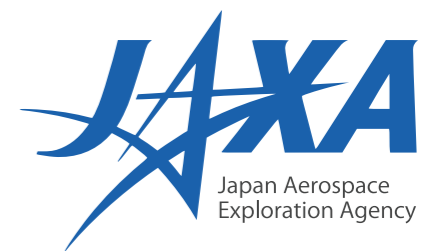
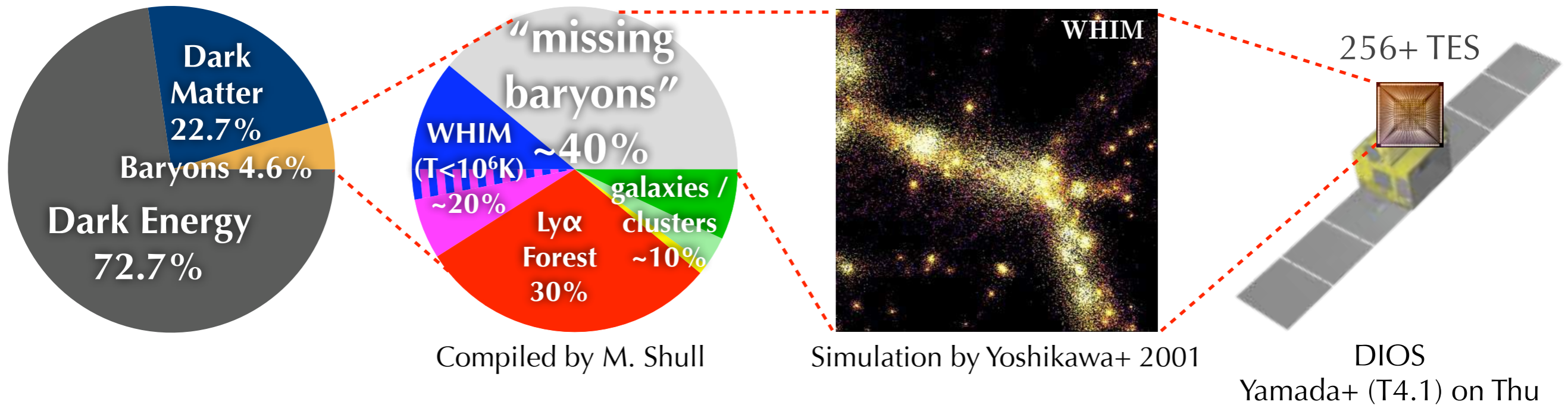


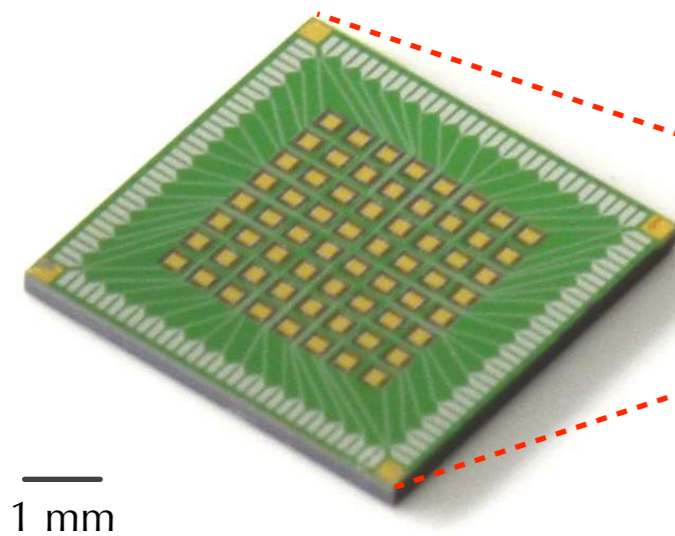
Development of Frequency-Division Multiplexing Readout System for Large-Format TES X-ray Microcalorimeter Arrays

Kazuhiro Sakai, R. Yamamoto, Y. Takei, K. Mitsuda, N. Y. Yamasaki (ISAS/JAXA)
 M. Hidaka, S. Nagasawa, S. Kohjiro (AIST)
 T. Miyazaki (Kanazawa U.)



