PHASE 0

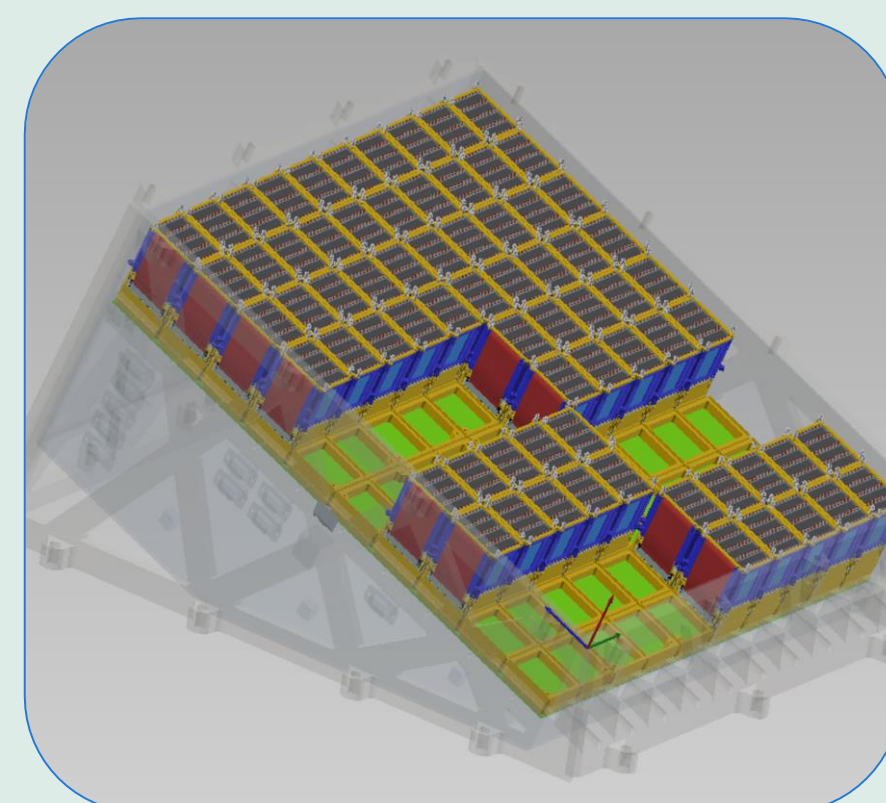
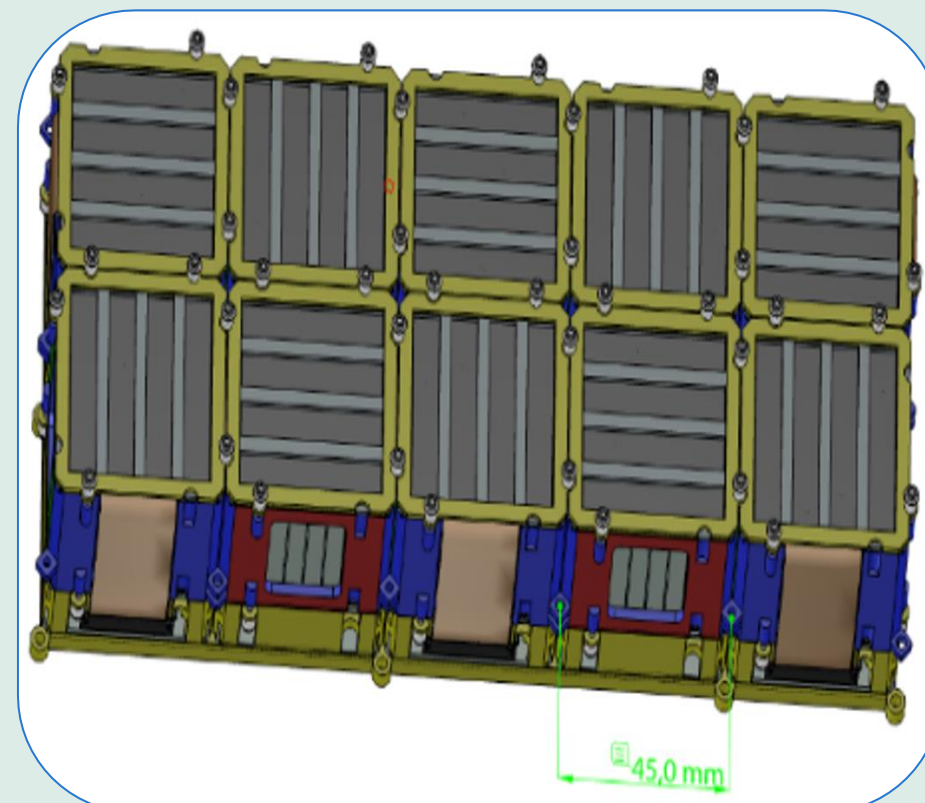
1 module = 64 pixels

