

Space Weather Capabilities of the Space Research Group of the University of Alcalá

Dr. Manuel Prieto Mateo
On behalf of SRG



Universidad
de Alcalá





SRG OVERVIEW

Multidisciplinary team: 30+ scientists and engineers

Expertise: Heliophysics and Cosmic Ray Physics

Strong instrumentation and modelling capabilities

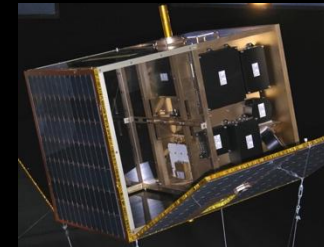
Participation in the following missions:



Nanosat 01

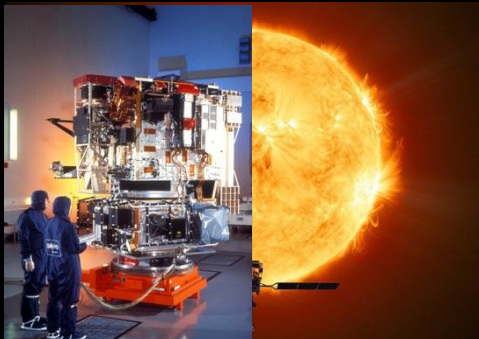


Nanosat 1B



Microsat

SOHO



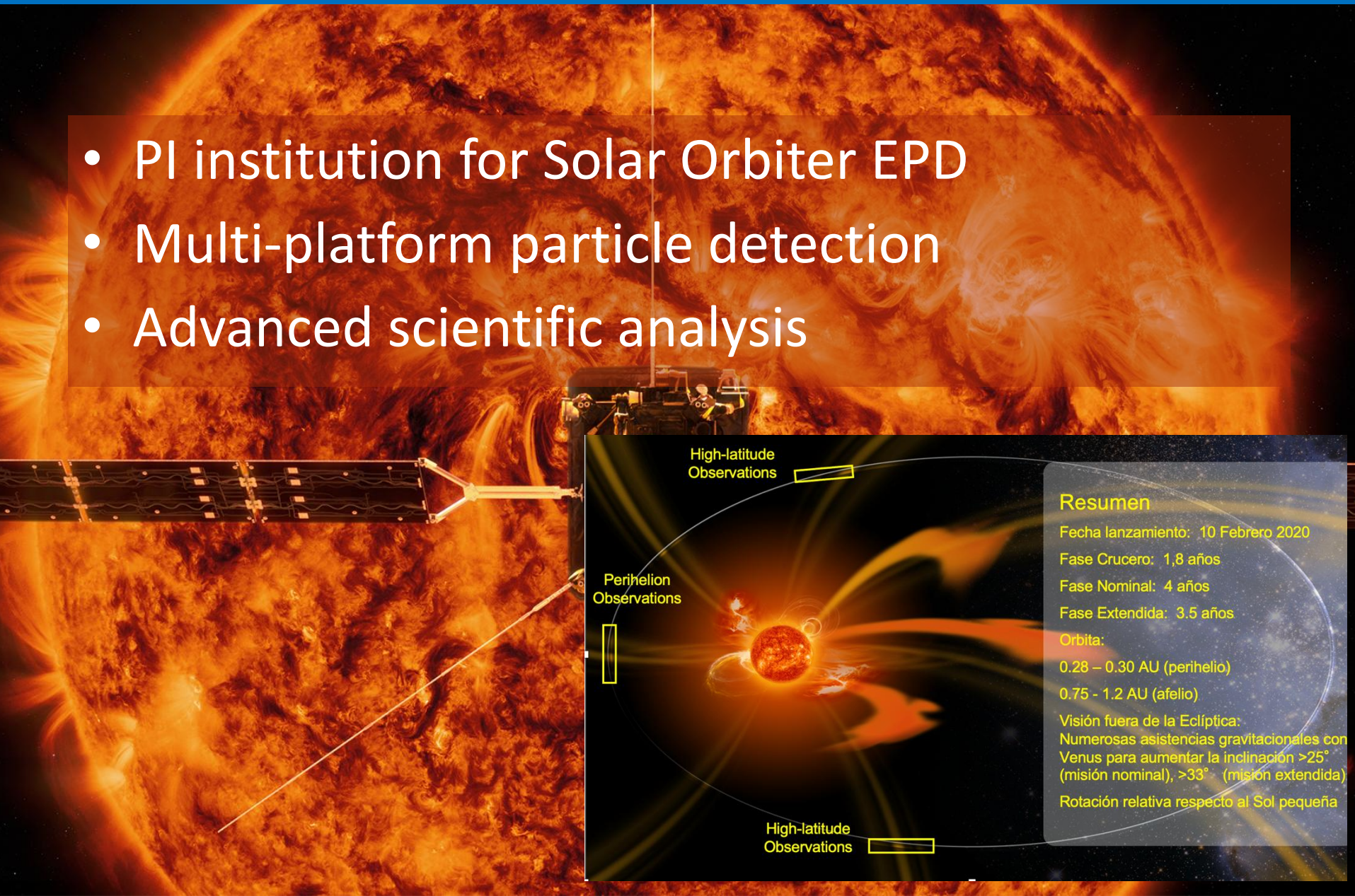
**PESCA
SIDRA
EXOMARS
FUEGOSAT
HUMSAT
EUCLID
Q-ANSER**

Solar Orbiter