Experimental Setup - Cold Stage

64-pixel TES



Muramatsu+
in this workshop

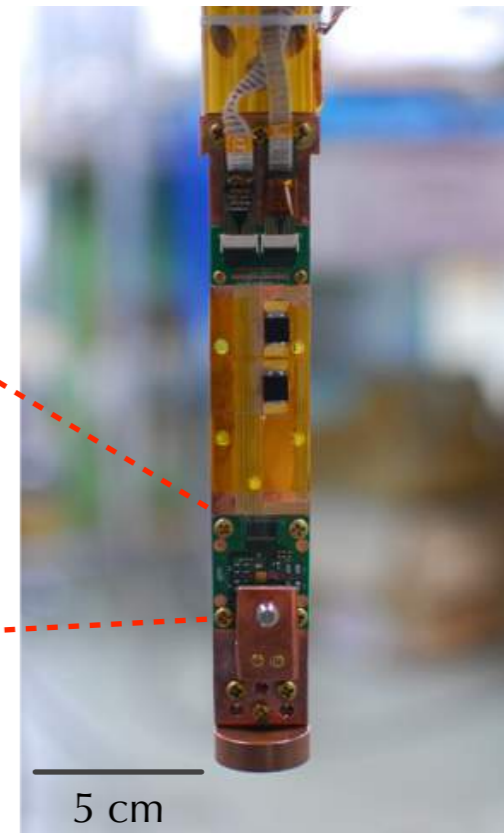
- Ti/Au bilayer
- Au absorber

Focal-Plane Electronics



- Single-staged config
- Low-power SQUID
(Sakai+ 2014)

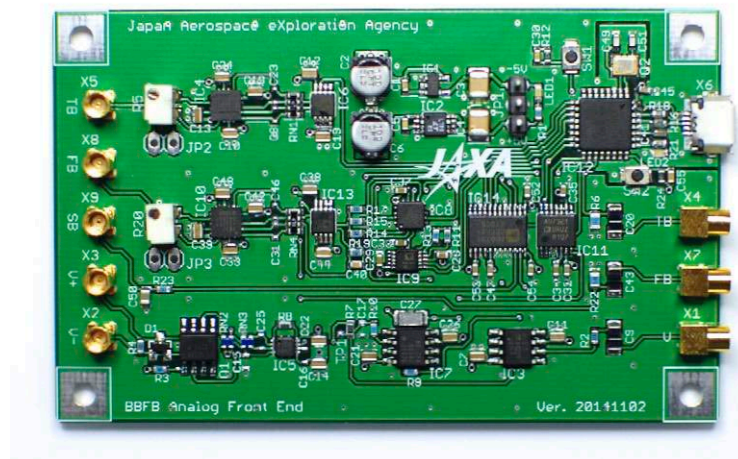
Cold Stage



- Dilution refrige
- ^{55}Fe X-ray source

Experimental Setup - Room Temperature

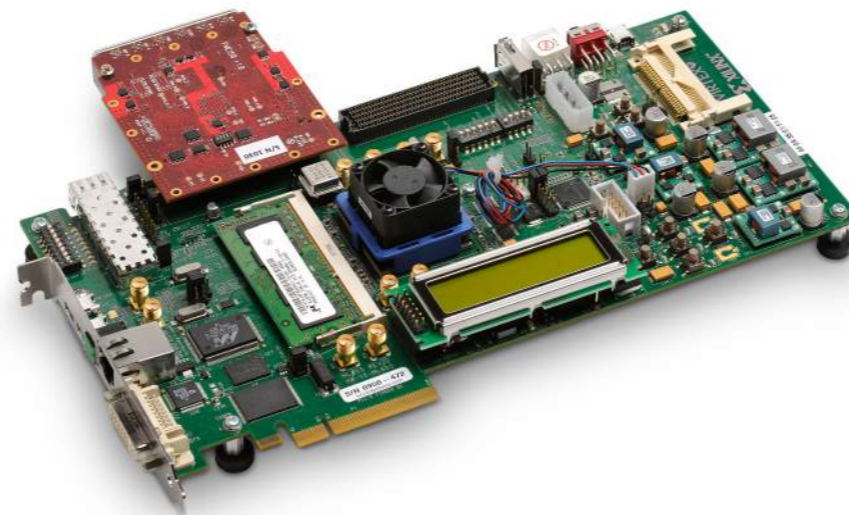
Analog Front-End Electronics (LNA + V/I Converter)