1 supermodule = 10 modules

Detection Plane = 100 modules

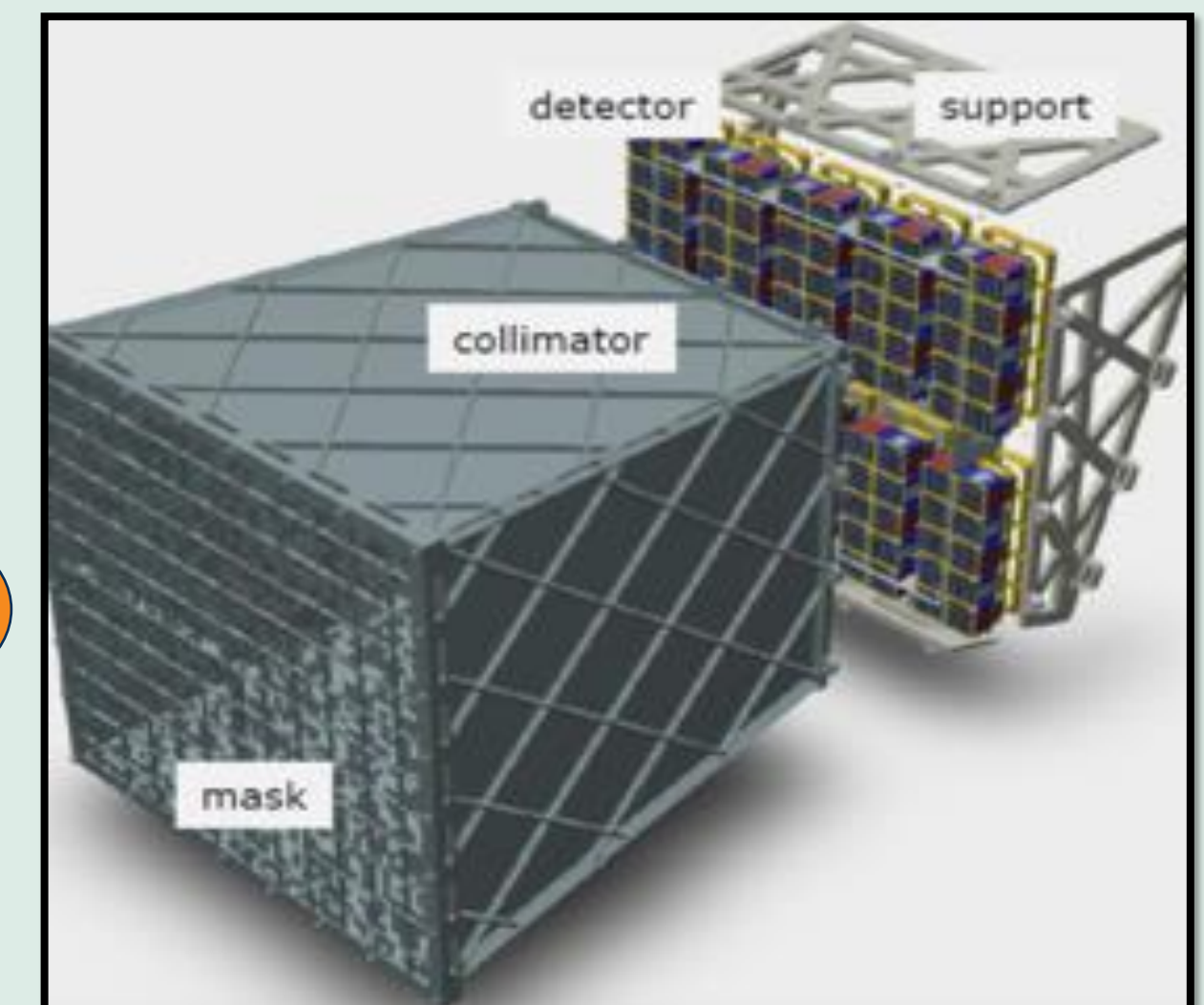


