SphinX X-ray Spectrophotometer

Mirosław Kowaliński,

Space Research Centre, PAS

SRC PAS – SphinX team

Principal Investigator: **Janusz Sylwester**

Project Manager: **Mirosław Kowaliński**

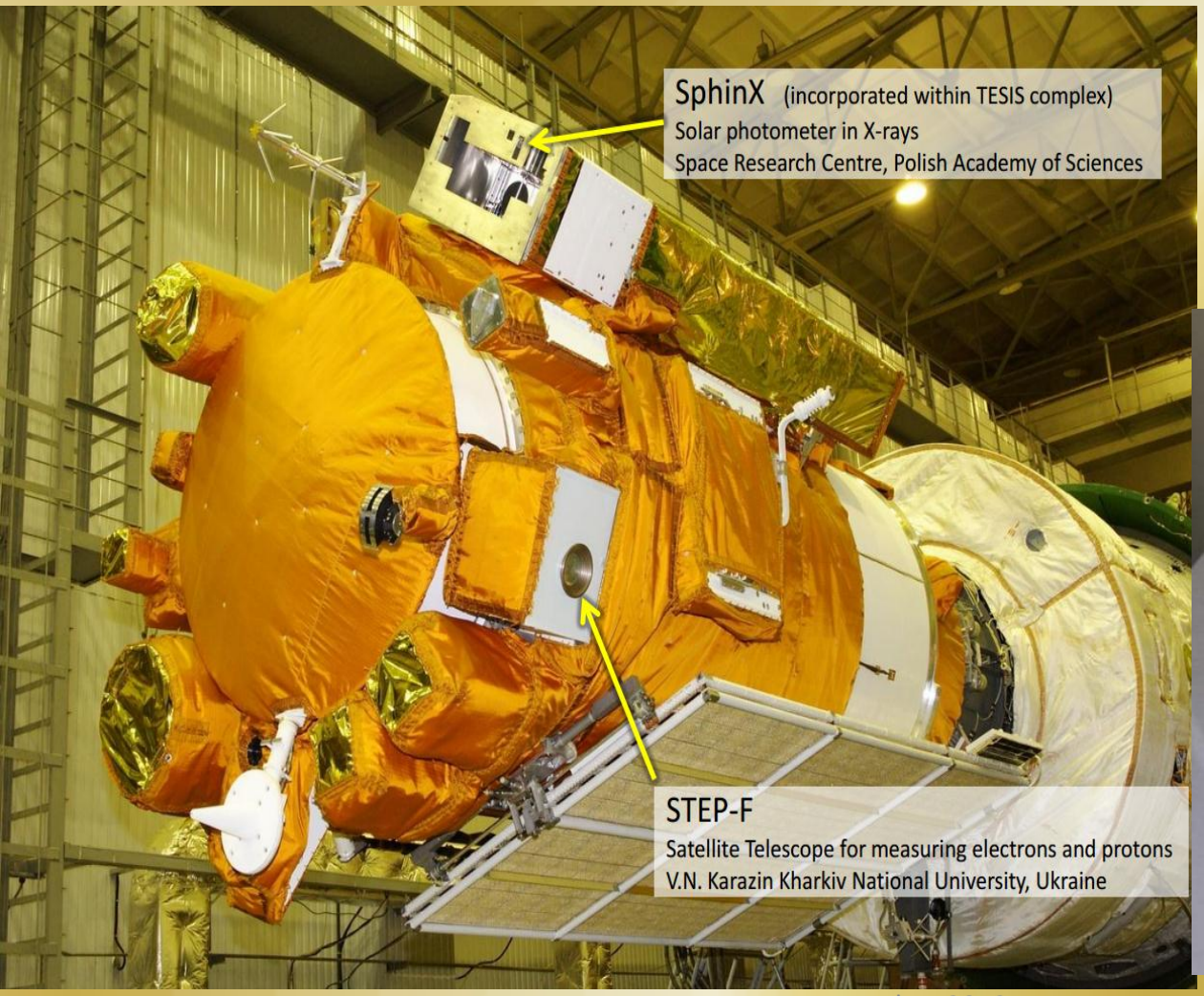
Project Constructor: **Jarek Bąkała**

Project Scientist: **Szymon Gburek**

Co-I: **Marek Siarkowski, Barbara Sylwester, Zbigniew Kordylewski, Piotr Podgórski, Witold Trzebiński, Stefan Płocieniak, Anna Kępa**

