SPACE IT UP!

Space It Up! Days

Firenze, 26-28 January 2026

ASI AGENZIA SPAZIALE ITALIANA

MUR Ministero dell'Università e della Ricerca

Spoke 4

Next generation detectors of ionizing radiation and fields for remote sensing

The Space It Up! project is funded by the Italian Space Agency (ASI) and the Ministry of University and Research (MUR), under contract no. 2024-5-E.0 – CUP I53D24000060005.

Spoke4 – The partners

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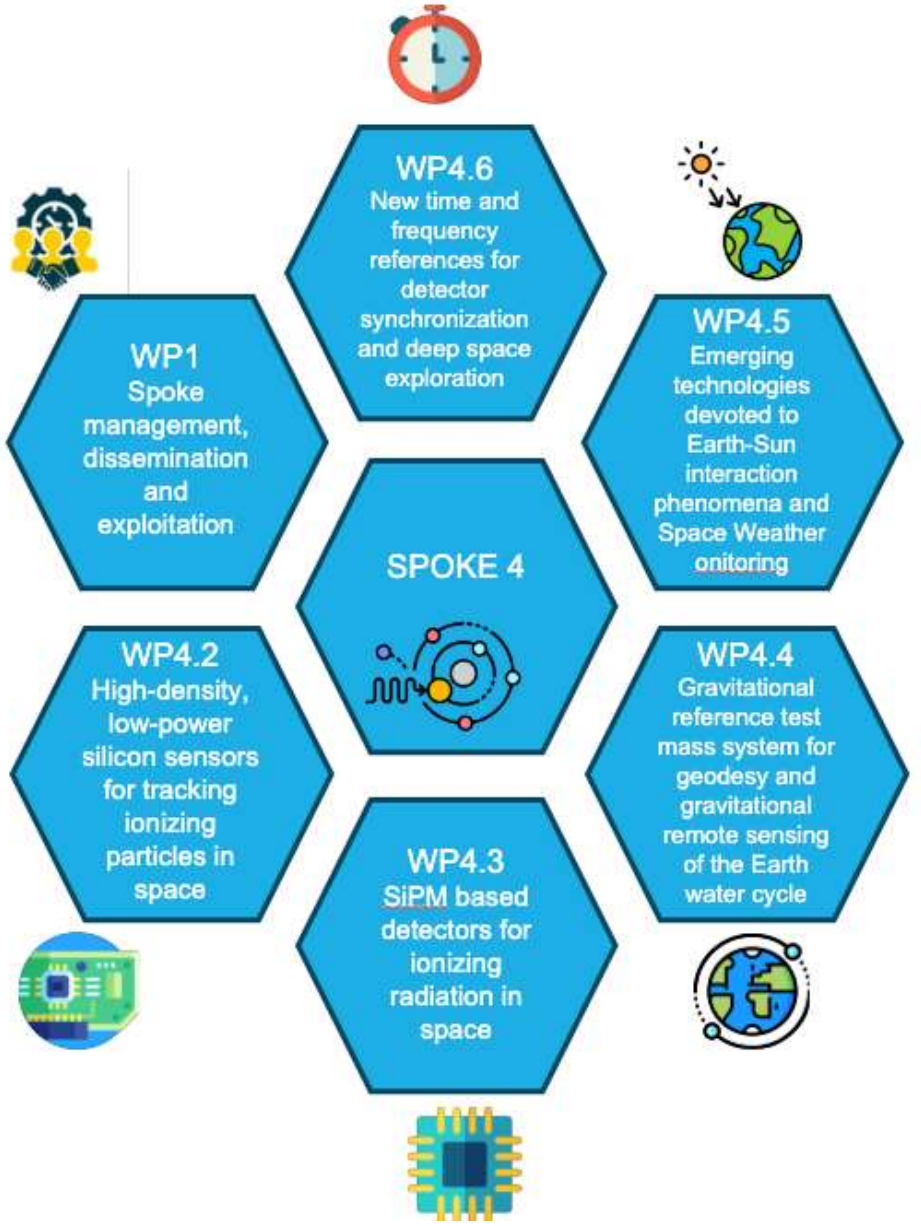
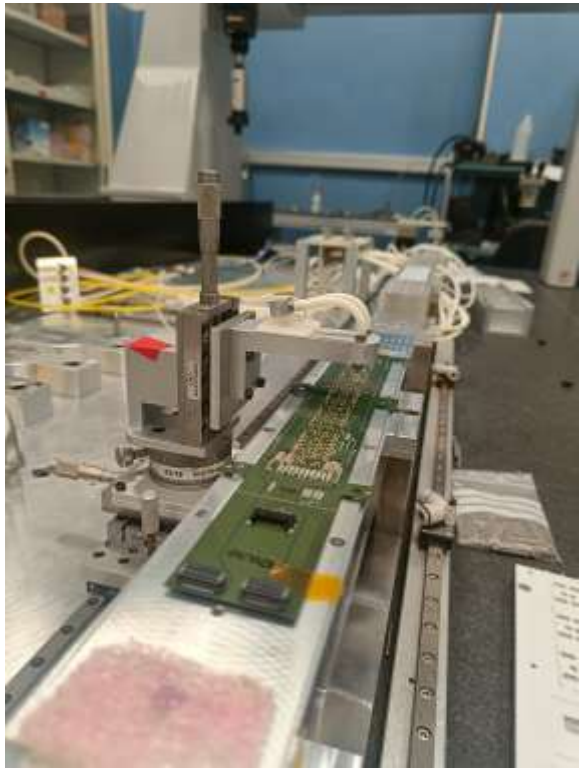
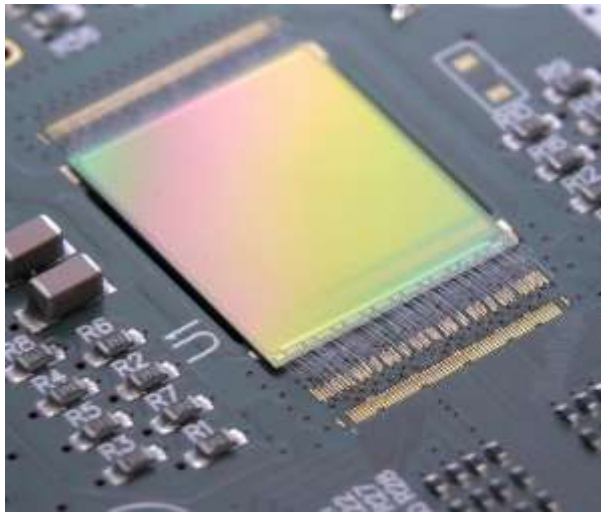
Spoke4 – Mission Statement

