TRITEL measurements on board the International Space Station

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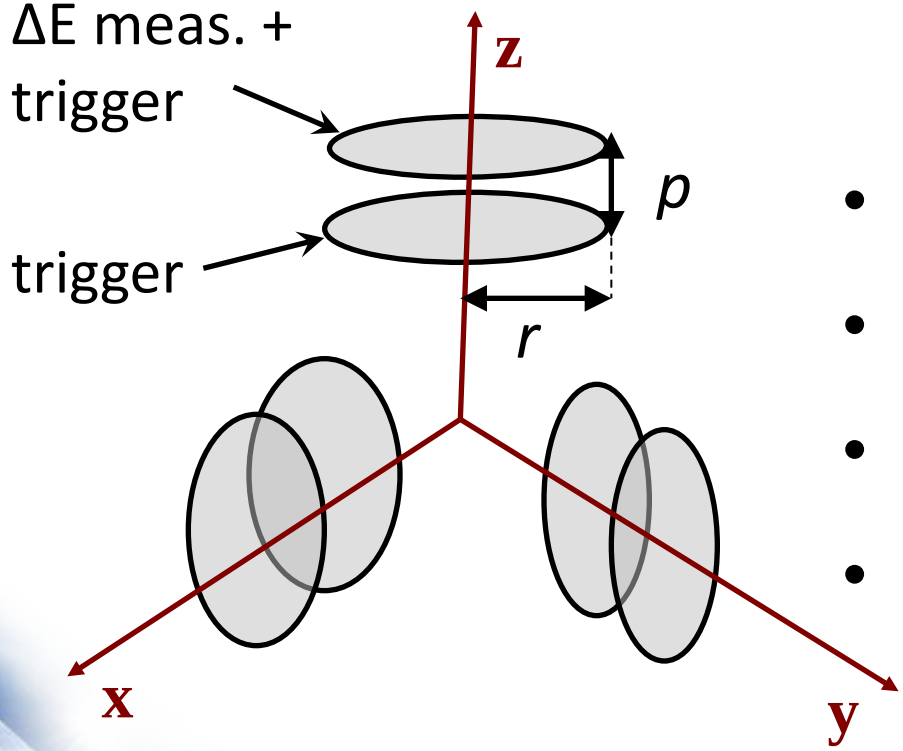
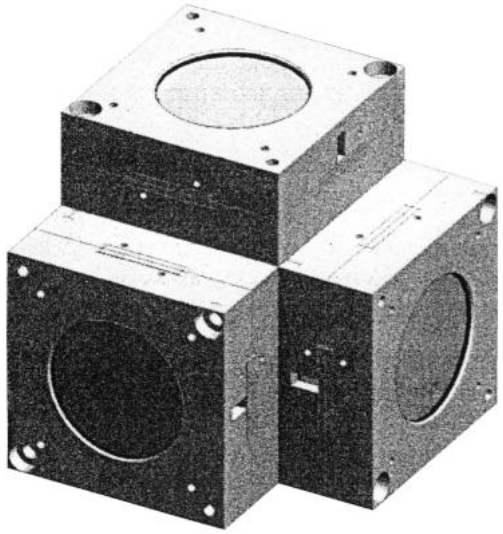
The TRITEL 3D Silicon Detector Telescope



- *3 x 2 Canberra FD PIPS det.*
- *r* = 8.4 mm
- *p* = 8.9 mm
- *w* = 300 µm



The TRITEL 3D Silicon Detector Telescope

- ΔE measurements: 60 keV – 83 MeV
  (quasi logarithmic spectra; total and coincidence)
  → LET: 0.2 keV/µm – 120 keV/µm in water

- ΔE spectra every 10 minutes
  → 90-min and daily spectra are stored

- Time spectra (total and coincidence); 1-min resolution

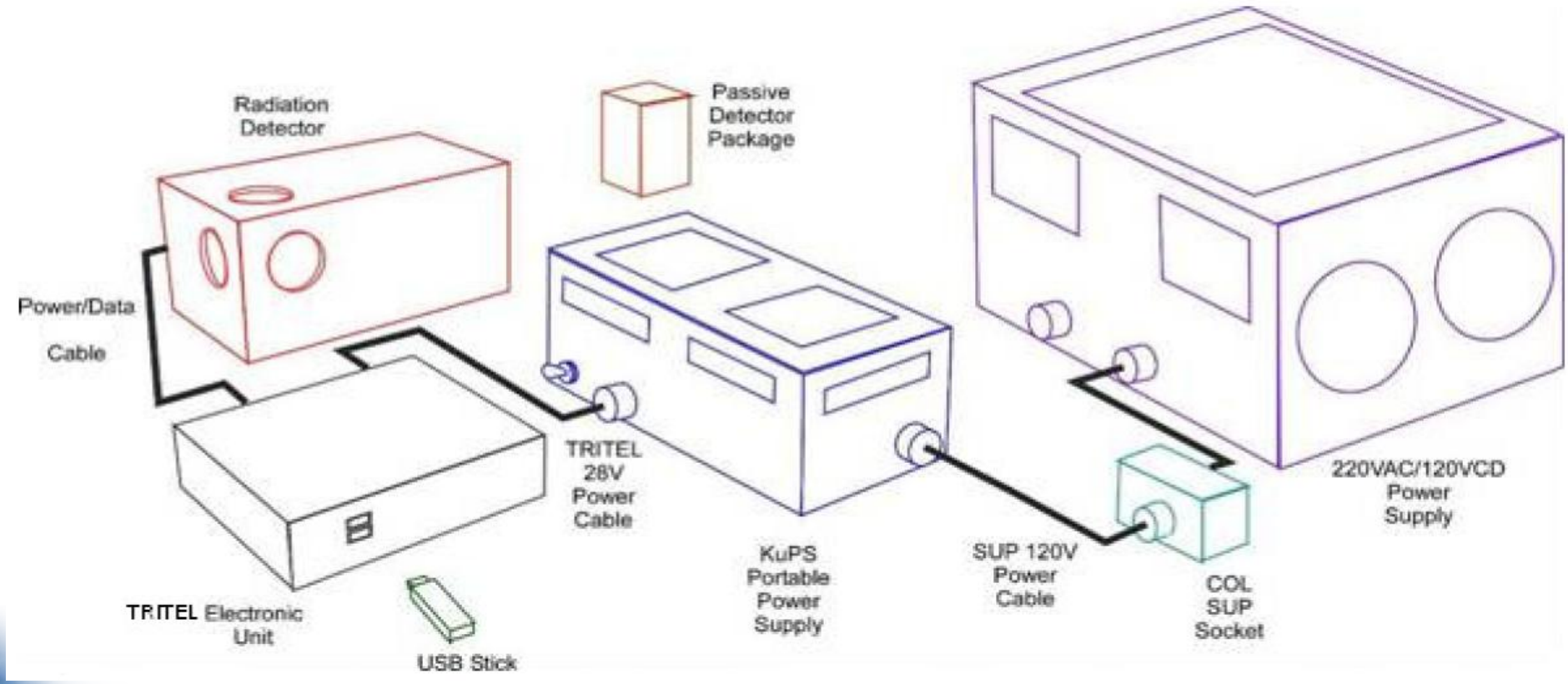
  - Contribution from SAA crossings → collected separately