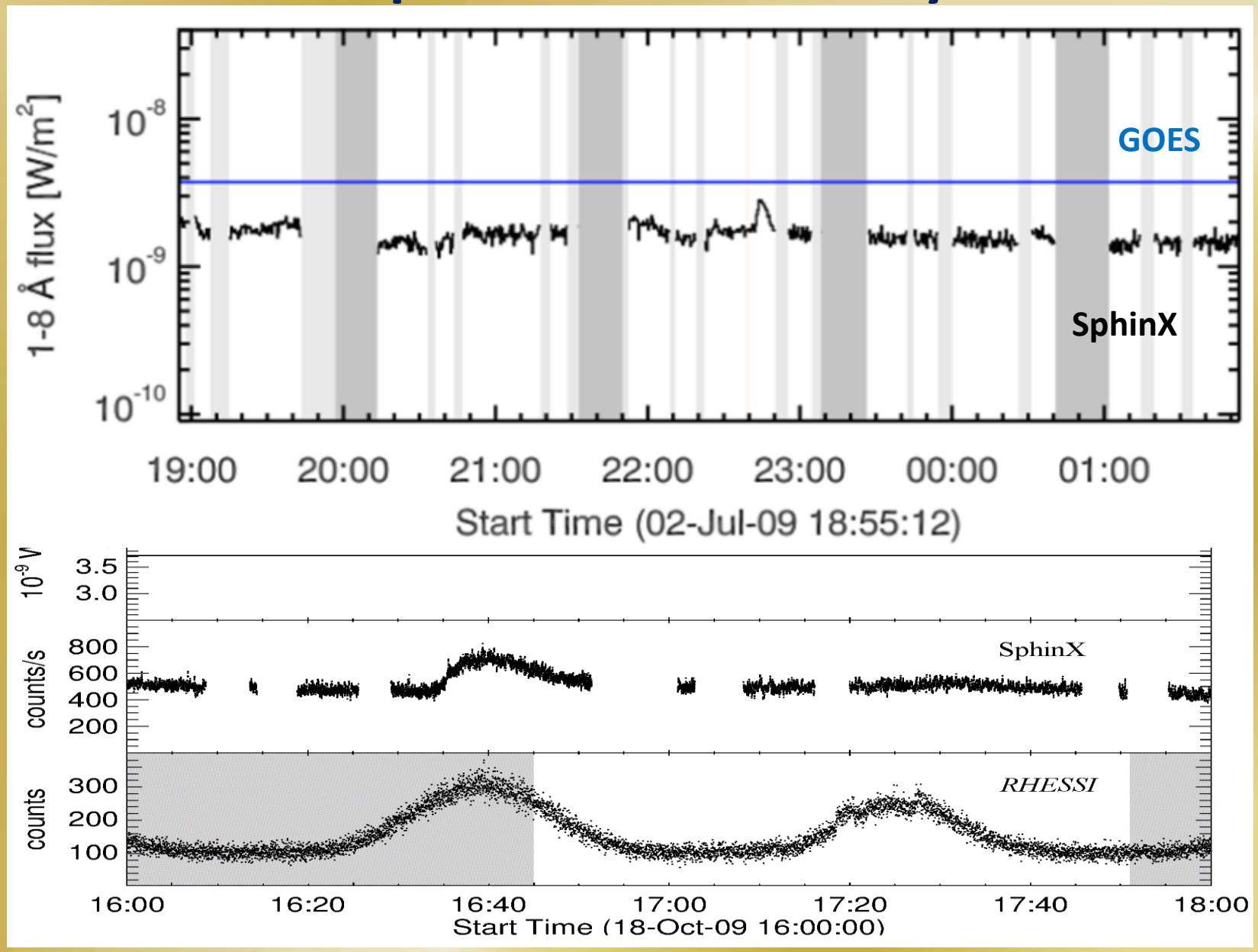
CORONAS-Photon

Launch: January 30, 2009 at 13:30 UT, from Plesetsk, Russia
Mission duration: February 20, 2009 – November 29, 2009
CORONAS-Photon satellite