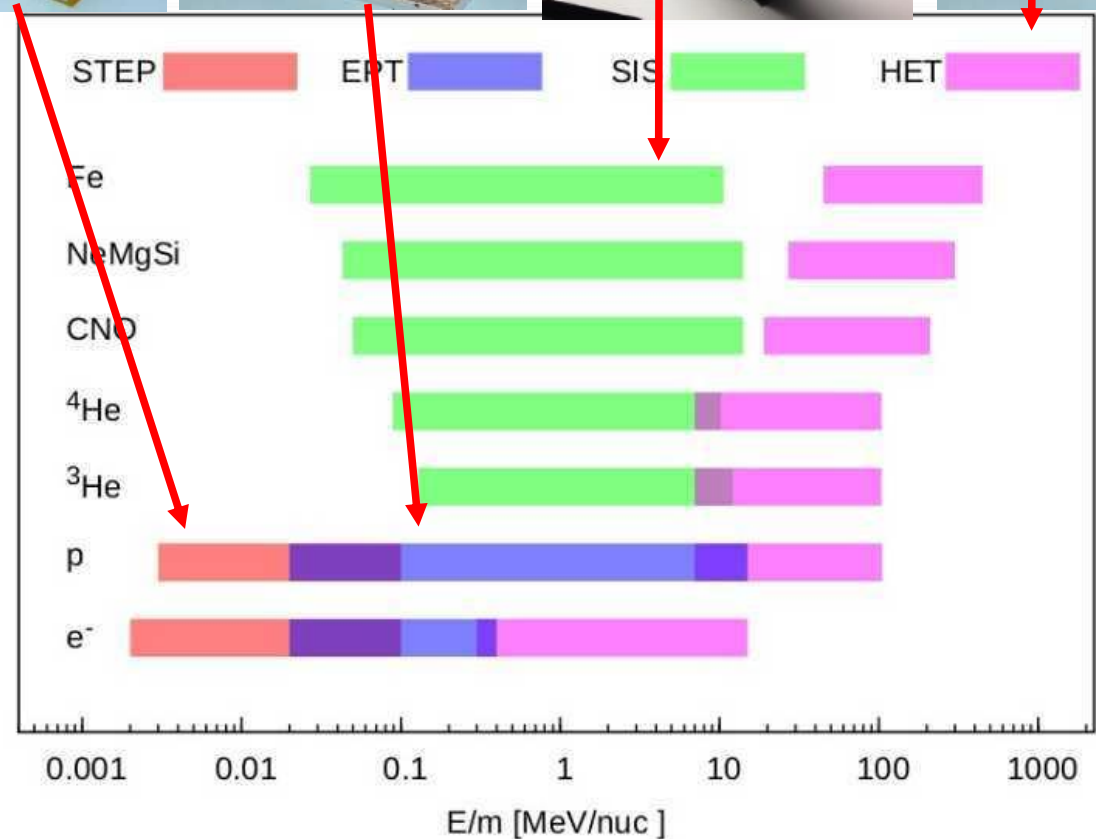
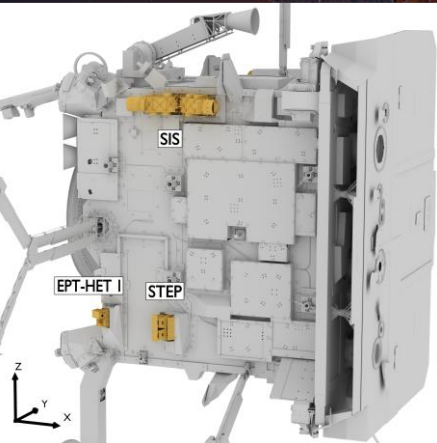
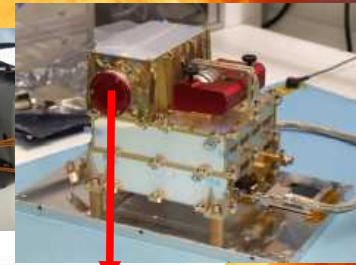
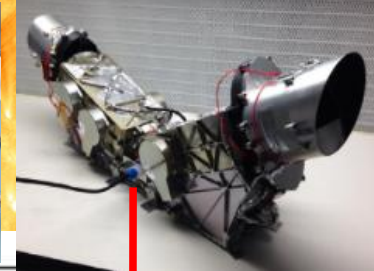
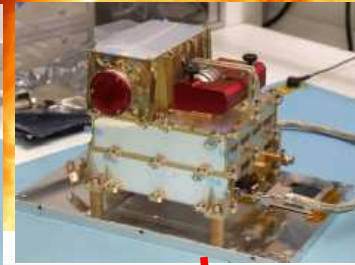
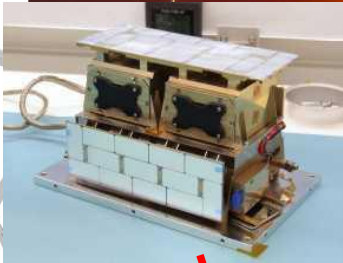
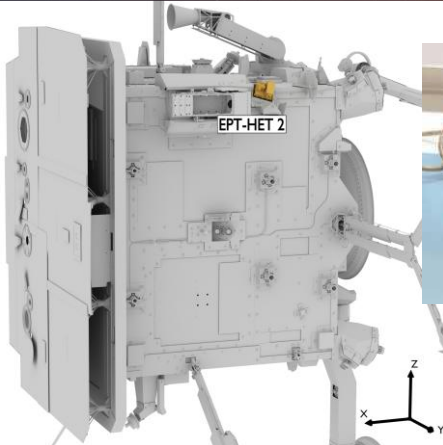
SEP Detection (Solar Orbiter EPD)