TRITEL on board Columbus

The TRITEL-SURE experiment is co-funded by the EC project SURE, contract number RITA-CT-2006-026069 and by the Government of Hungary through ESA Contracts 98057 and 4000108072/13/NL/KML under the PECS (Plan for European Cooperating States).

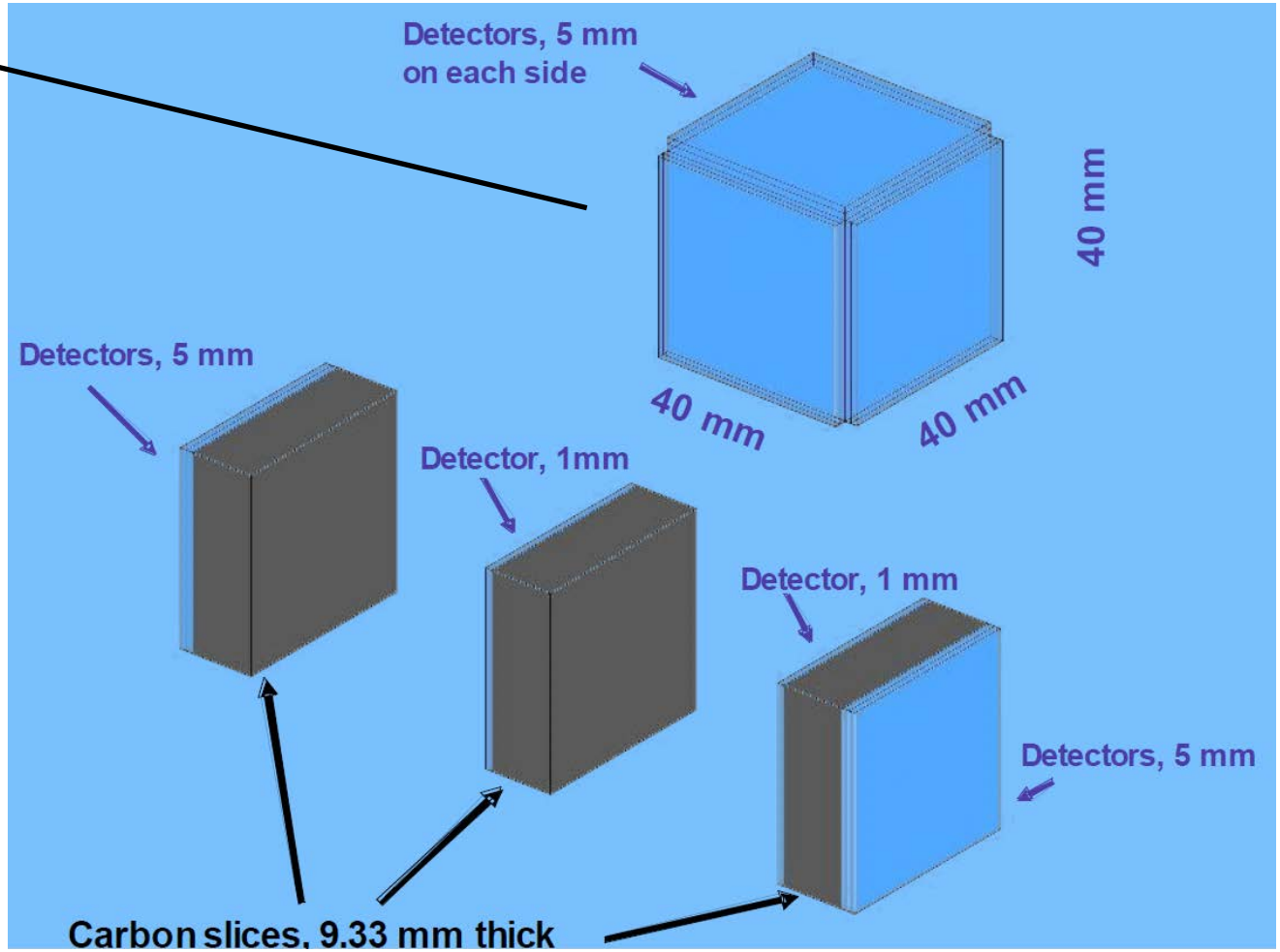
The view expressed herein can in no way be taken to reflect the official opinion of the European Space Agency.

