15th AGILE Workshop

TAS I contribution

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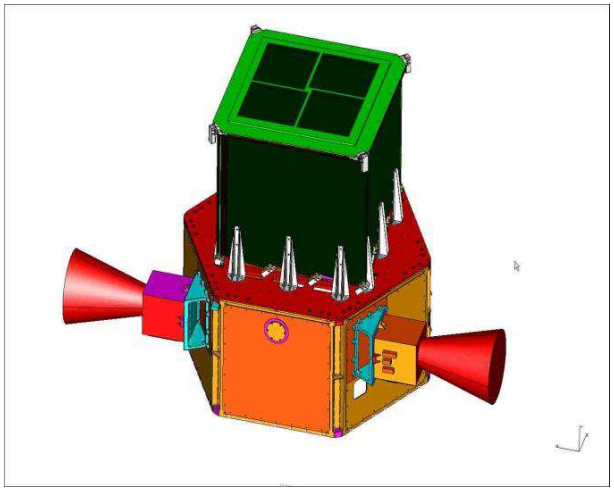
a Thales / Leonardo company

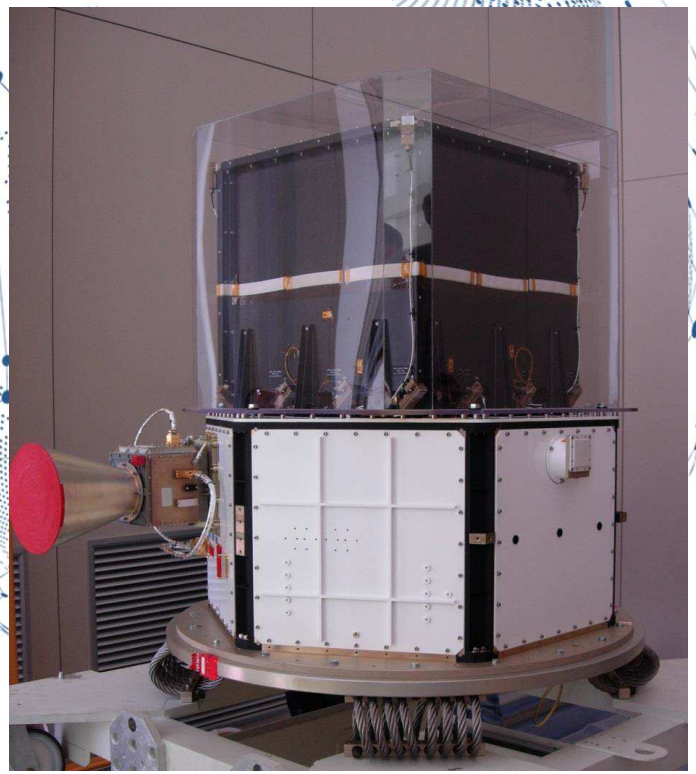
22.05.17

15th AGILE Workshop: History of Agile Payload

ASTRORIVELATORE
GAMMA
IMMAGINI
LEGGERO



from concept to reality



15th AGILE Workshop

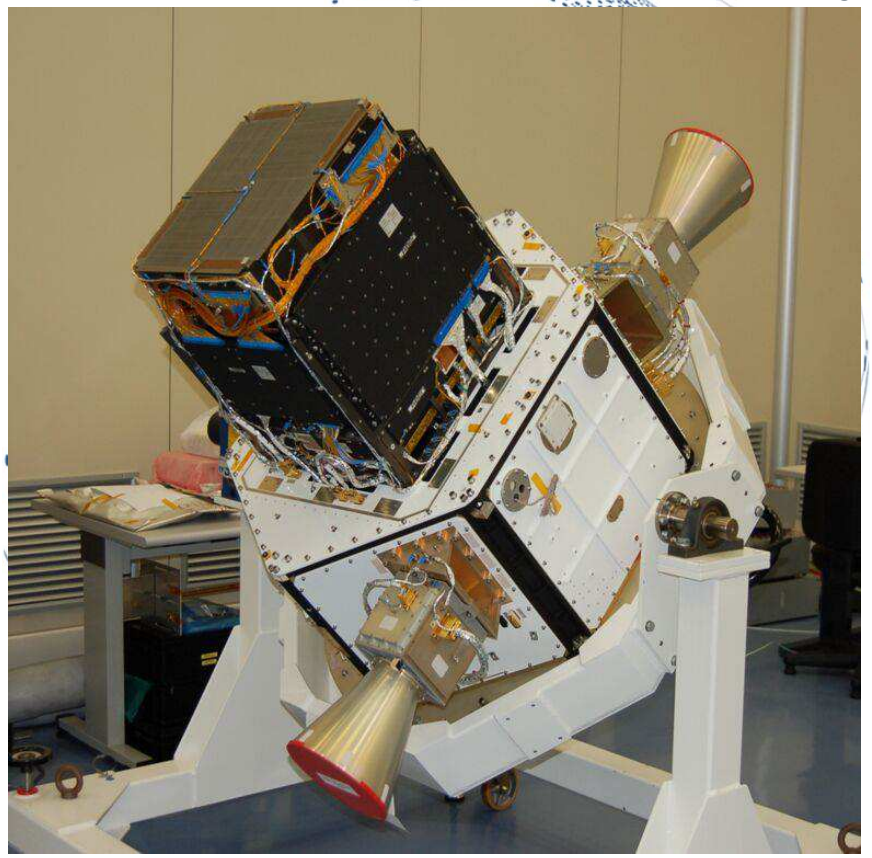
X and Gamma rays imager with:

- Silicon Tracker: 36864 (γ-ray imager) channels
- Super Agile: 6144 (hard X-ray imager) channels
- Mini-Calorimeter: 60 channels