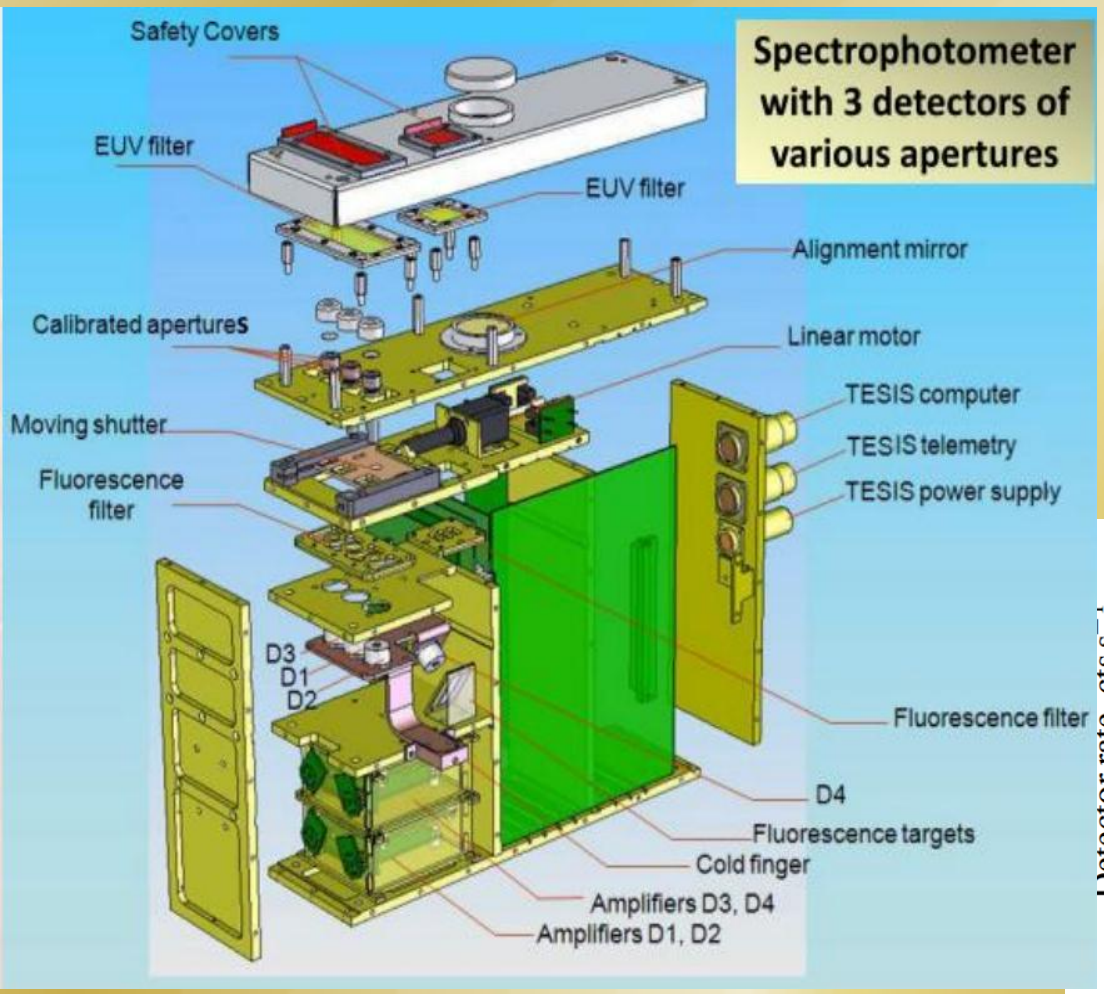


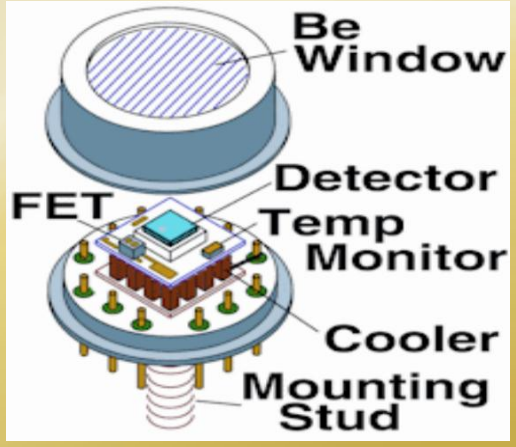
~4kg/~10W (peak)
~1 keV - ~15 keV
Time resolution ~6 µs
Energy resolution ~400 eV
Telemetry 150 MB/day