The TRITEL experiment

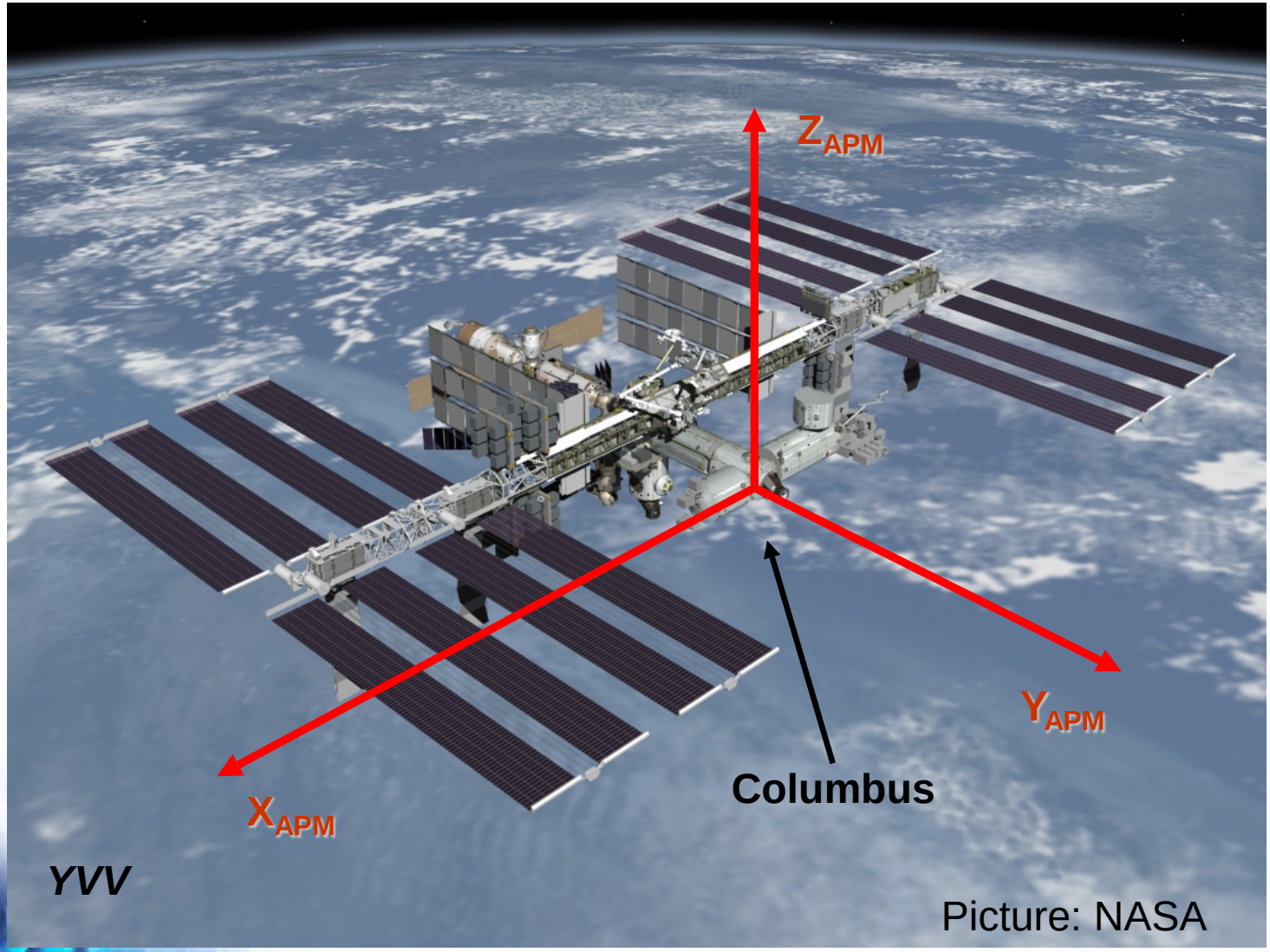


- Radiation Detector
- Power/Data Cable
- TRITEL Electronic Unit
- USB Stick
- Passive Detector Package (PDP)