- AC: 15 (PMT) channels

Mass: 170Kg

Power: •130W

•3mW average power per channel



15th AGILE Workshop - Key of success of Agile Payload

Keys of success:

- Collaborative Teamwork
- Institutes excellence
- Industrial capacity

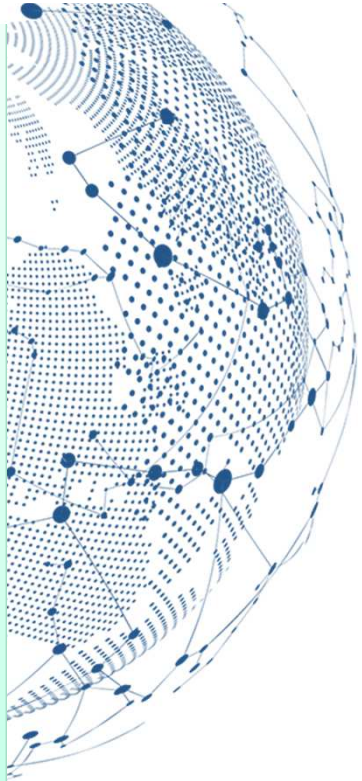
Team

Institutes:

- IASF: Roma
  Milano
  Bologna
- INFN: Trieste
  Roma
- Università: Trieste,
  La Sapienza
  Tor Vergata
- CISF

Industries:

- TAS-Italia
  (former Laben)
- Rheinmetall
  (former Oerlikon Contravers)
- Leonardo
  (former Galileo Av.)