Comparison of sensitivity

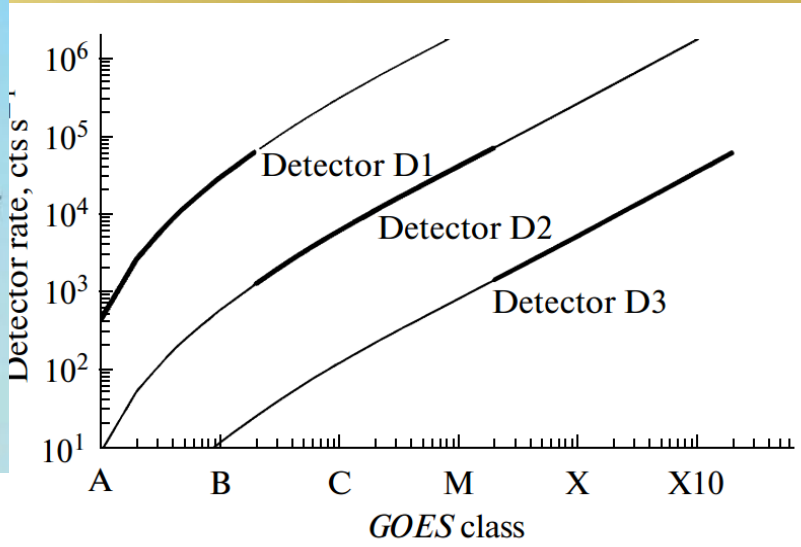


SphinX construction

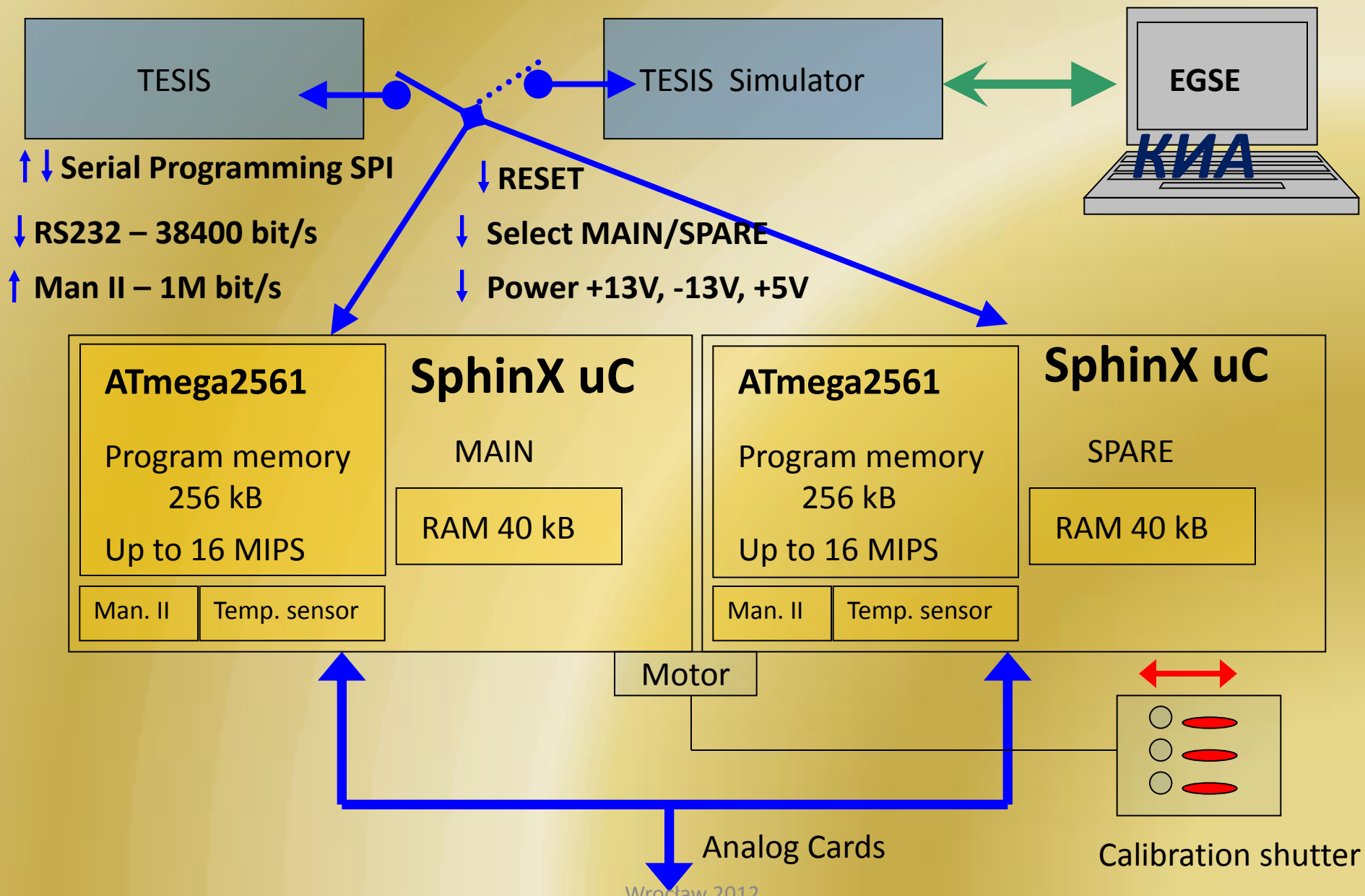




Amptek (Bedford, US) detectors used
256 energy bins between 0 - 15 keV



SphinX block diagram



SphinX Analog Cards

To Main Controller

4

MAIN

ADC

Controller

Peak Detector

Amplifier

3

MAIN

ADC

Controller

Peak Detector

Amplifier

2

MAIN

ADC

Controller

Peak Detector

Amplifier

1

MAIN

ADC

Controller

Peak Detector

Amplifier

SPARE

ADC

Controller

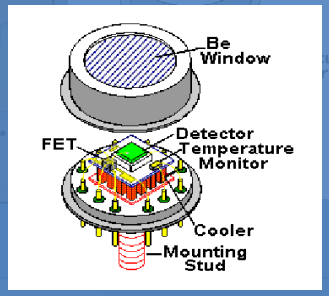
Peak Detector

Amplifier

HV

Cooler

Preamp.



SphinX Flight Software

Communication with TESIS:
- **Reprogramming**
- **Commanding**
- **Telemetry**

Controlling analog cards:
- **Housekeeping data**
- **Reprogramming microcontrollers**