The PDP of TRITEL



TRITEL on board Columbus



TRITEL on board Columbus

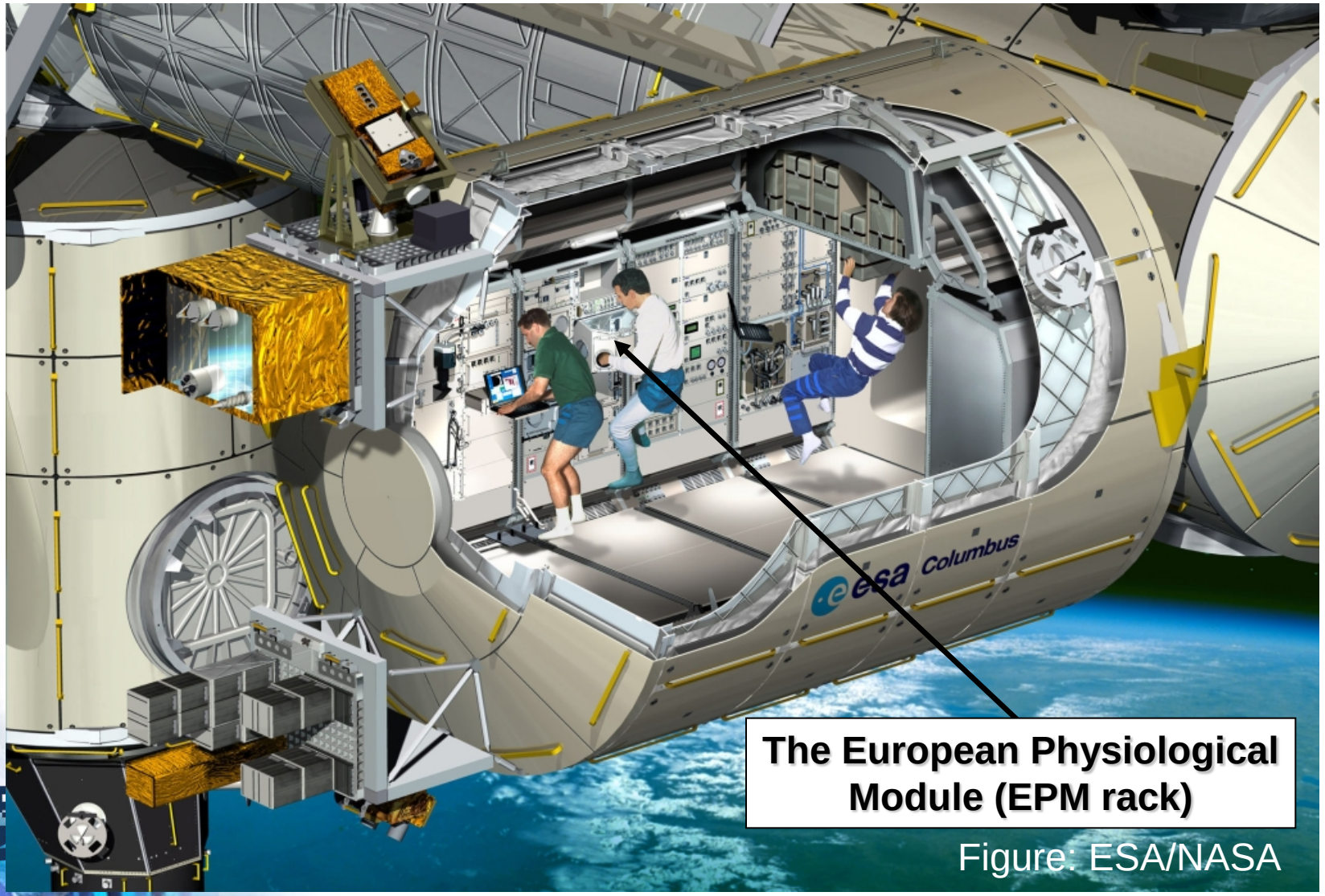
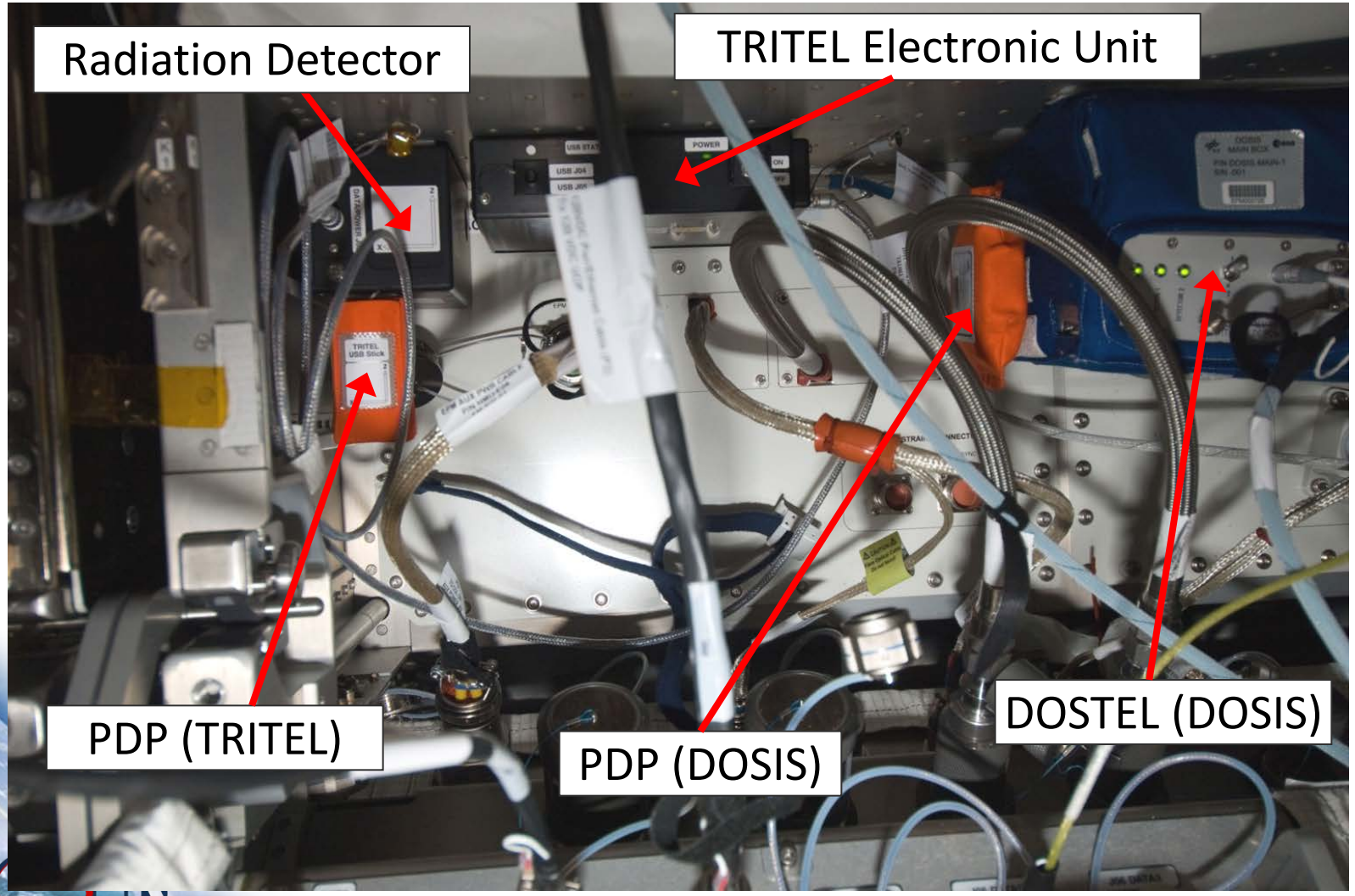