Design, **develop and qualify high resolution, miniaturized detection systems for the next decades satellite missions** observing ionizing radiation around the Earth and water reservoirs on the Planet.

Establish a reliable supply chain of national manufacturers for all critical components of the detector systems, integrated sensors, electronics and mechanical units, based on successful heritage projects







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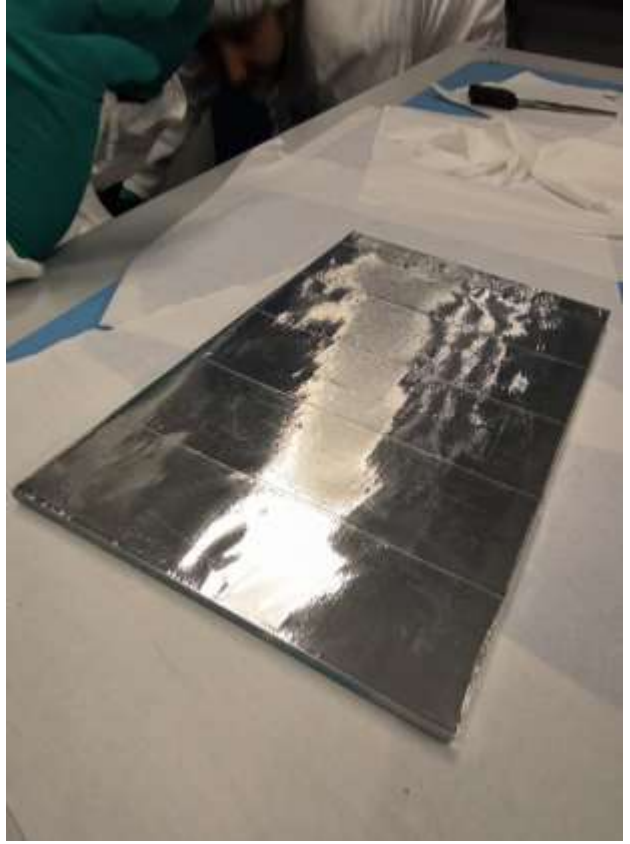
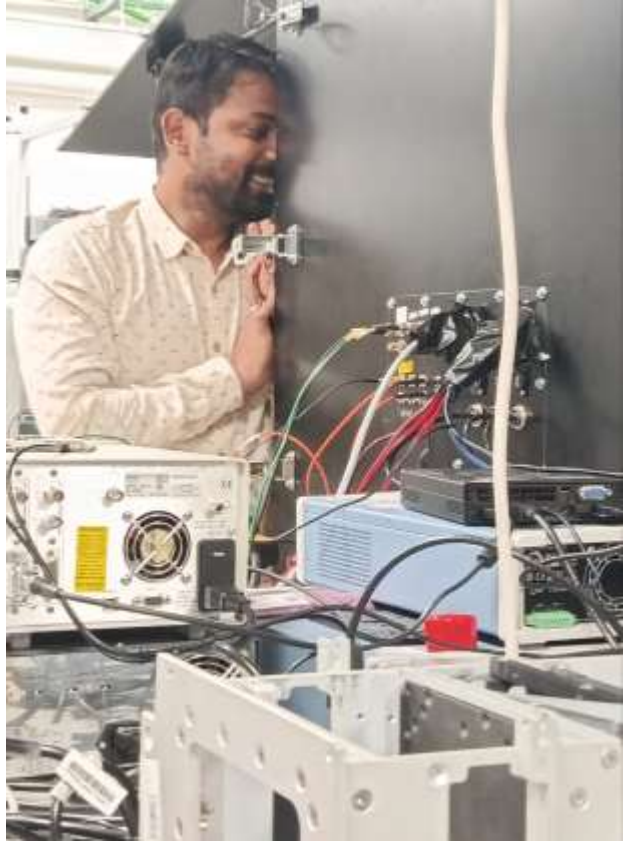
WP 4.2 - High-density, low-power silicon sensors for tracking ionizing particles in space

- Chip design and fabrication, front-end firmware and DAQ development, module integration and qualification, performance optimization



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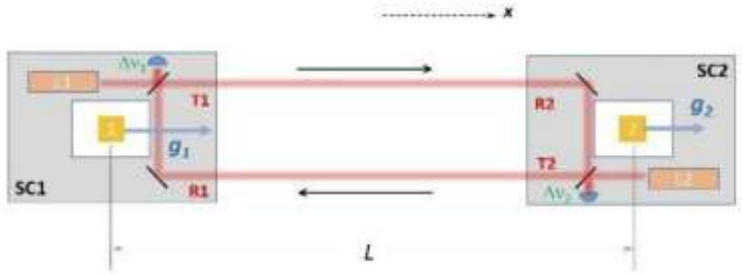
WP 4.3 - SiPM based detectors for ionizing radiation in space

- Sensors performance optimization, module design and integration, detector assembly and qualification



WP 4.4 – Gravitational Reference test mass System for geodesy and gravitational remote sensing of the Earth water cycle

- Requirements optimization, module design and procurement, performance qualification