1 cm

- 40 dB 2nV/srHz LNA
- 2 V/I converters

FDM Digital Electronics



Sakai+ 2014 (LTD15)

- 4DSP 150FMC + ML605
- Leon3-based SoC + Linux

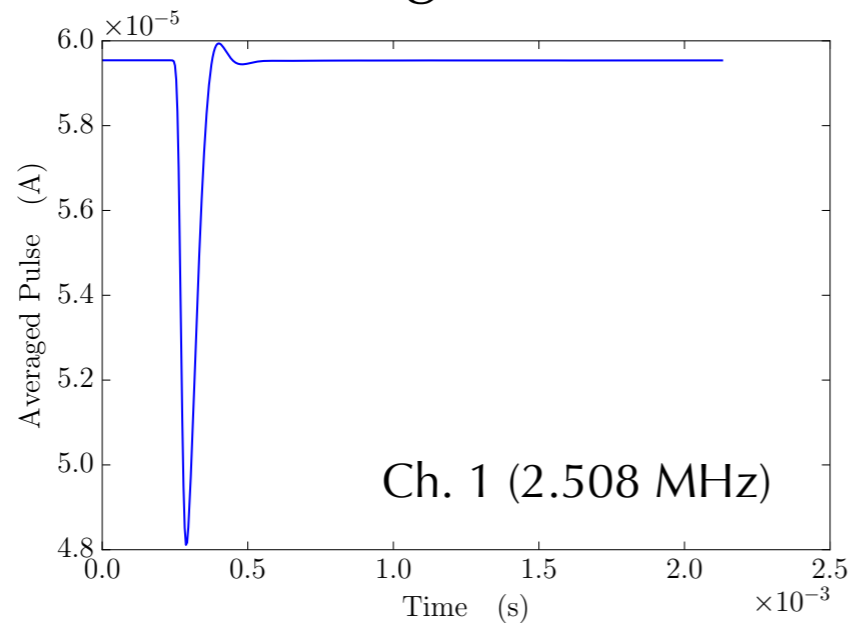
TES-Workbench



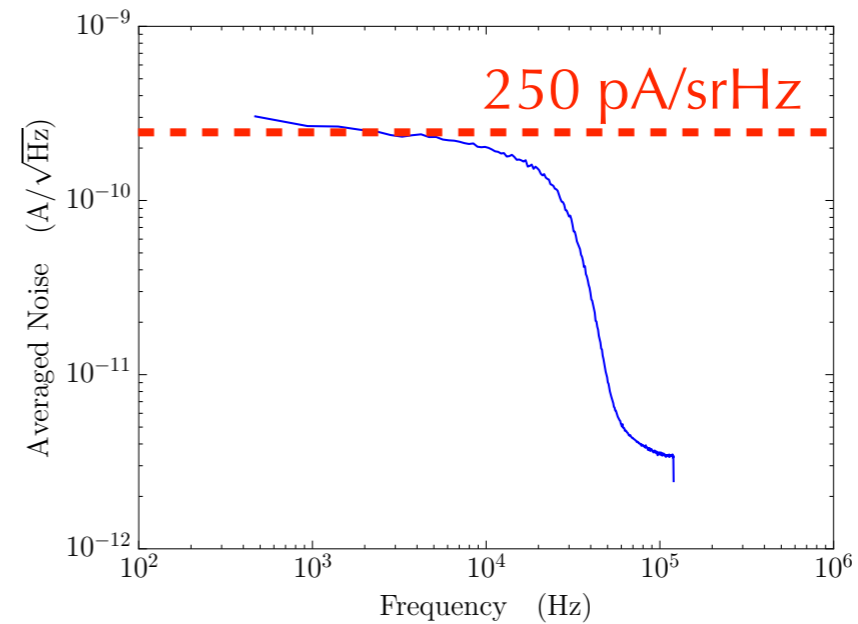
- TCP/IP conn to ML605
- Signal acq. & analysis