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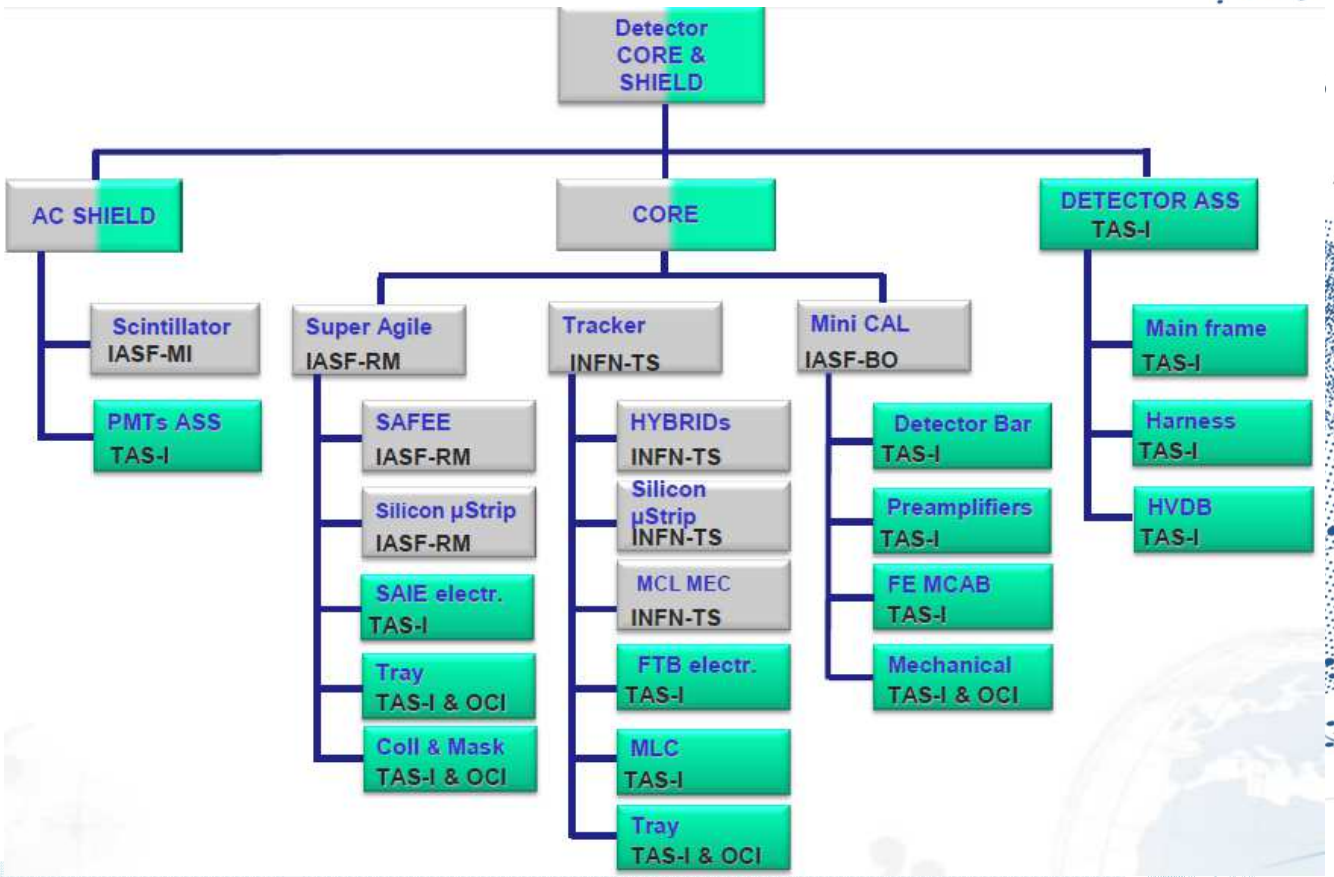
15th AGILE Workshop – Detector's product tree



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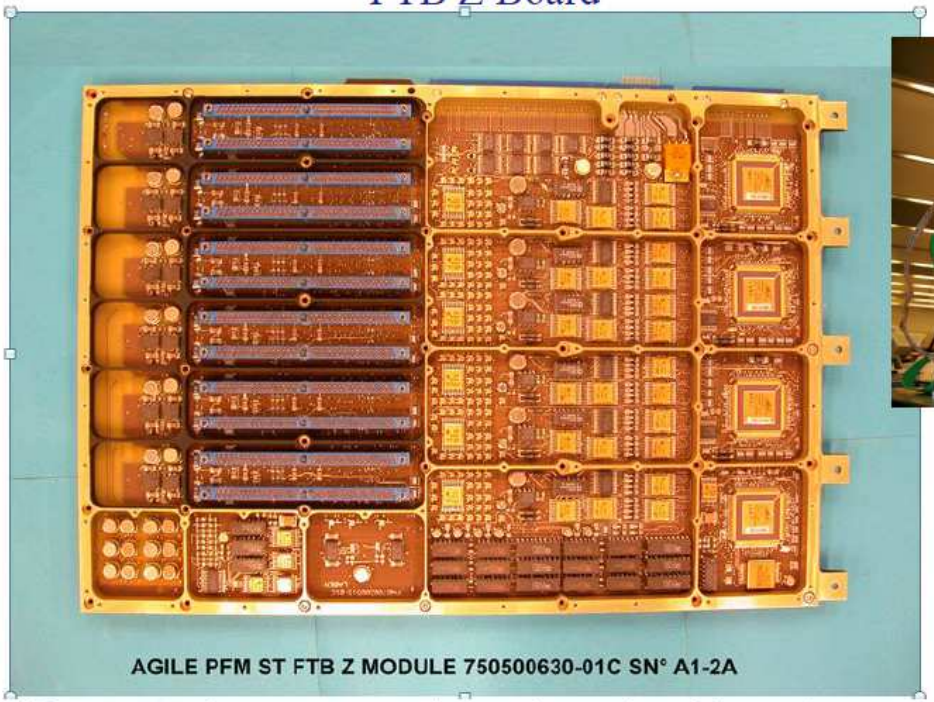
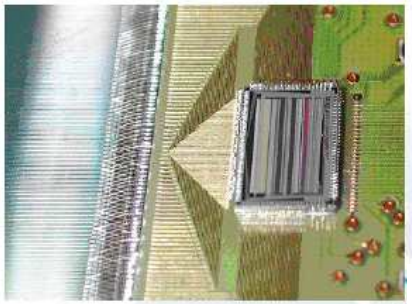
15th AGILE Workshop – Silicon Tracker Detector