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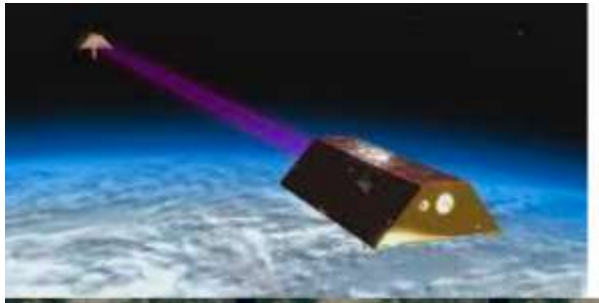
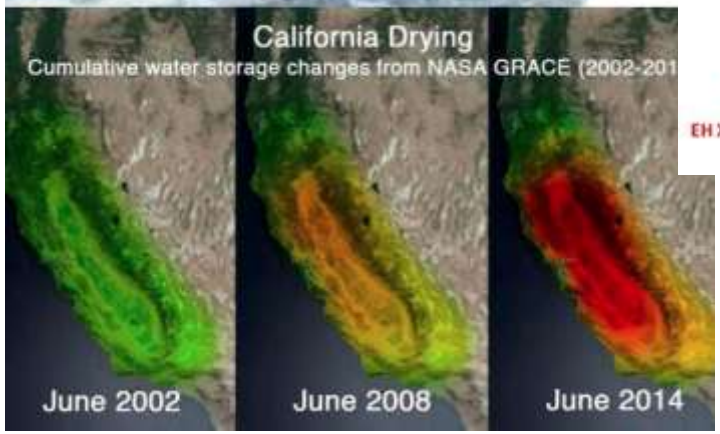
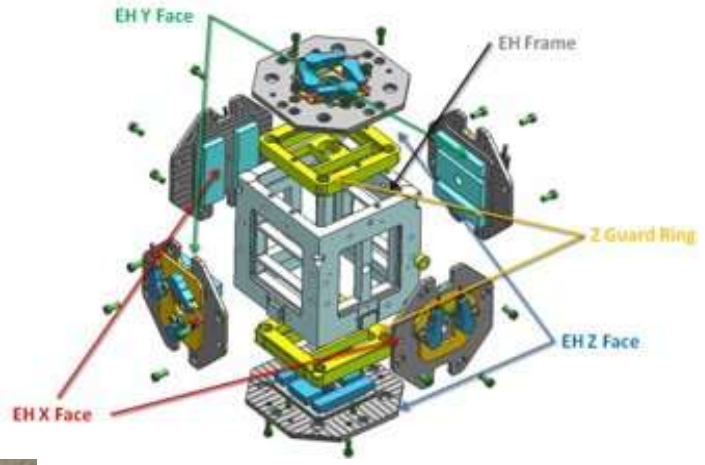