Figure: ESA/NASA

TRITEL on board Columbus



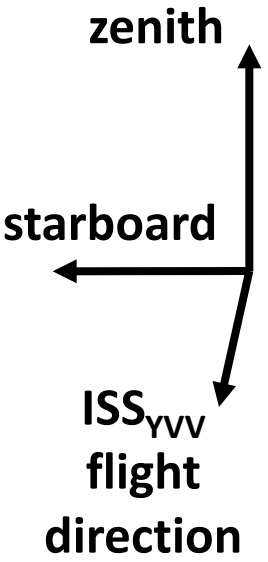
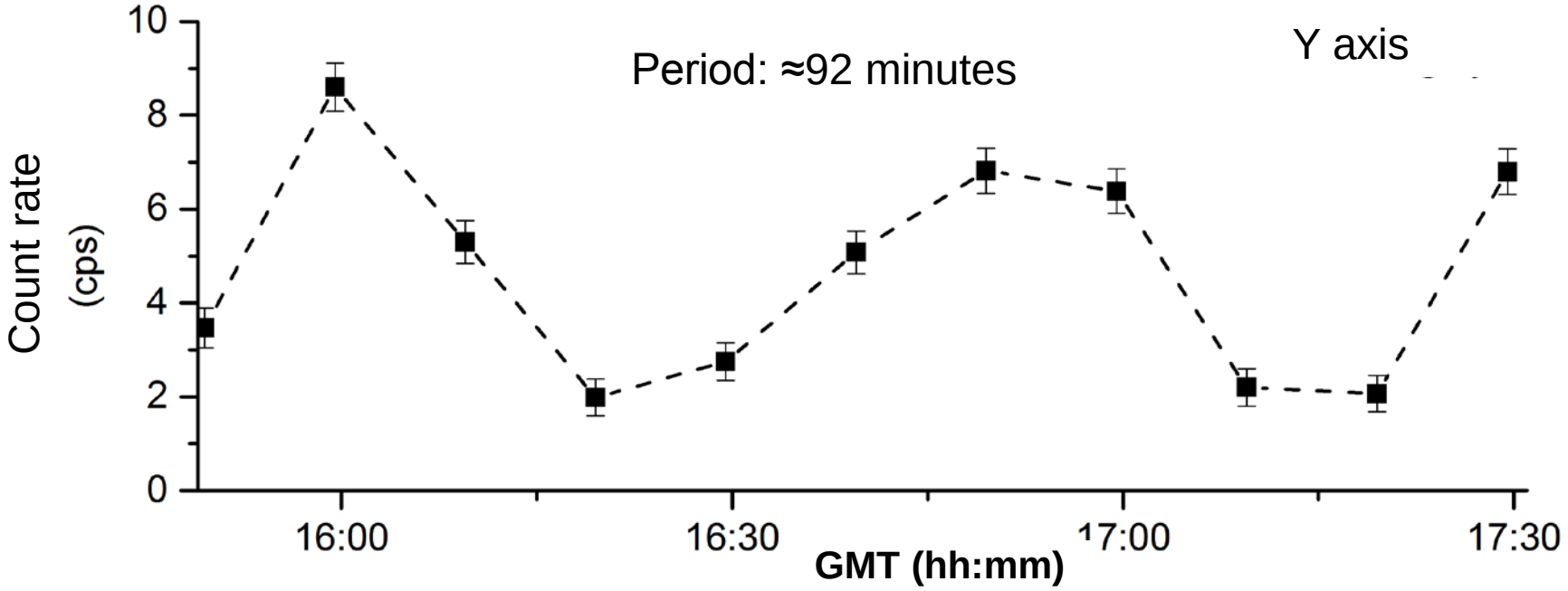
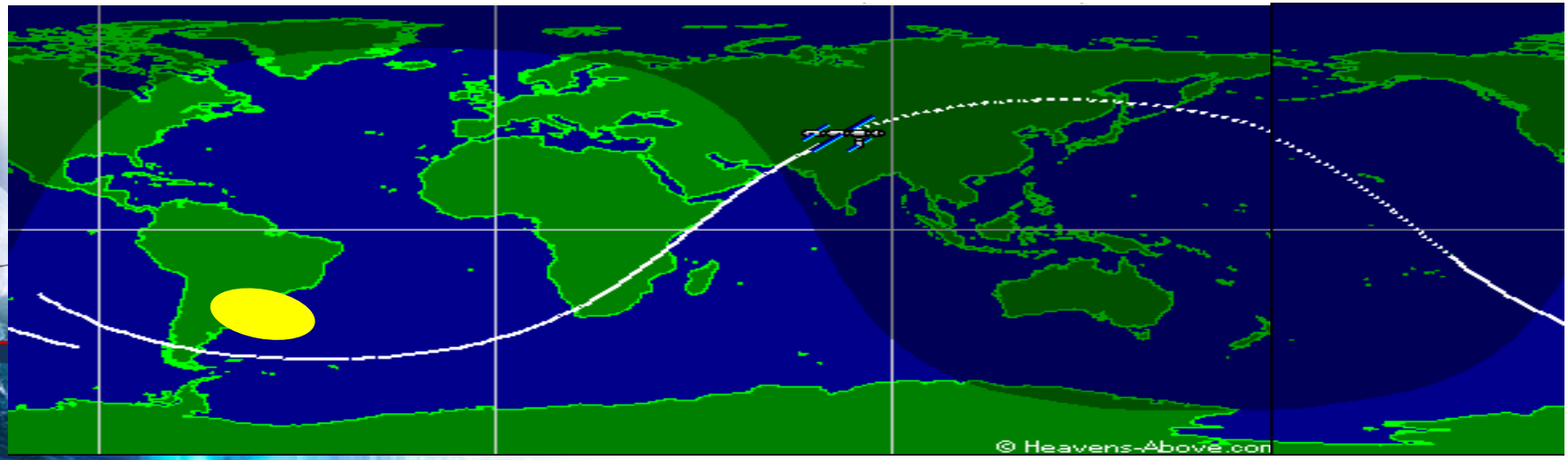