Demonstration Module realized during ESA M5 Phase A Study: 2018-2021



MODULAR APPROACH

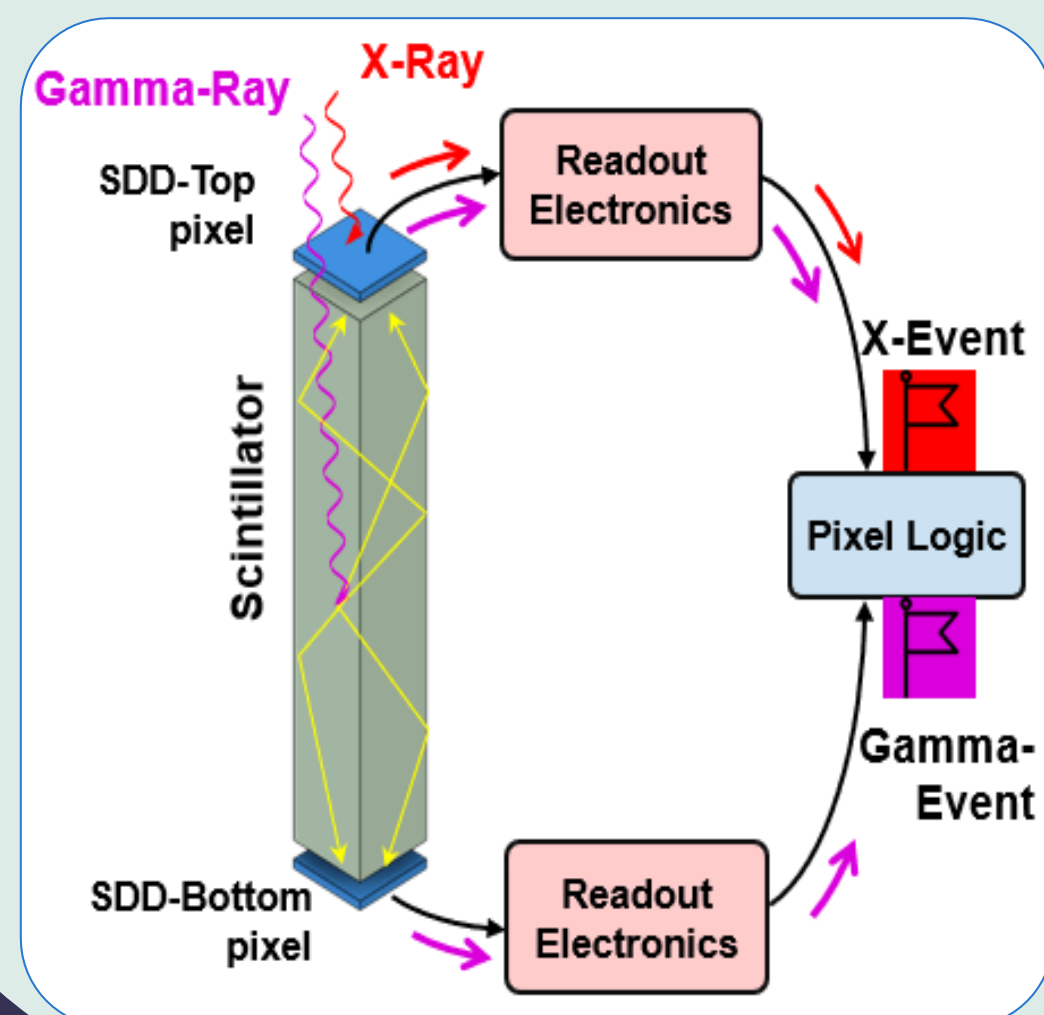