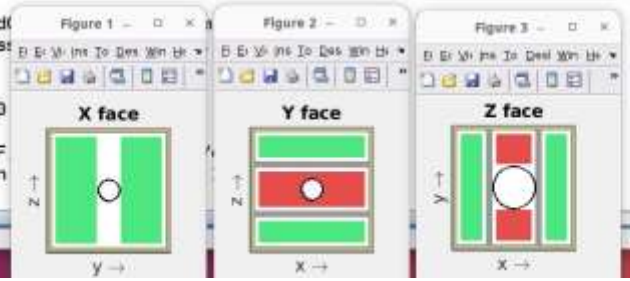


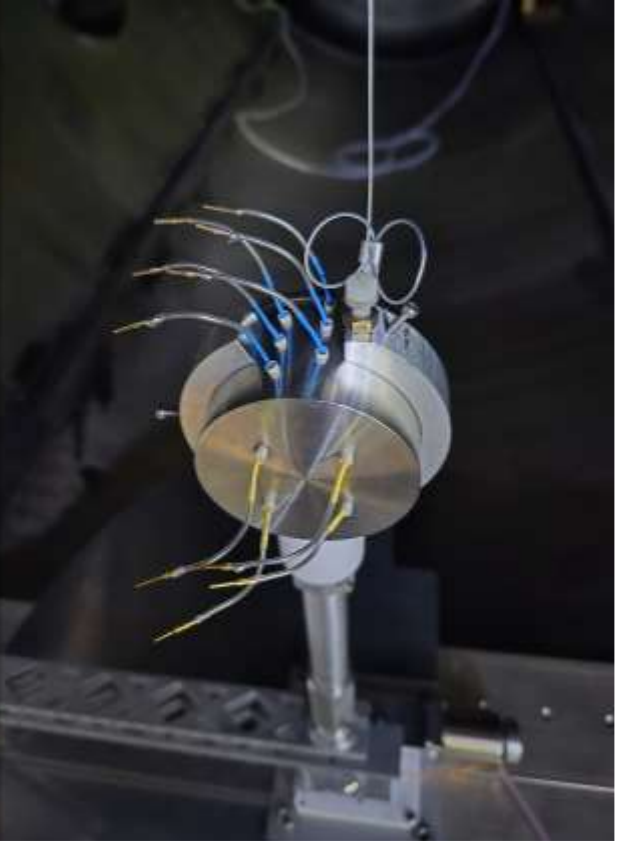
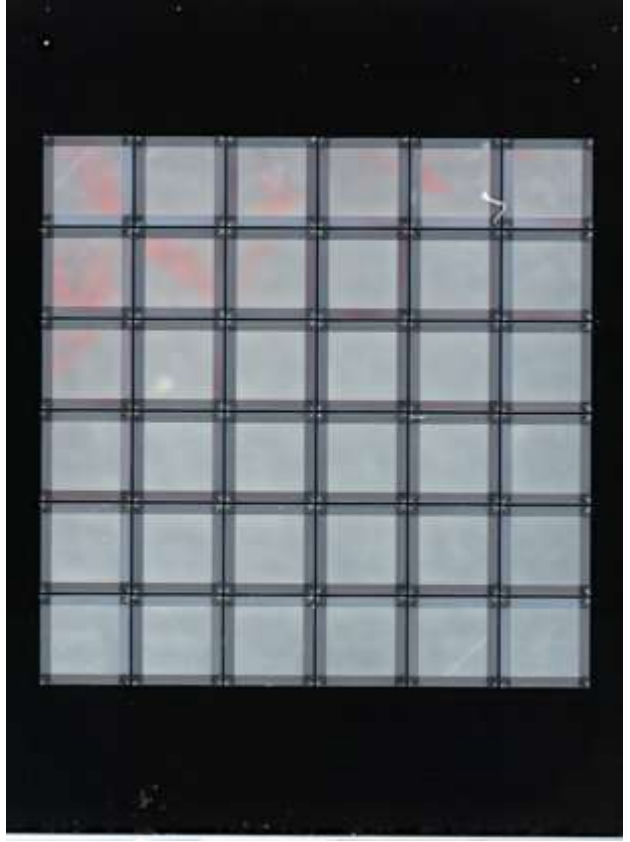
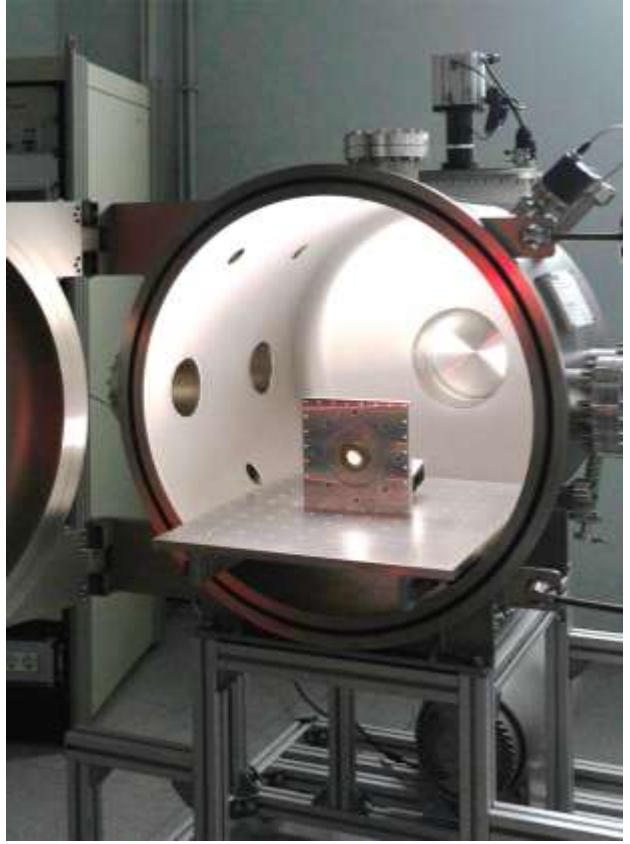
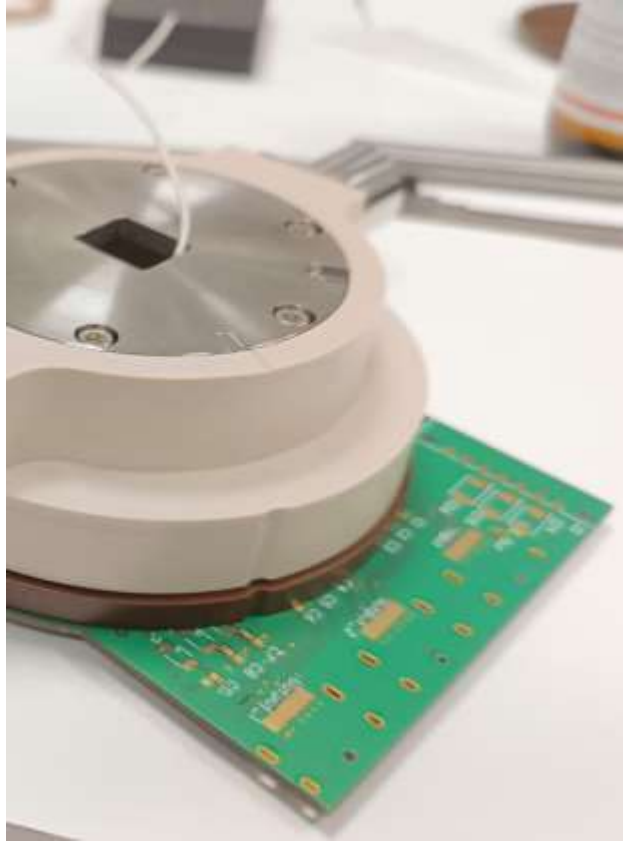



```
>> geo_grs('mass',34,'plt','xyz','win',10,'winz',10,'dx',0.8,'dy',0.8,'dz',0.8,'VIN',2.5,'din',1,'double_inz','cagehole',1
Modified Trento Design (2 sensing electrodes on every face, YZ injection)

DESIGN
X faces (mass face 34 x 34 mm
   Two sensing electrodes:  11.7 x 30.4 mm , gap 0.8 mm,  Rphi 9.35 mm (6 mm laser hole)
R2(x)phi = 10.288 mm, R2(x)eta = 9.1666 mm
X Guard rings:  1 mm top, 1 mm side
   Capacitance Cx =  3.9347 pF,    Sensitivity d(
   Single face extra cap: 1.1753 pF      Or (pes

Y faces (mass face 34 x 34 mm)
   Two sensing electrodes:  6.2 x 30.4 mm, gap 0
R2(y)th = 12.5151 mm, R2(y)phi = 9.1666 mm
    Single electrode capacitance Cy =  2.0851 pF
 Single injection electrode:  10 x 30.4 mm (with
  Effective size: 10 x 30.4 mm
```