Photo: ESA/NASA

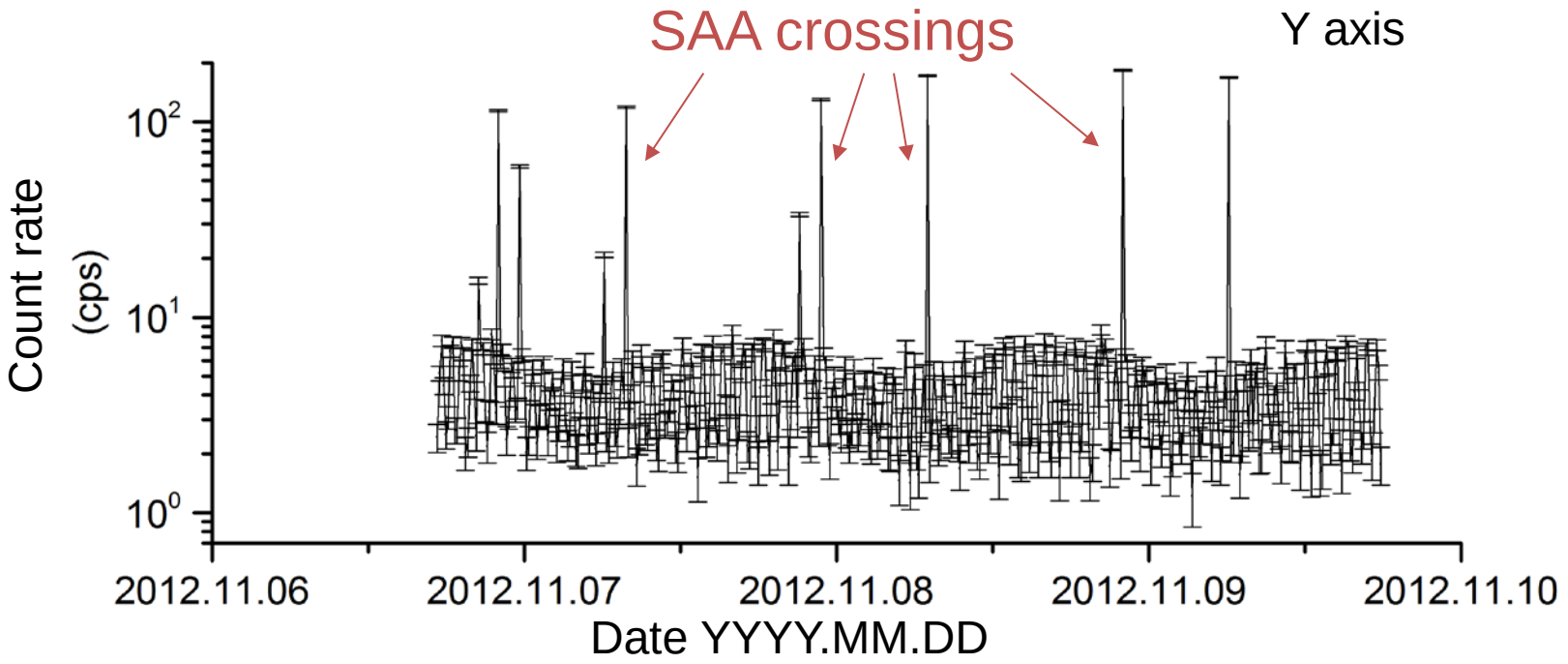
TRITEL axes: -X; -Y; +Z

TRITEL time spectra

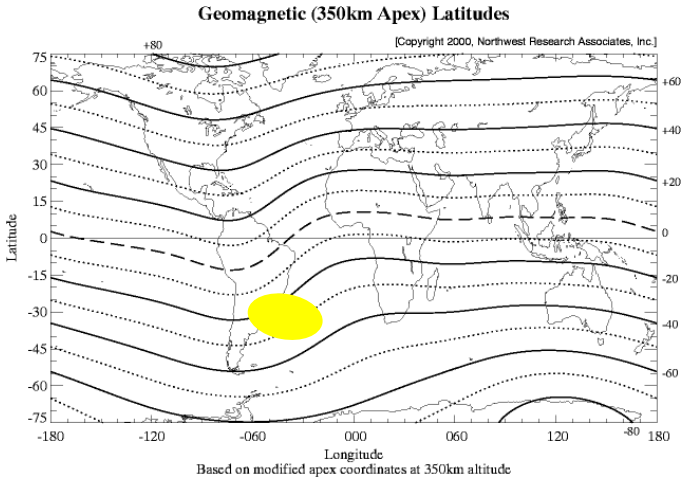




TRITEL time spectra



- period: ≈24 h
- SAA crossings



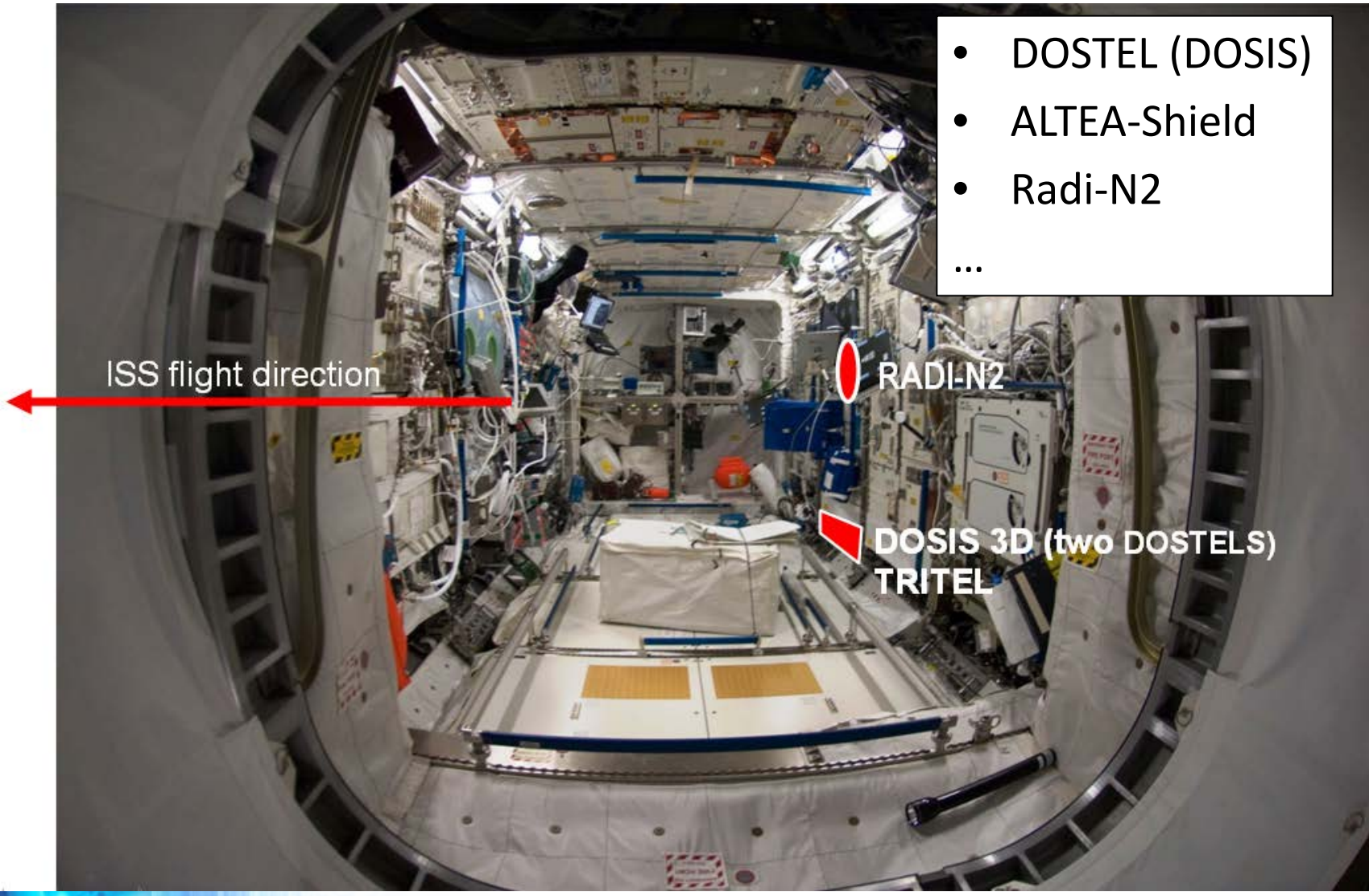
Some preliminary results

Example: Nov 8, 2012

- Contribution of SAA crossings:
  - X: 130 µGy/d ± 10 µGy/d
  - Y: 130 µGy/d ± 10 µGy/d
  - Z: 117 µGy/d ± 10 µGy/d
- Contribution outside SAA:
  - X: 123 µGy/d ± 10 µGy/d
  - Y: 148 µGy/d ± 8 µGy/d
  - Z: 124 µGy/d ± 4 µGy/d

- Total:
  - X: 253 µGy/d
  - Y: 278 µGy/d
  - Z: 241 µGy/d
- Quality factors:
  - Outside SAA:
    - X: 3.5 ± 0.4
    - Y: 3.6 ± 0.1
    - Z: 4.3 ± 0.2