FTB Z Board



Silicon tracker



Silicon Tracker: 36864 Channels each with EN/DIS and threshold setting by TC or LUT at power On

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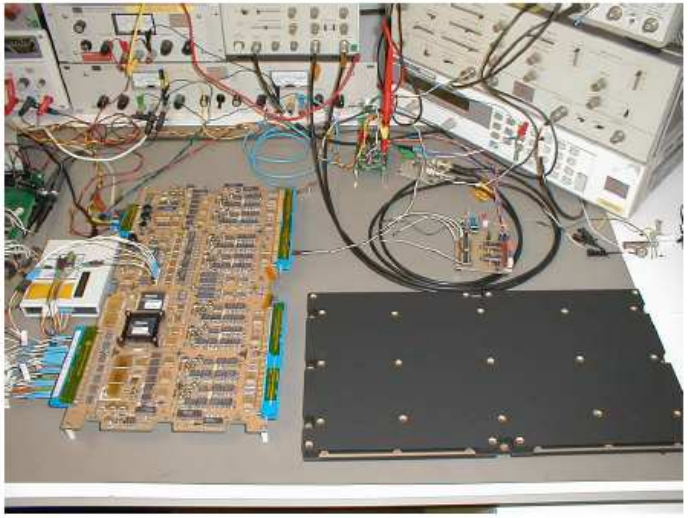
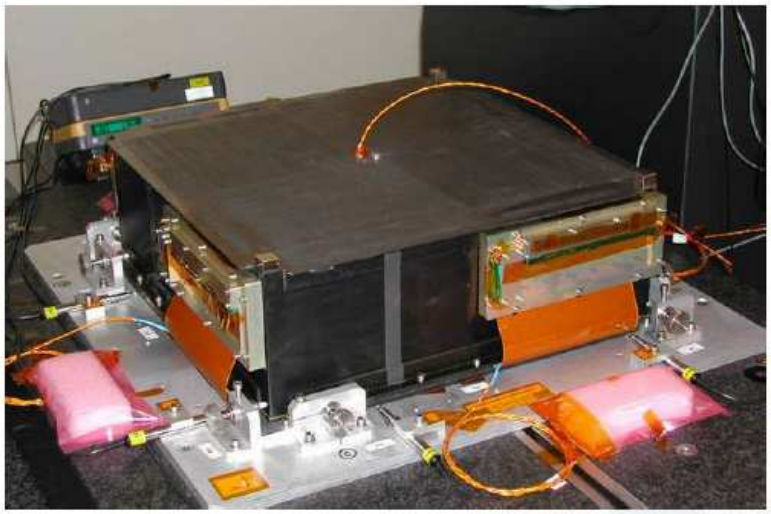
15th AGILE Workshop – Super Agile Detector

SAIE Board



Super Agile PFM model



Super Agile: 6144 channels each ones with EN/DIS and threshold setting by TC or LUT at the power ON