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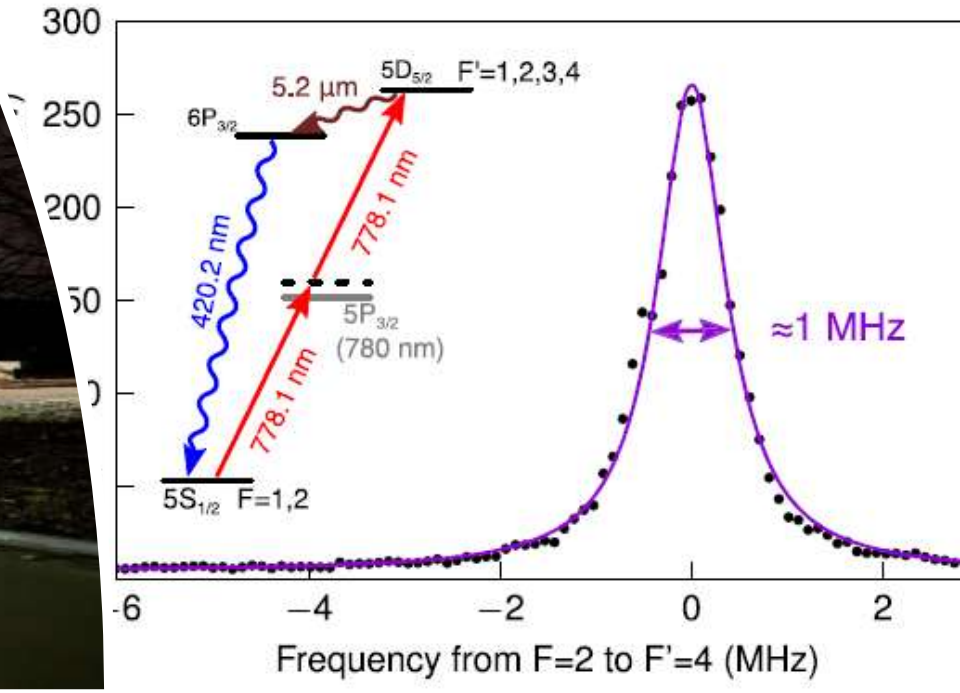
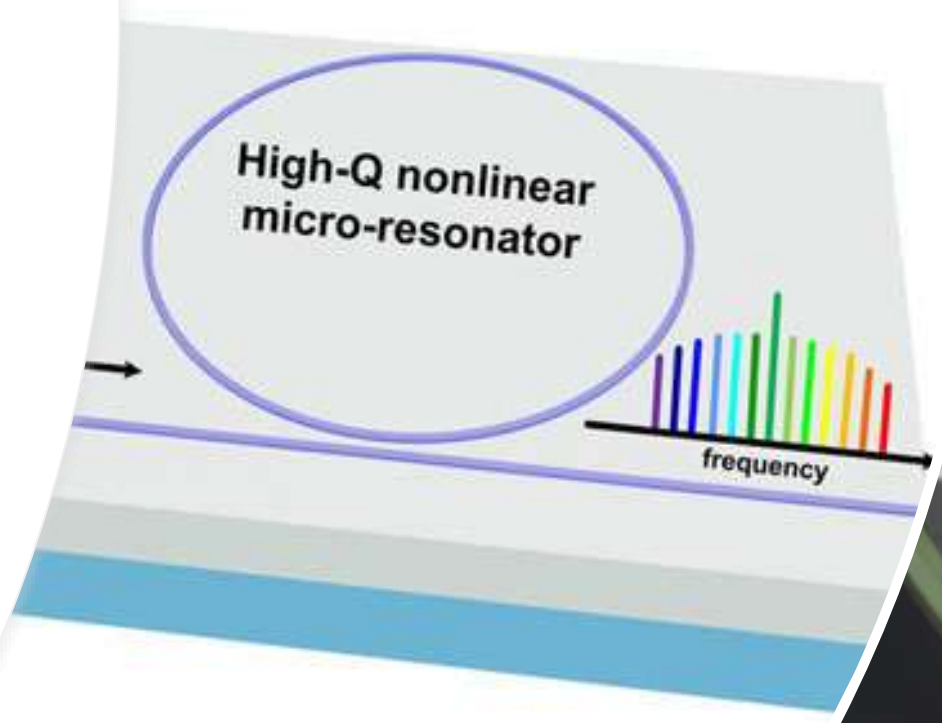
WP 4.5 – Emerging technologies devoted to Earth-Sun interaction phenomena and Space Weather monitoring