Intercomparisons planned

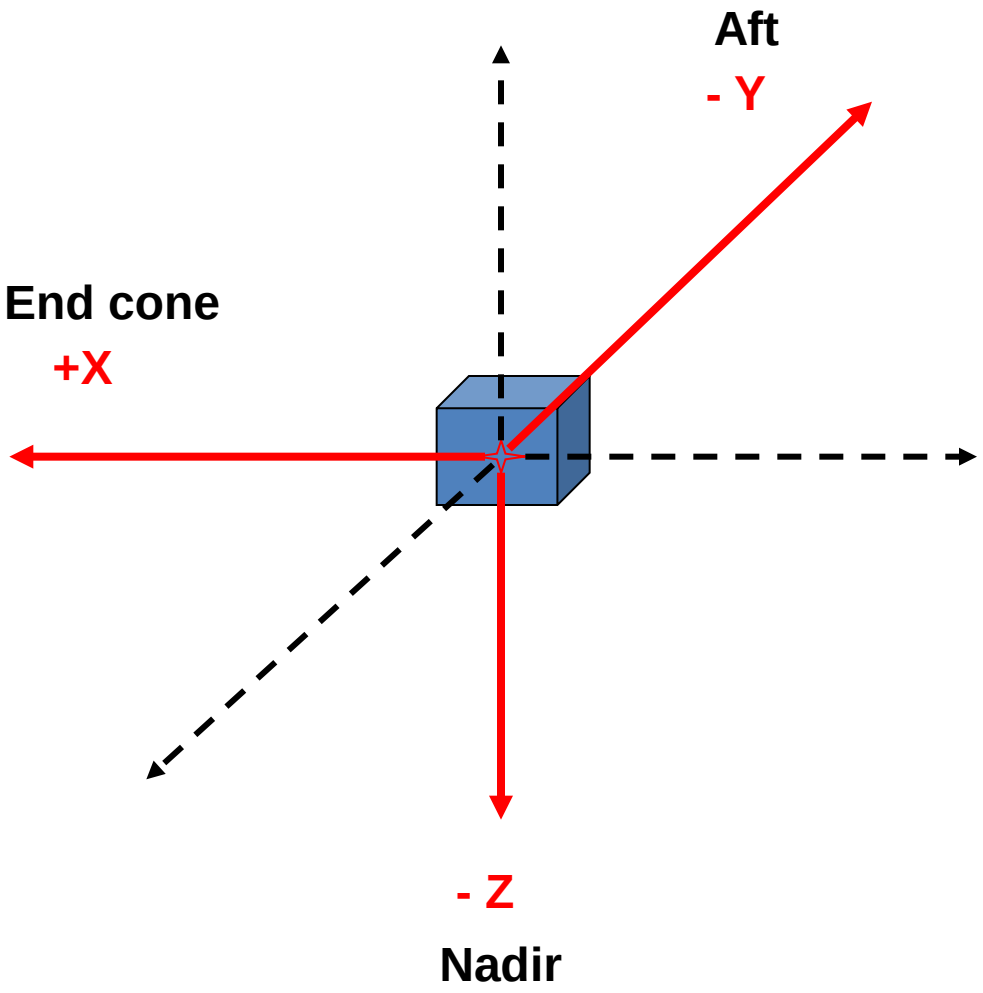


- DOSTEL (DOSIS)
- ALTEA-Shield
- Radi-N2

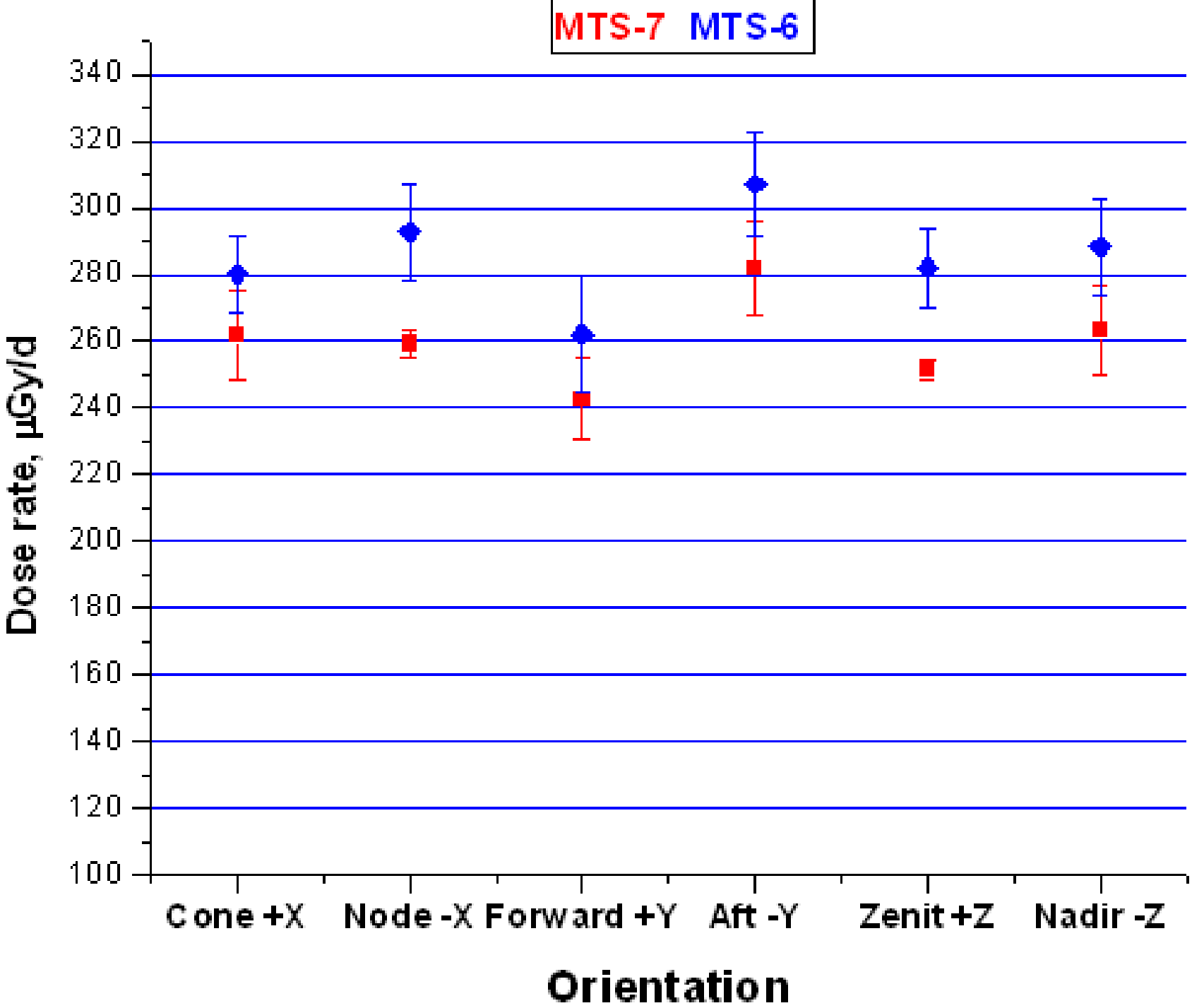
…

Figure provided by René Demets

PDP TL data



Red lines show the identical orientations of the TRITEL-SURE and DOSIS-3D-2 TLD detectors