Non-Multiplexing Readout

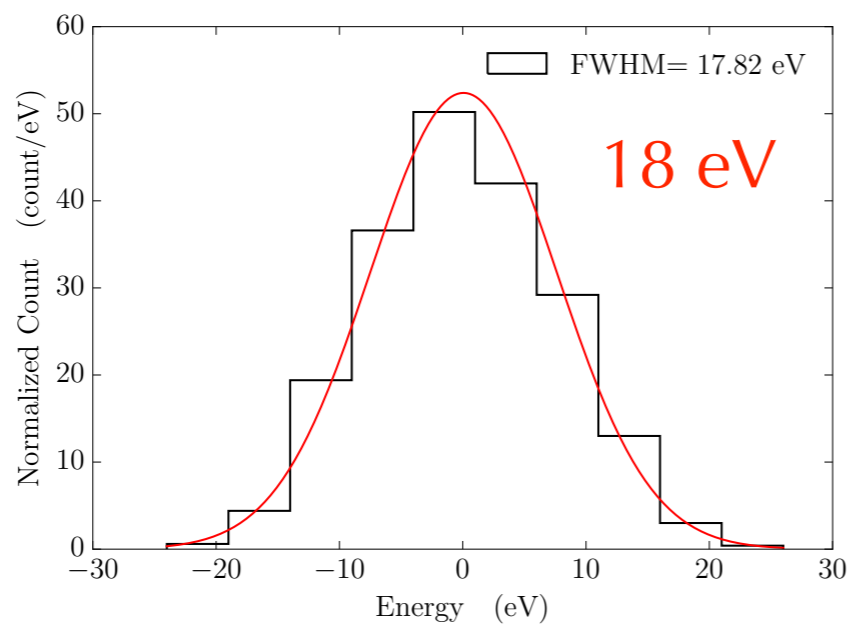
Averaged Pulse



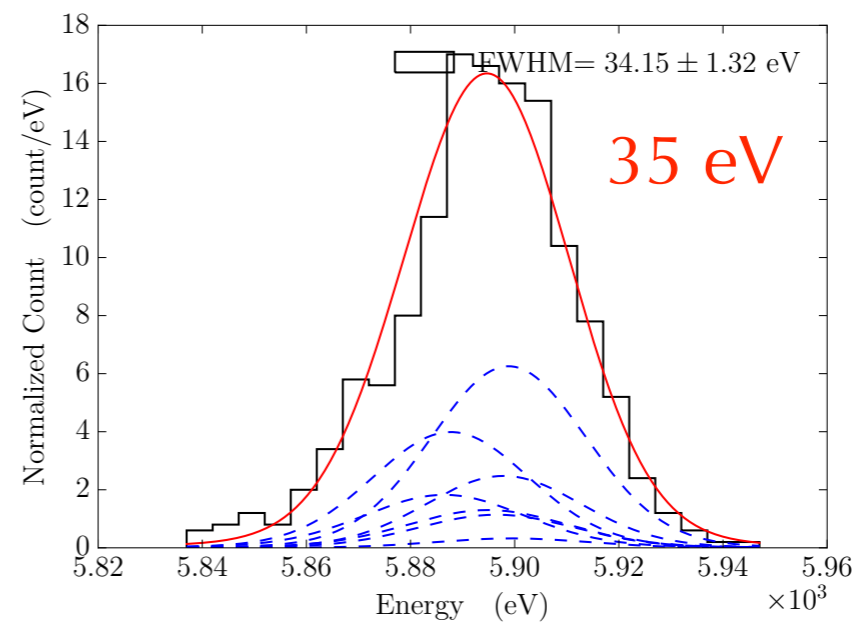
Averaged Noise



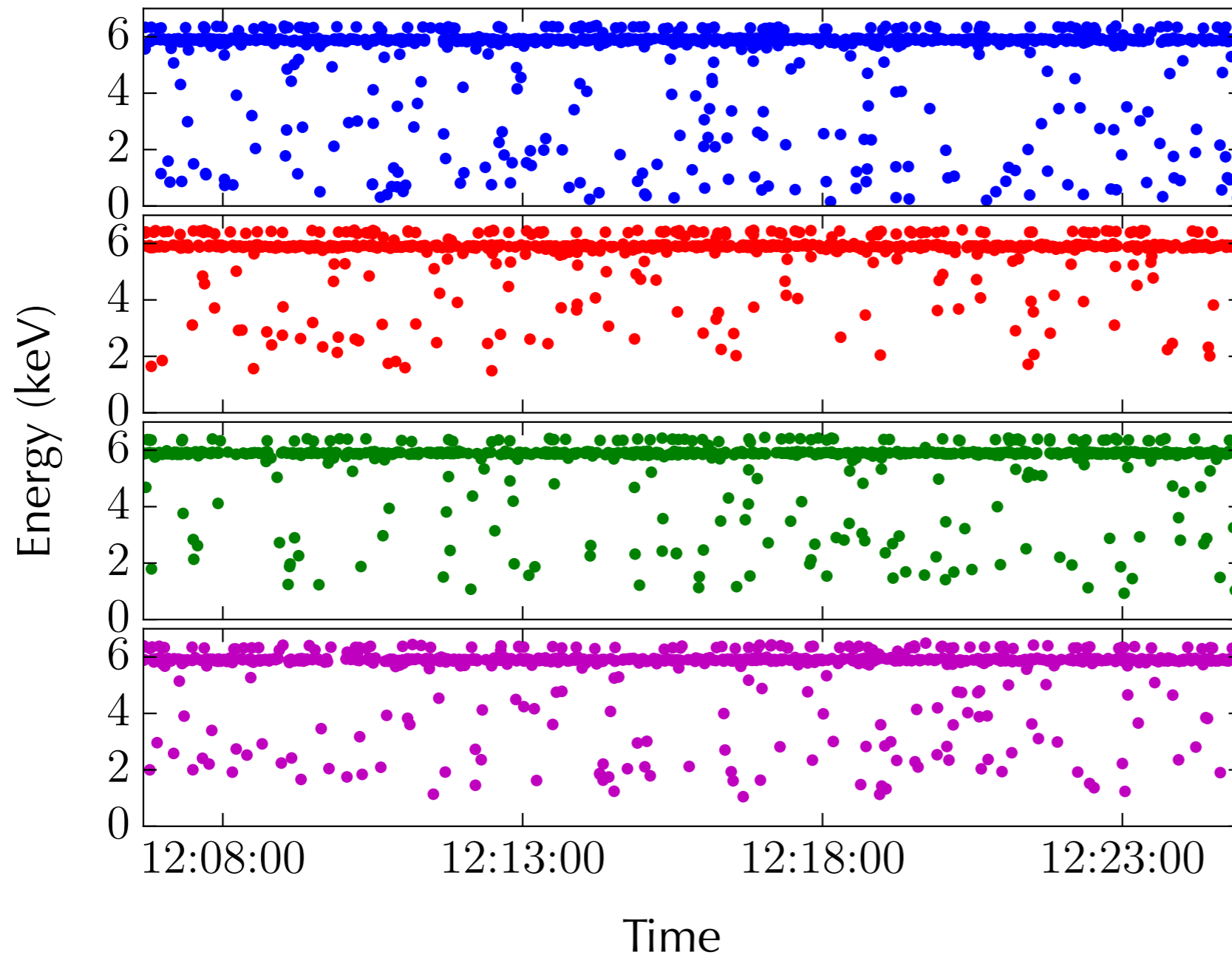
Baseline Energy Resolution