- PI institution for Solar Orbiter EPD
- Multi-platform particle detection
- Advanced scientific analysis



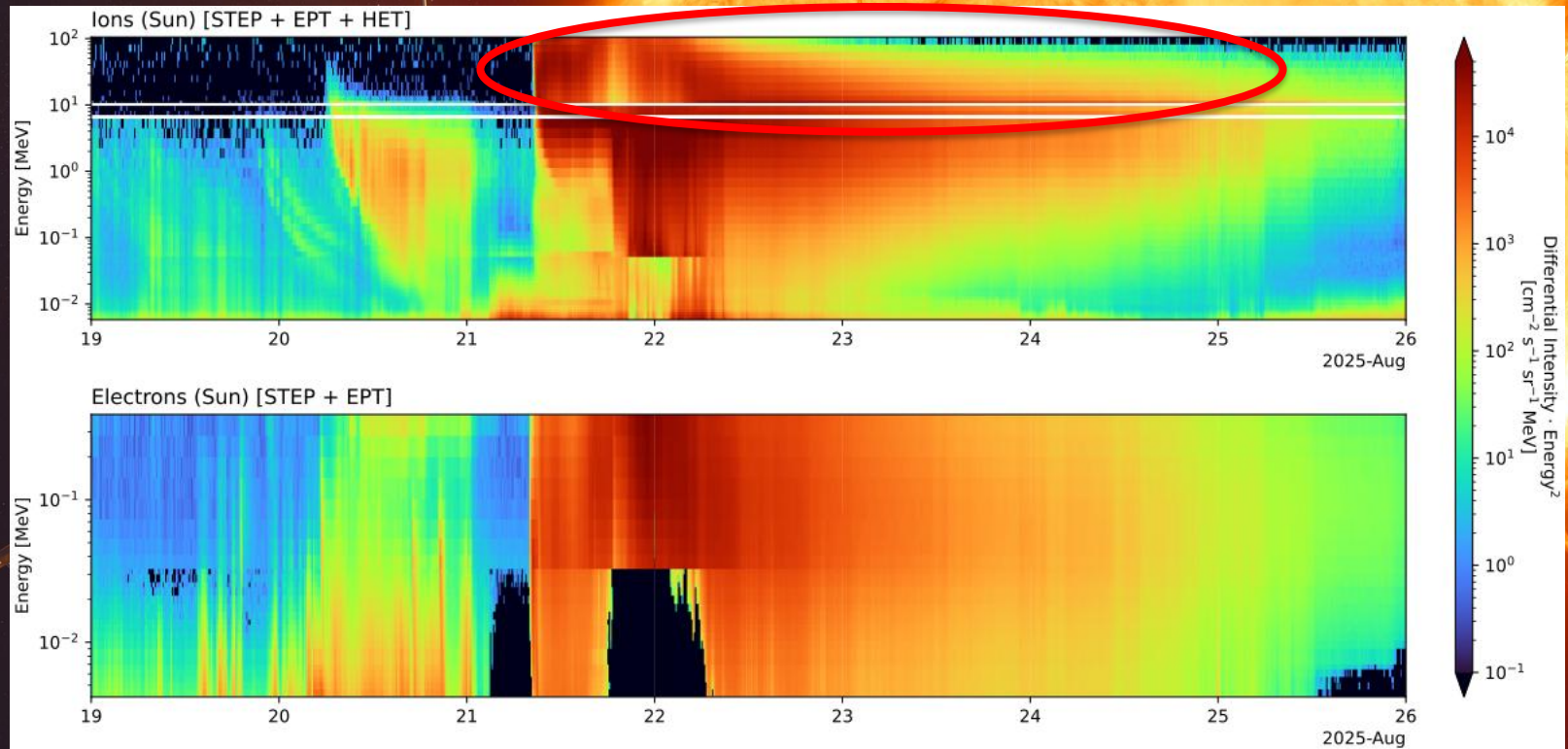


ENERGETIC PARTICLE DETECTOR (EPD)