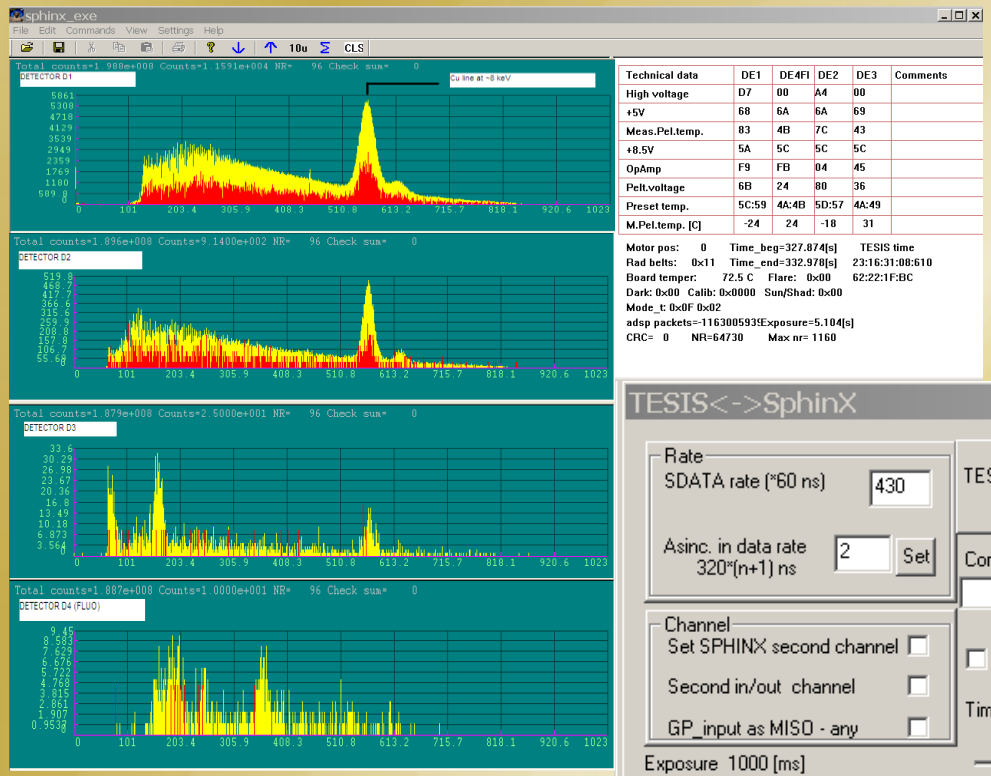
Detector PIN reading:
- **Basic mode**
- **Time stamping**
- **Spectral mode**
- **Calibration**

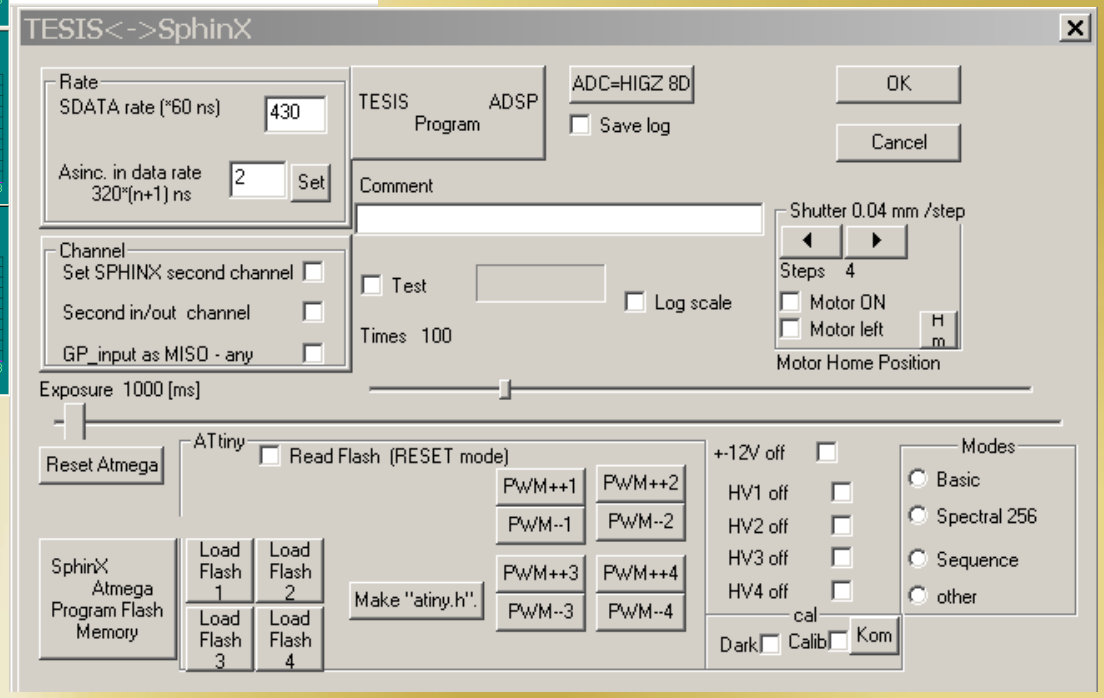
Application procedures:
- **Compress**
- **Flare flag**
- **Radiation belts**
- **X-ray shadow**