XGIS CAMERA



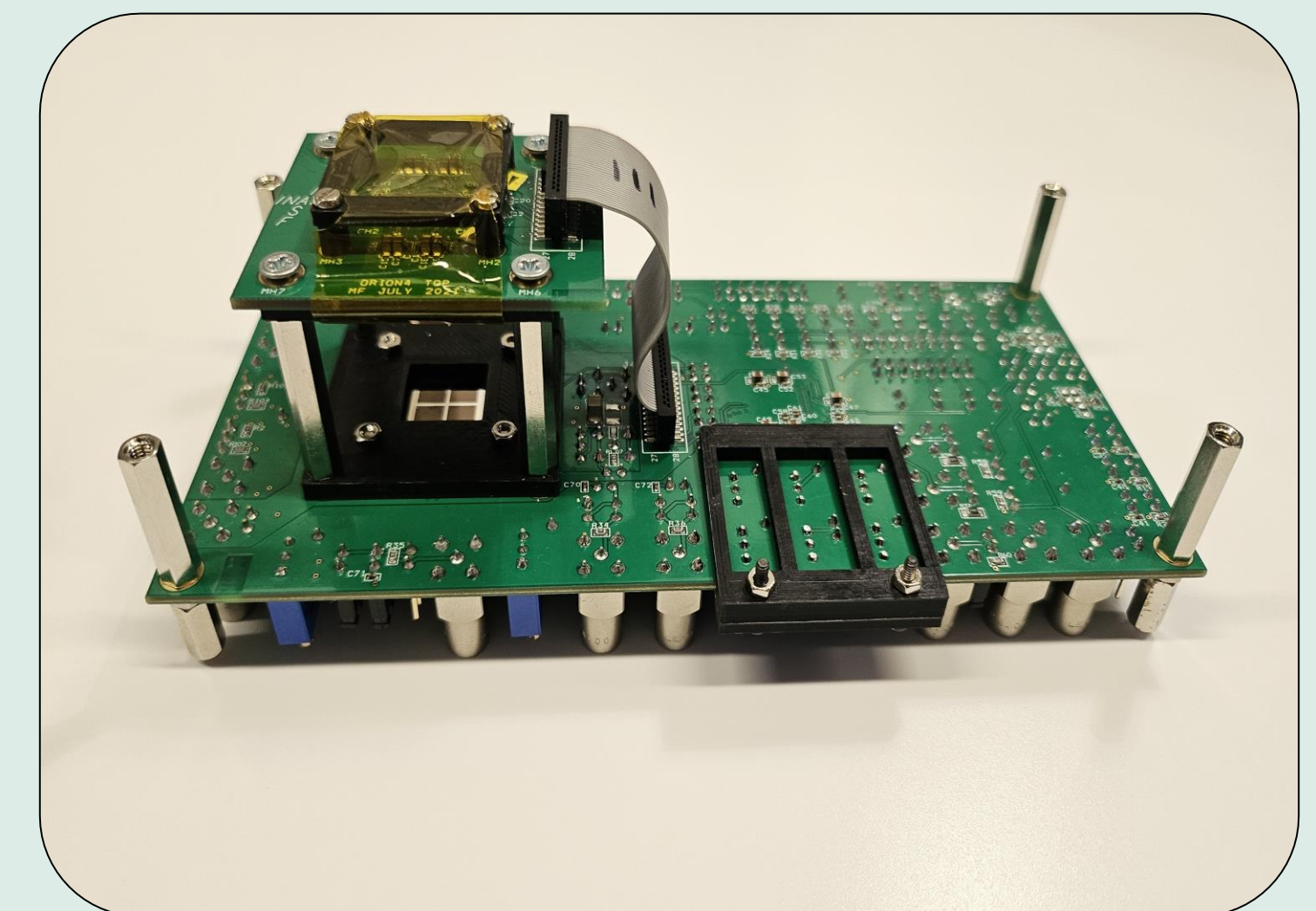
2 identical cameras onboard with coded mask + collimator assembly