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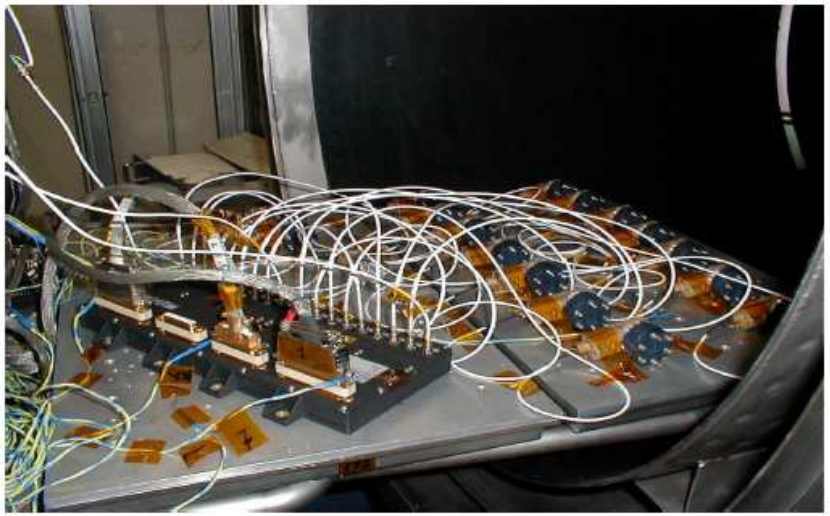
15th AGILE Workshop – AC System Detector

AC HV unit and PMTs



AC: 15 PMTs channels each ones with programmable HVs and gain

AC Detector Assembly

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15th AGILE Workshop – Mini Calorimeter Detector

MCAL Board

Guinness Board:560x560mm; about 6000 EEE parts

Mini CAL Assembly

60 Analog channels each with:

- Low noise pre-amplifiers
- Trigger level setting on TC
- Gated integrators
- A to D conversion (Mux)
- Digital pre-processing

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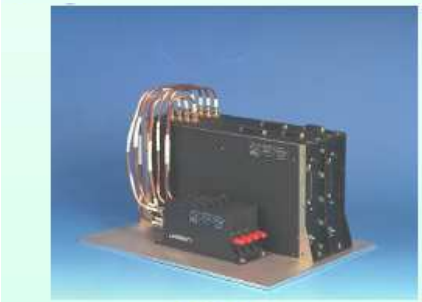
15th AGILE Workshop – Equipment and Payload Shell