- Energetic Neutral Atoms detectors, Hard X-ray polarimeters, Miniaturized plasma sensors and advanced qualification facilities



WP 4.6 - New time and frequency references for detector synchronization and deep space exploration

- Atomic clock design, nanofabrication machines, microrings coating and qualification, miniaturizated clocks performance testing



PIQUET
Piemonte Quantum Enabling technology

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Spoke4 – Sinergies

Spoke 6
Protection of Critical Structures and Space Weather

Spoke 5
Planetary Protection and Geohazards Mitigation

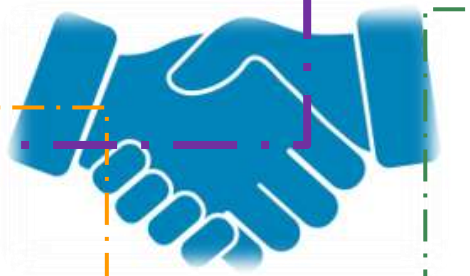
Spoke 3
Future imaging systems for microwave and optical remote sensing

Spoke 2
Advanced design and analysis of space missions and systems and innovative digitalization

Sharing of technologies, facilities and analysis tools

Spoke 7
Space for the sustainable development of the planet

Spoke 1
Enabling Technologies for Novel Near-Earth and Exploration Missions



Spoke 8
Robotic and Human Exploration of Extraterrestrial Habitats, Architectures and Infrastructures

Science and mission requirements flowdown

Spoke 4
Next Generation Detectors of Ionizing Radiation and Fields for Remote Sensing

Better sensors and timing references

Check out Spoke4 contributions

Presenter	Title	Session
W.J. Weber	High precision gravimetry	M2
C. Sgro'	Particle detectors & Silicon Photon multipliers	P1
S. Micalizio	Atomic clock/Time-reference	P1
M. Barbagiovanni	Monolithic γ/x-Ray Camera for Compton Telescope: Low Power In-Pixel Time and Charge Readout	poster
A. Driutti A. Frassa'	Application of CMOS Monolithic Active Pixel Sensors (MAPS) to Compton Telescopes	poster
M. Mandurrino	Space it Up! gamma/X-ray camera: Sensor design and simulation	poster
U. Savino T. Bencivenga	Design and Thermal Analysis of a Scalable MAPS-based Modular Compton Detector	poster
E. Ricci	High-density, low-power CMOS sensors for tracking ionizing particles in space: performance verifications and calibrations	poster

Presenter	Title	Session
M. Boscardin	Next Generation Silicon Detectors For Ionizing Radiation In Space Experiments	poster
F. Acerbi	FBK SiPM for Spoke4 and Spoke6	poster
F. Perfetto, F. Sansone, L. Lavitola	Development of a SiPM readout system for space-based radiation measurements	poster
C. Trimarelli	SiPM based detectors for ionizing radiation in space	poster
E. Dalla Ricca	Requirements, preliminary design, and tradeoffs for a gravitational reference system for geodesy	poster
E. De Angelis F. Pilo	Study and development of innovative ENA detection technique based on MPGD	poster
R. Vaccaro	Technology for plasma sensor	poster
Y. Evangelista	Toward a Photoelectric Imaging Hard X-ray Polarimeter for Solar Flares	poster
M. Gozzellino	New time and frequency references for space exploration	poster

Spoke4 towards new eyes for the Universe and the Earth ….

…. come join the fun