SphinX Ground Software

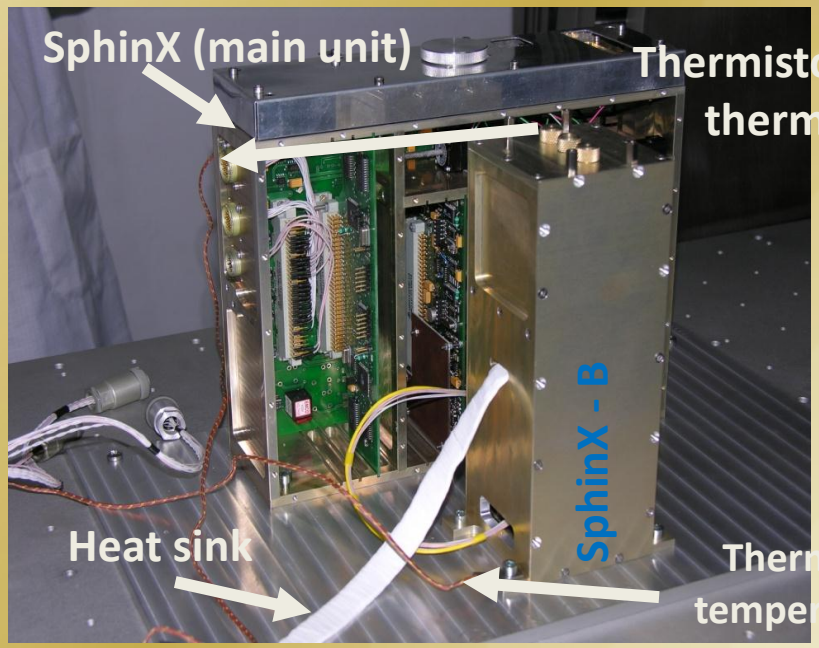
EGSE main features:

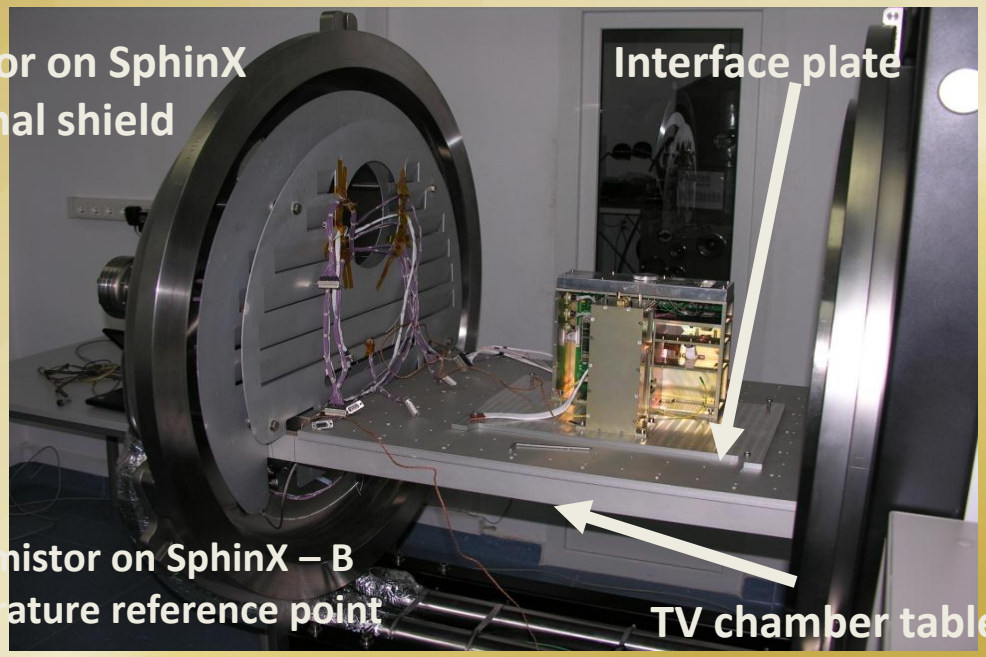
- TESIS simulator
- Functional testing at instrument level
- GUI
- Archiving
- Calibration
- Входной Контроль