MTS-7 MTS-6
340
320
300
280
260
240
220
200
180
160
140
120
100
Dose rate, µGy/d
Cone +X
Node -X
Forward +Y
Aft -Y
Zenit +Z
Nadir -Z
Orientation

Comparison of TRITEL-SURE and DOSIS-3D-2 dose rate data obtained by TLDs

µGy/d	MTS-7	SD	MTS-6	SD
Cone +X	261.83	13.09	280.16	11.65
DOSIS-3D-2	257.49	7.10	261.04	11.40
Node -X	259.32	4.18	292.70	14.63
Forward +Y	242.67	12.13	262.09	17.64
Aft -Y	281.81	14.09	307.17	15.36
DOSIS-3D-2	259.89	26.95	269.08	24.35
Zenit +Z	251.57	3.02	282.19	11.82
Nadir -Z	263.42	13.17	288.57	14.43
DOSIS-3D-2	226.65	9.36	230.11	12.10

Exposures

DOSIS-3D-2:

23.10.2012. – 06.03.2013. 144 d

TRITEL-SURE:

12.12.2012. – 14.05.2013. 147 d

TRITEL in the Russian SM

TRITEL-RS (in the frame of Matroshka-R) was developed in cooperation with the Institute of Biomedical Problems, Moscow and with the former financial support of the Hungarian Space Office.

TRITEL in the Russian SM

Location: CM 221 and CM222 panels

Preliminary results from on-board calculations for some periods:

Apr 5 – May 16, 2013:
320 µGy/d; 862 µSv/d → Q_{av}: 2.7

June 11 – June 12, 2013:
298 µGy/d; 809 µSv/d → Q_{av}: 2.7

Photo: IBMP/Roscosmos/Energia

TRITEL on board ISS

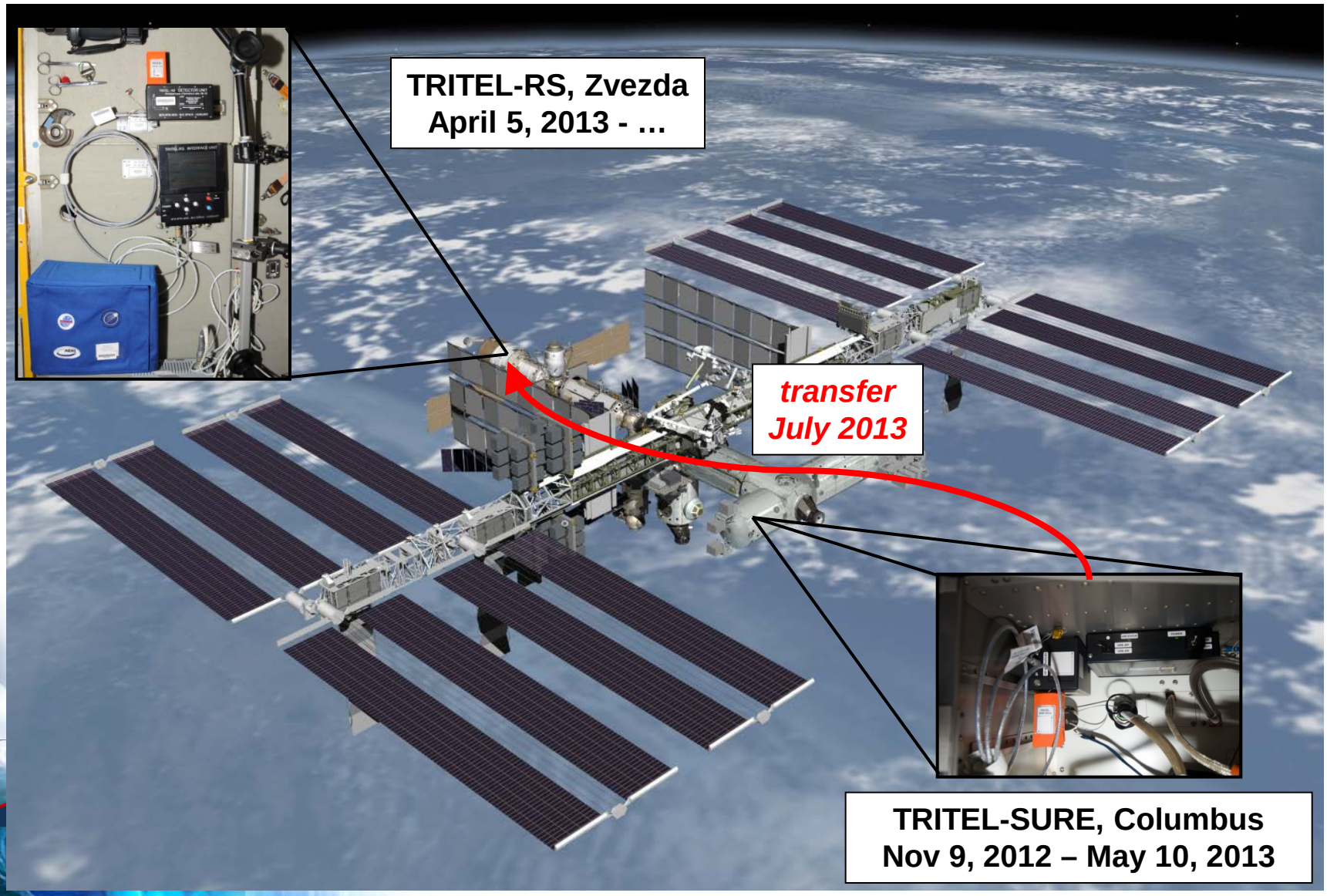


Figure: NASA; Photos: Energia/Roscosmos/IMBP and ESA/NASA

Thank you for your attention!