MnKa Energy Resolution



Multiplexing Readout



Ch 1 (2.508 MHz)
112±4 eV @ 5.9 keV
29 eV @ Baseline

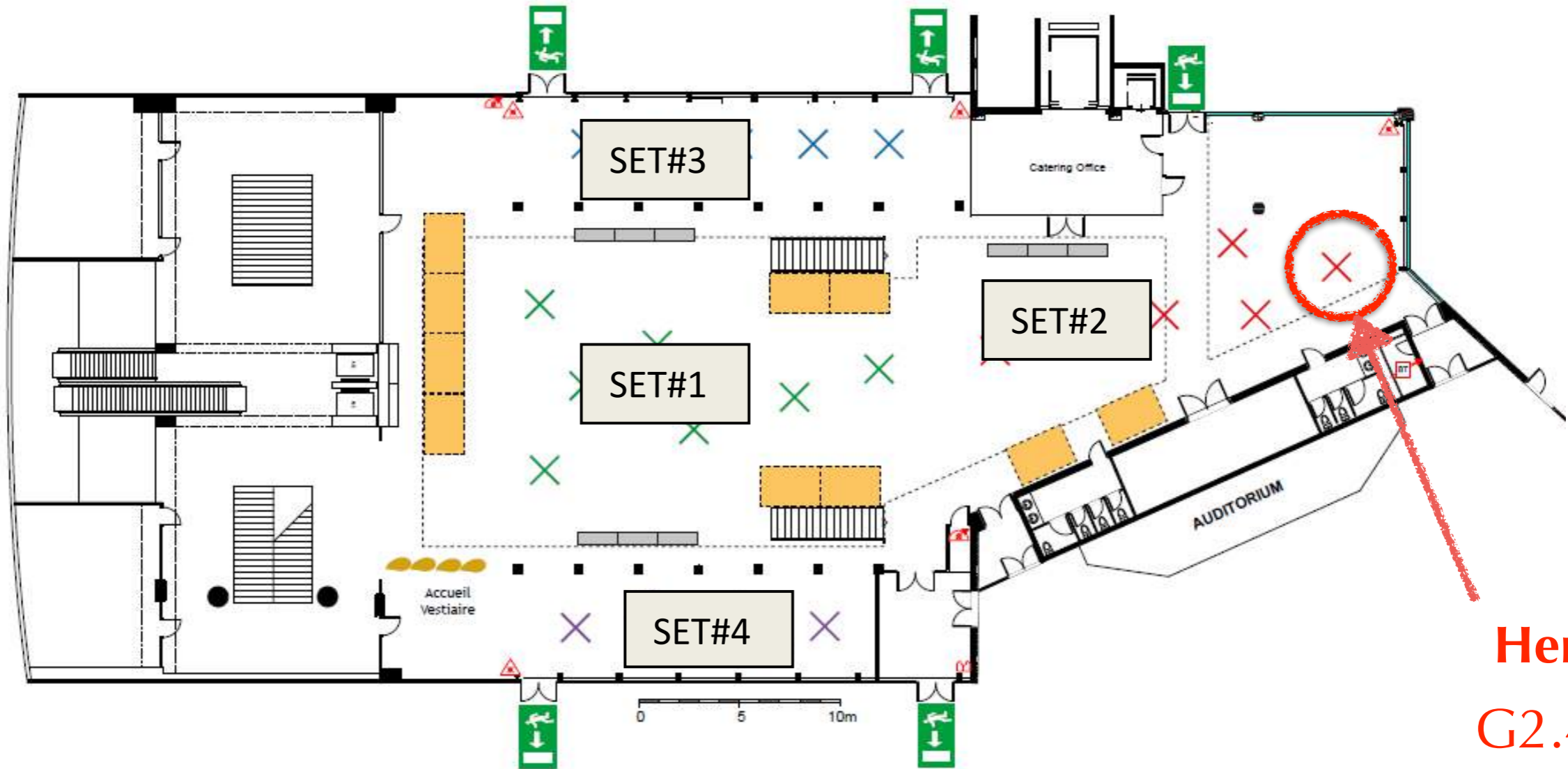
Ch 2 (2.766 MHz)
97±3 eV @ 5.9 keV
75 eV @ Baseline

Ch 3 (3.039 MHz)
87±3 eV @ 5.9 keV
61 eV @ Baseline

Ch 4 (3.291 MHz)
118±4 eV @ 5.9 keV
78 eV @ Baseline

See you at my poster!

Law Temperature Detectors
20 au 24 juillet 2015



Here
G2.46

G2.46

Development of FDM Readout System
K. Sakai (ISAS/JAXA)