THE SUPERSTORM OF AUGUST 21ST, 2025



EPD low latency data



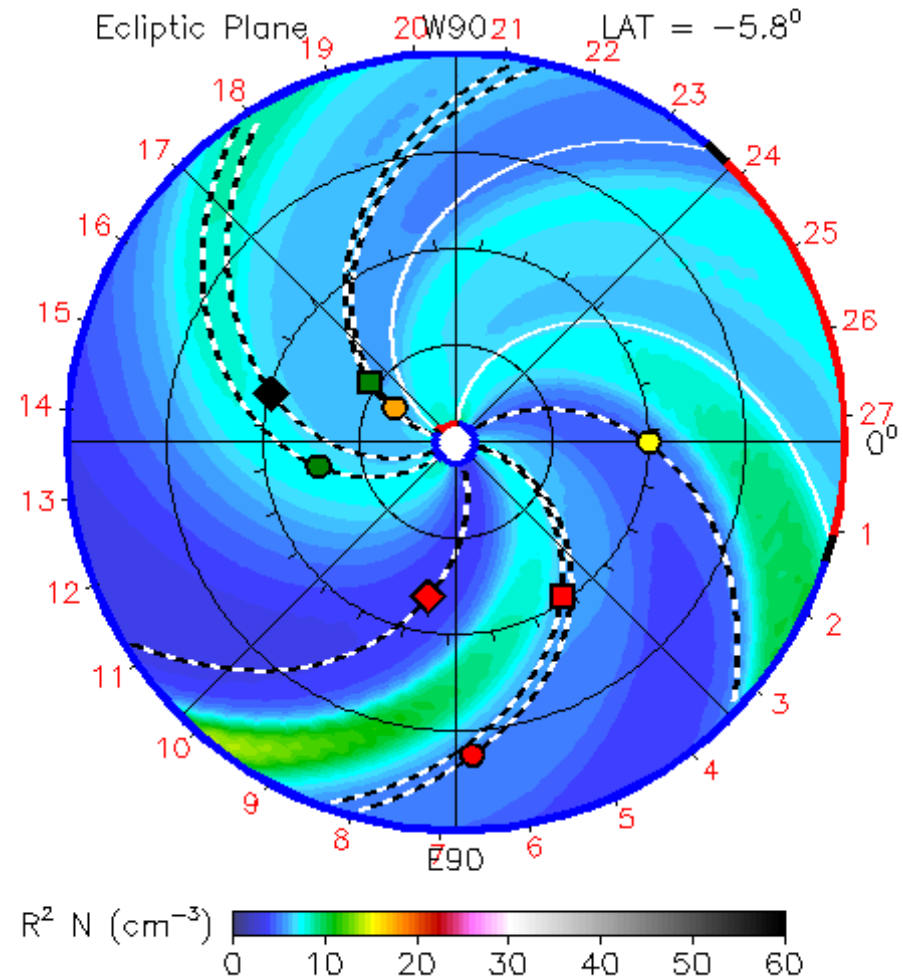
INGENUITY PERSEVERANCE

19 ABRIL, 2021



2021-04-11T00:00

● Earth ● Mars ● Mercury ● Venus



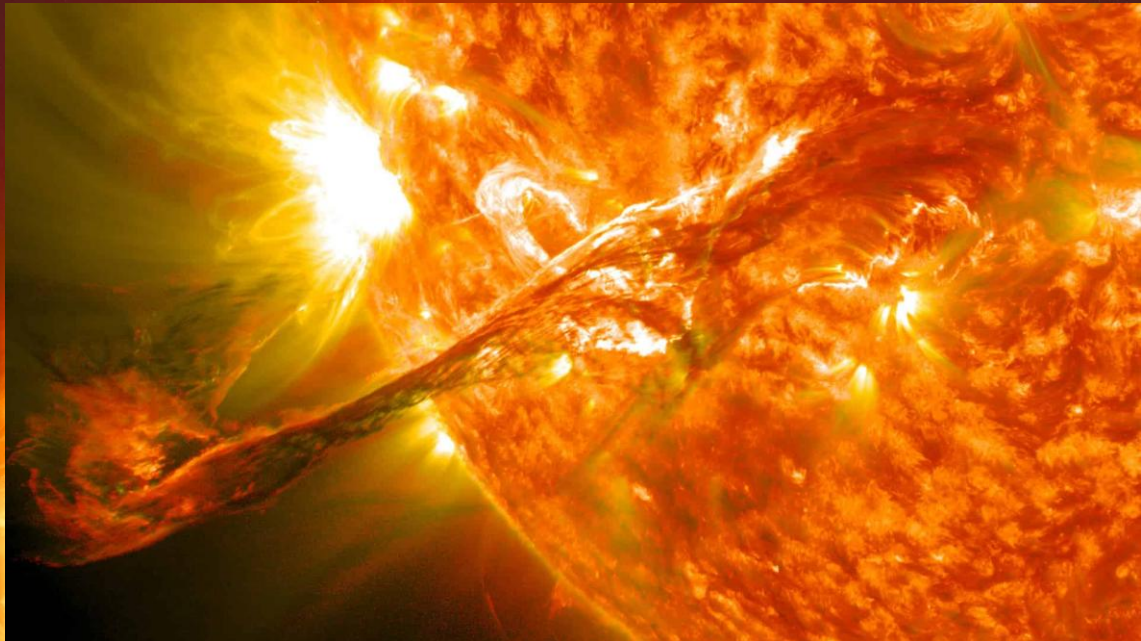
ENUL-2.7 lowres-2243-a4b1 WSA_V2.2 GONGZ-2243

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ARTEMIS II

1-10 DE ABRIL DE 2026



ARTEMIS II

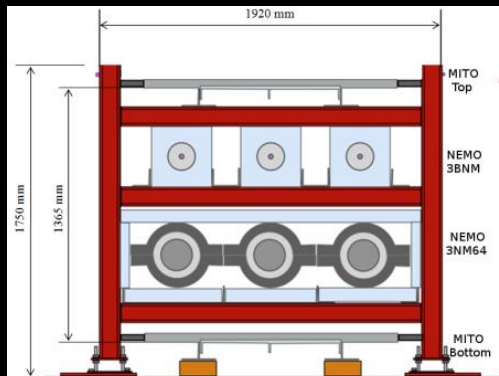
First Crewed Test Flight to the Moon Since Apollo