SISWICH PRINCIPLE

1 Pixel = 2 Silicon Drift Detectors + 1 Cs(Tl) Scintillator Sandwich

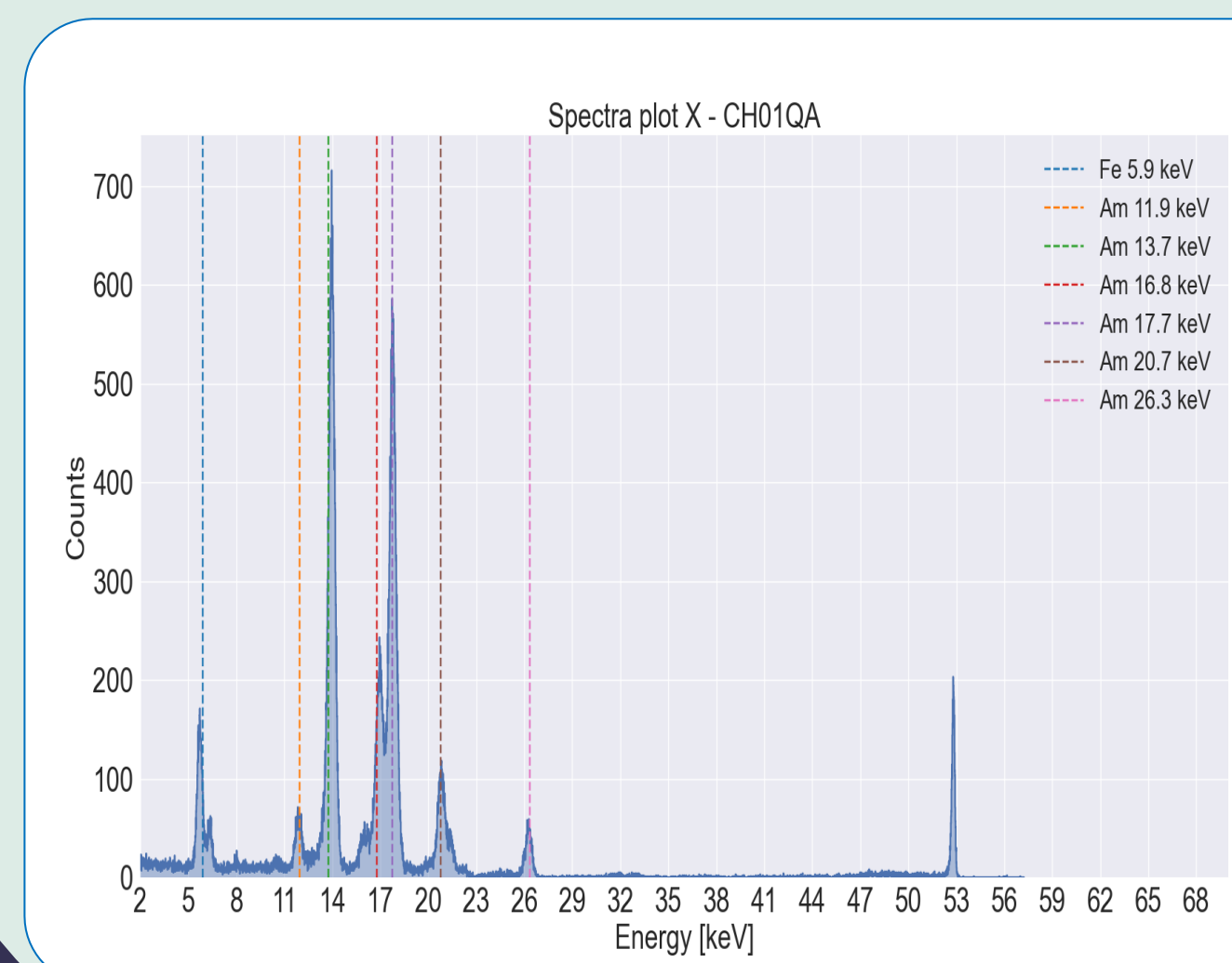
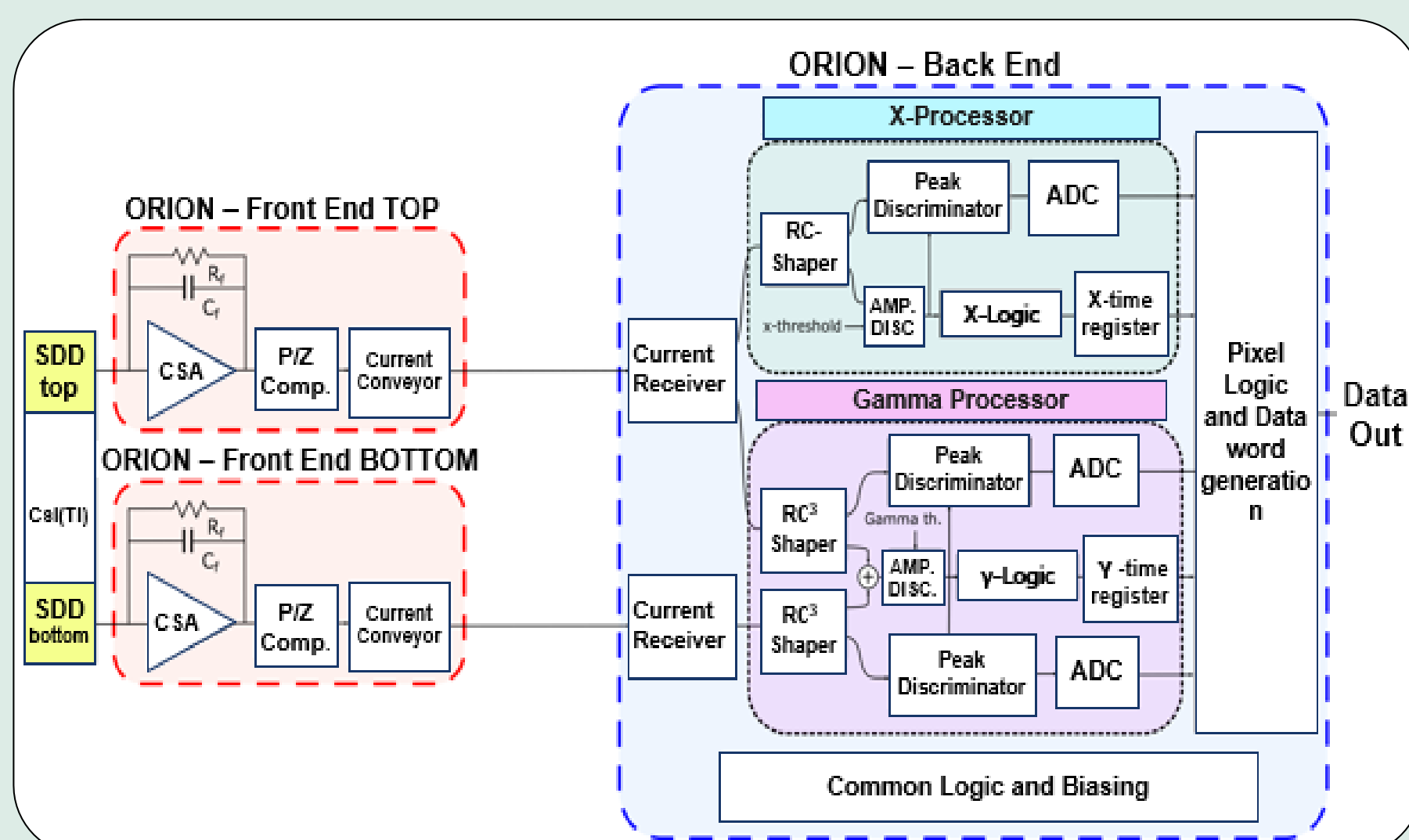


- Radiation < ~30 keV interacts in the Top SDD
- Radiation > ~30 keV interacts directly in the scintillator bar. Optical photons are collected by both top and bottom SDDs.
- Data acquisition performed by an ASIC ORION [2].
- A very low noise Front End + mixed signal Back End chipsets with processing capability up to 8 pixels (channels) per ASIC [3]
- Linear processing of signals in X range up to 40 keV and up to 5 MeV for Y-Photons



ORION ASIC Board

ORION IV: OPERATION PRINCIPLE



Performance of ORION IV channel in X - processing Branch:

- Electronic Noise: 40 e- @ Room Temperatures
- Energy Resolution FWHM: 434 eV @ 13.7 keV of Am-241

PHASE A 2023 SELECTION

ORION IV: PERFORMANCE

References:

- [1] Labanti, C., Frontera, F., Amati, L. et al. SPIE 2020: (Vol. 11444, pp. 395-413)
[2] F. Mele, Campana, R. et al in IEEE 2021 Transactions on Nuclear Science, vol. 68, no. 12, pp. 2801-2809
[3] M. Grassi, F. Fuschino, Marchesini, E. et al 2022 IEEE, 2022, pp. 1-6, 10.1109/I2MTC48687.2022.9806486