GPS

STAR SENSORS

PSU

HARNESS

PAYLOAD SHELL

PDHU

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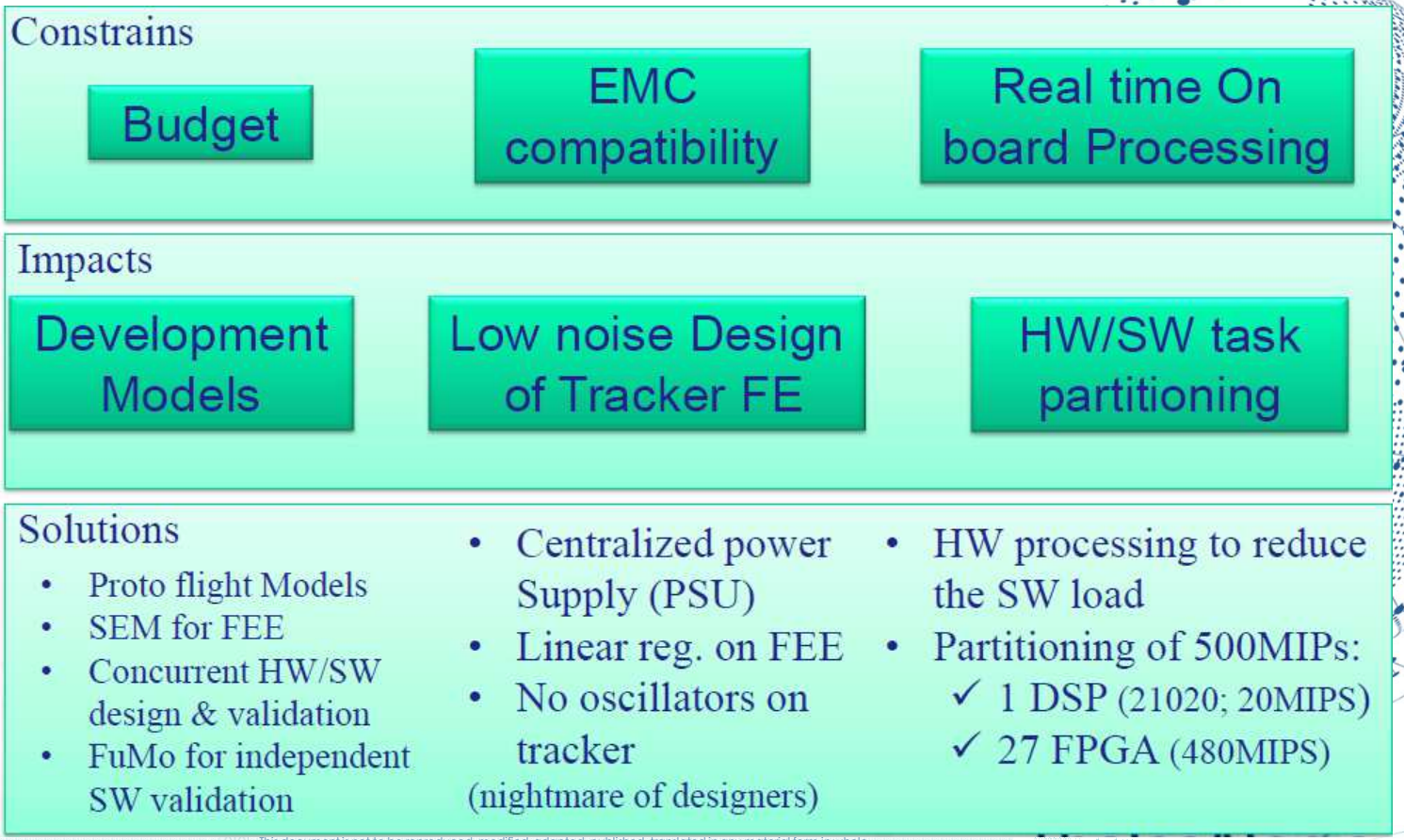
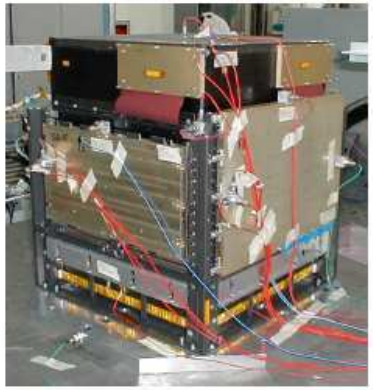
15th AGILE Workshop – Challenging Design Constraints



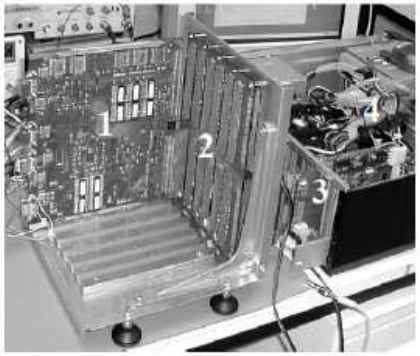
15th AGILE Workshop – Risk Reduction Strategy

Risk reduction strategy

Models:	DETECTOR's EGSEs SIMULATORS:	HW/SW concurrent design
• PFM of Front End and Back End Equipment • SEM for the Front End • Functional Mod. for independent SW validation	• Tracker EGSE • Super Agile EGSE • Mini Cal. EGSE • AC EGSE (for PDHU HW/SW validation)	• HW design based on FPGA with contingency (LR, freq.) • Intensive test of interaction of HW and real time SW • Independent SW validation with simulator and FuMo



Simplified EM



FuMo for independent SW validation

IPL: Proto flight M

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15th AGILE Workshop – A success story

Teamwork between Institutes and industry, since the beginning, was one of the key of success:

1) Payload design requirement definition
2) Pre integration of FEEs and Detectors
3) HW and SW validation at payload and satellite level
4) Joined team during calibration activities and data analysis
5) Collaboration in the commissioning phase

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15th AGILE Workshop – A success story

Agile is a scientific success for understanding of Universe, but it was an opportunity to develop new technologies for companies in the aerospace sector.

Agile was a precursor in the usage of GPS satellites achieving a time tag resolution of few µs.

Agile improved the real time processing capability on board and opened the doors to new High performance computers development:

"Power PC module for space is now a reality in TAS-Italia".

The Agile's team