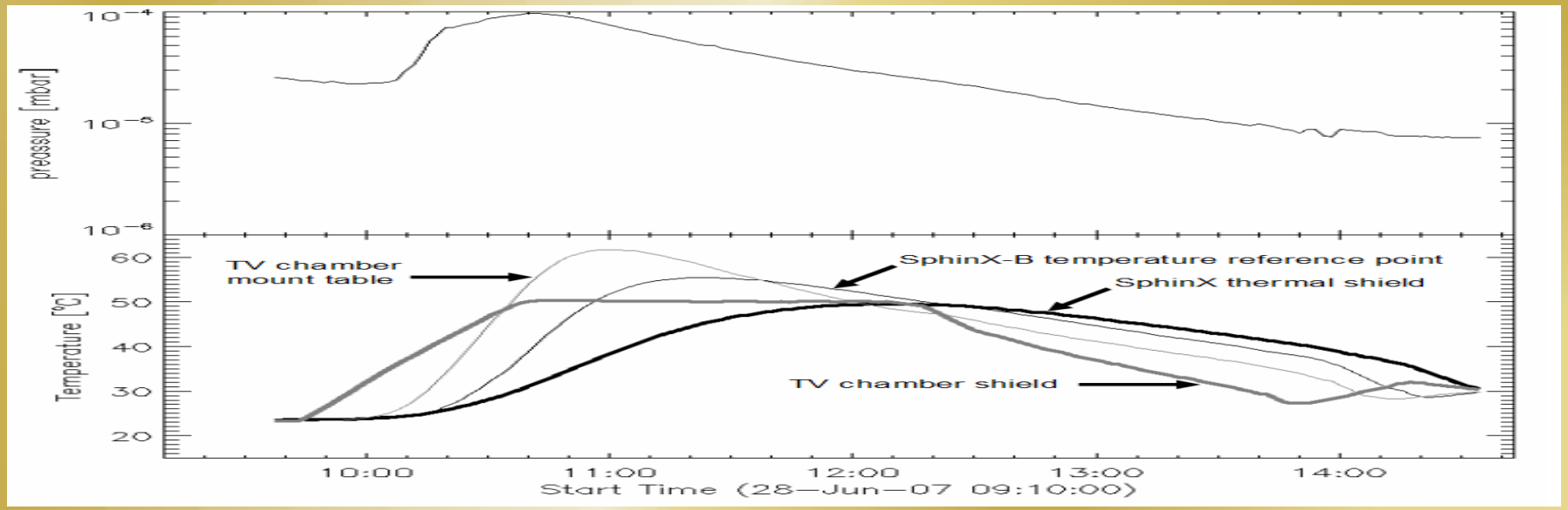




SphinX Thermal-Vacuum Tests







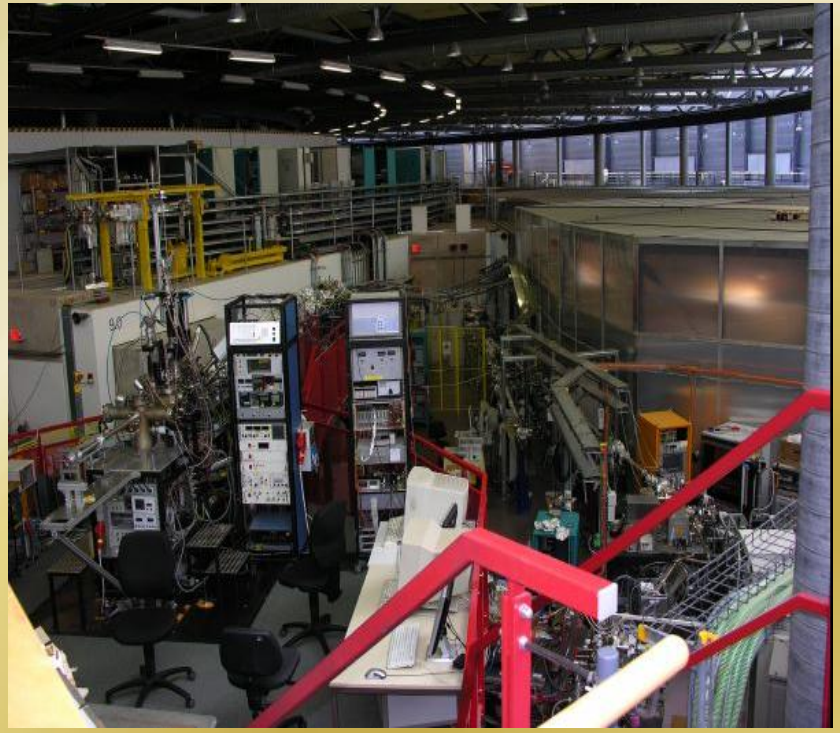
SphinX Mechanical Tests

TEST	Amplitude	Frequency
Acoustic vibrations	122 dB – 133 dB	35 Hz - 5 kHz
Acceleration	3 g, 10 g	10 min
Transports in 3 axes	9g	5 ms-10 ms, 120 shock/min
Resonance	50 g	10 Hz - 2 kHz
Vibration overload	2 g -80 g	10 Hz - 2.5 kHz
Shocks in 3 axes	80 g	2 ms

SphinX Calibration

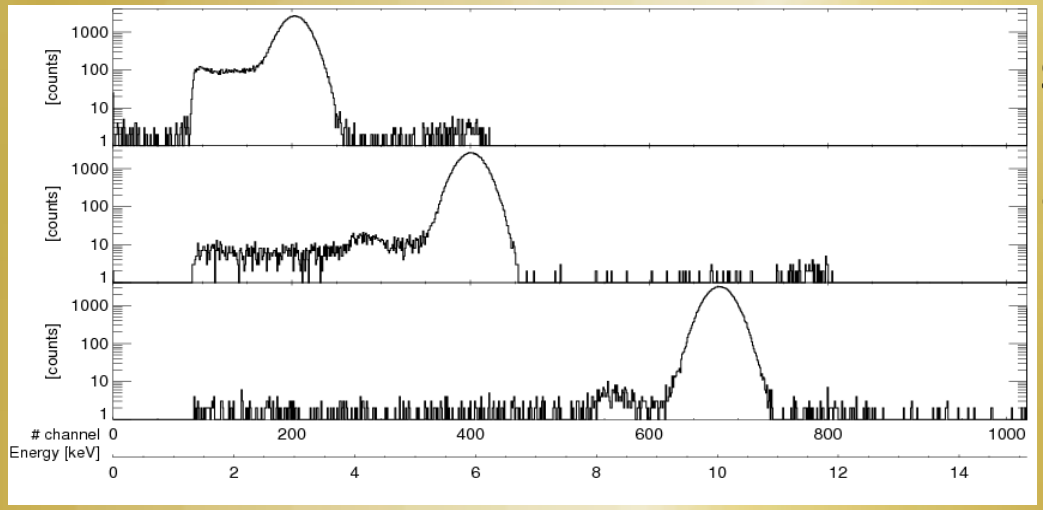
XACT, Palermo October 2007

BESSY II, Berlin, Feb/Mar 2008



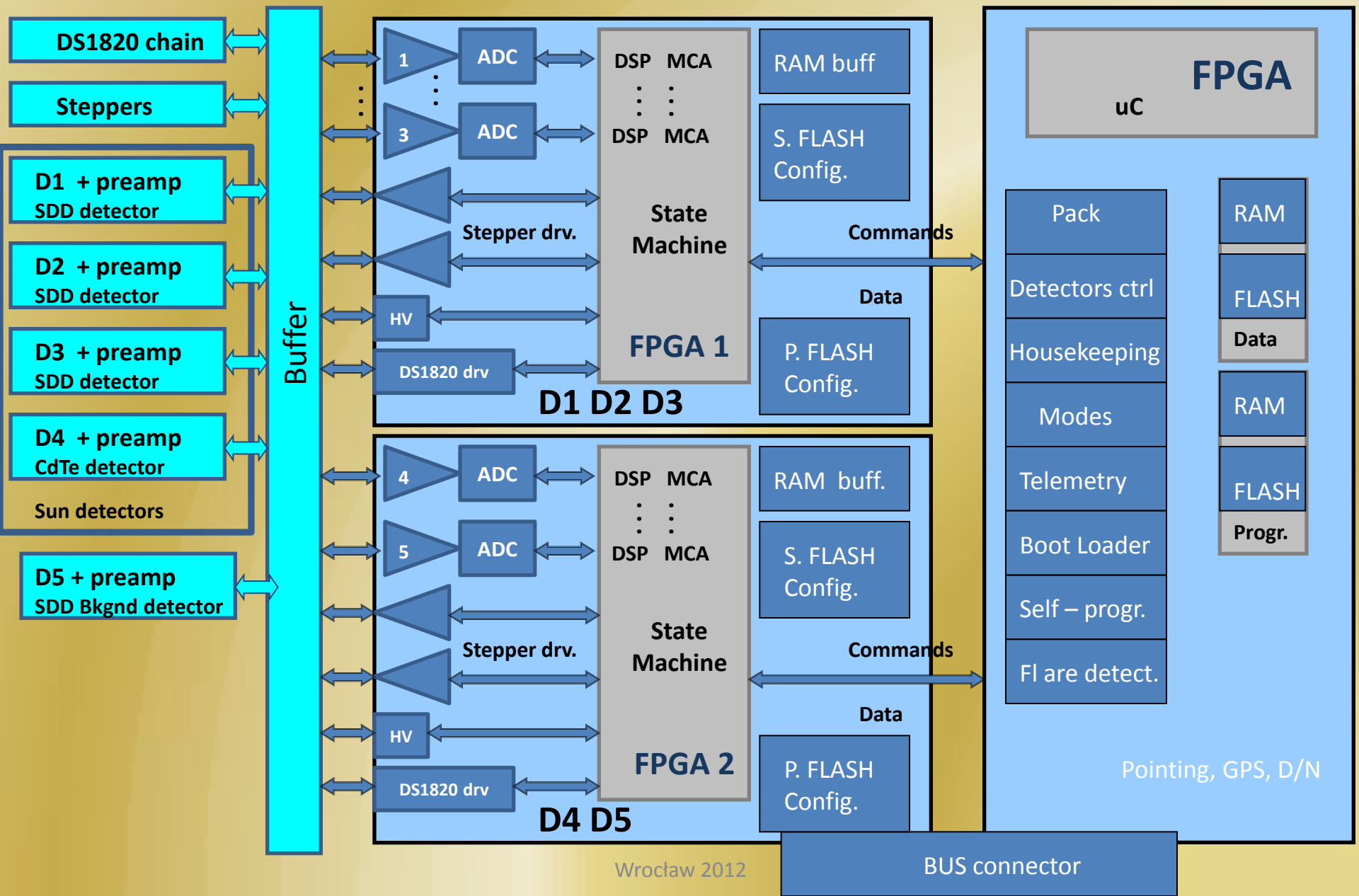
SphinX Calibration Results

X-ray flux level	Low	moderate	High	High
Detector Name	D1	D2	D3	D4
Observation type	Direct Solar X-rays	Direct Solar X-rays	Direct Solar X-rays	Fluorescence
Aperture, [mm^2]	21.500A	0.4947S	0.01008S	11.1A
Energy FWHM, [eV]	480B	350B	370B	290P
Pulse width [μs]	1.25	4.17	4.17	4.17
Energy range [keV]	1.0 – 15	0.85 - 15	0.85 – 15	0.85 – 15



SphinX spectra recorded on FCM beamline for energies 3 keV 5.9 keV and 10 keV

SphinX New Generation



Thank you.