- 1. LAUNCH
Astronauts lift off from pad 39B at Kennedy Space Center.
- 2. PERIGEE RAISE MANEUVER
- 3. APOGEE RAISE BURN TO HIGH EARTH ORBIT
Begin 24 hour checkout of spacecraft.
- 4. HIGH EARTH ORBIT CHECKOUT
Life support, exercise, and habitation equipment evaluations.
- 5. JETTISON ROCKET BOOSTERS, FAIRINGS, AND LAUNCH ABORT SYSTEM
- 6. CORE STAGE MAIN ENGINE CUT OFF
With separation.
- 7. PROX OPS DEMONSTRATION
Orion proximity operations demonstration and manual handling qualities assessment for up to 2 hours.
- 8. INTERIM CRYOGENIC PROPULSION STAGE (ICPS) DISPOSAL BURN
- 9. TRANS-LUNAR INJECTION (TLI) BY ORION'S MAIN ENGINE
Lunar free return trajectory initiated with European service module.
- 10. OUTBOUND TRANSIT TO MOON
4 days outbound transit along free return trajectory.
- 11. LUNAR FLYBY
4,000 nmi (mean) lunar farside altitude.
- 12. TRANS-EARTH RETURN
Return Trajectory Correction (RTC) burns as necessary to aim for Earth's atmosphere; travel time approximately 4 days.
- 13. CREW MODULE SEPARATION FROM SERVICE MODULE
- 14. ENTRY INTERFACE (EI)
Enter Earth's atmosphere.
- 15. SPLASHDOWN
Ship recovers astronauts and capsule.

PROXIMITY
OPERATIONS
DEMONSTRATION
SEQUENCE



NEUTRON MONITORS AND MUON TELESCOPES SRG-UAH



ORCA



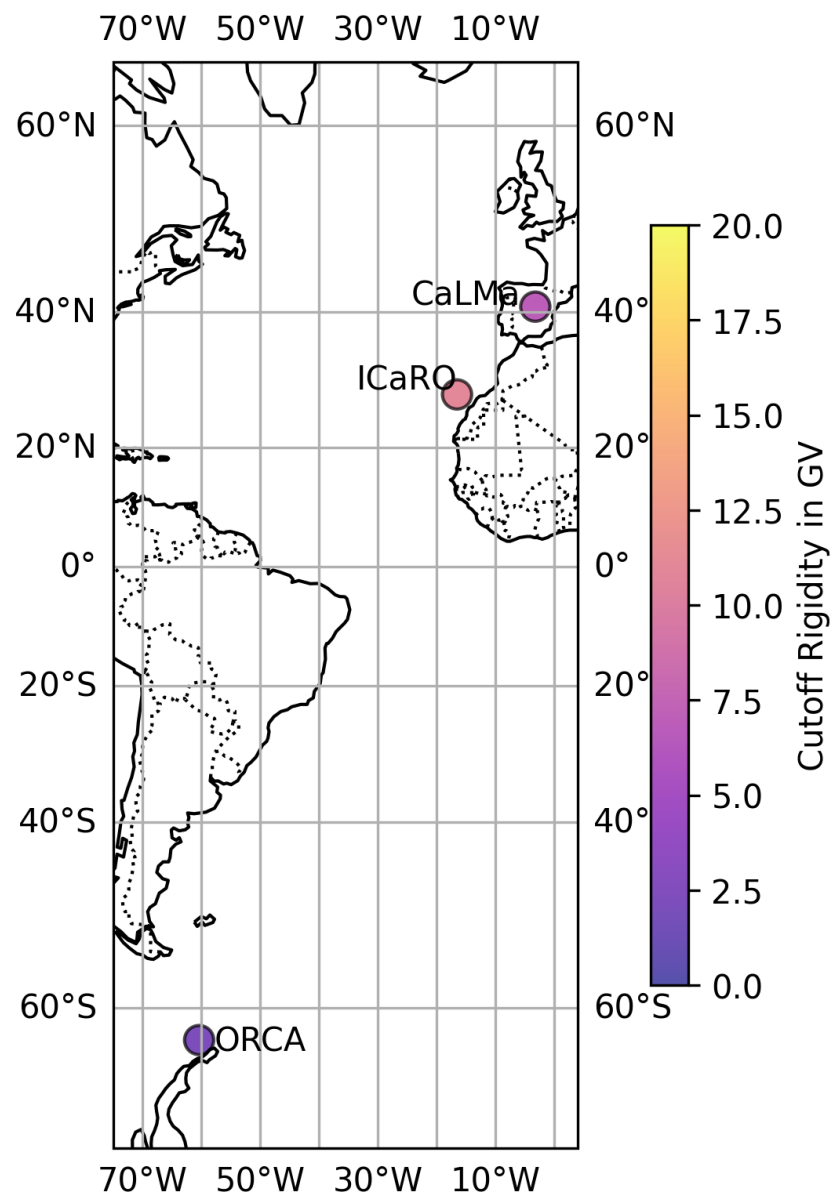
ICaRO



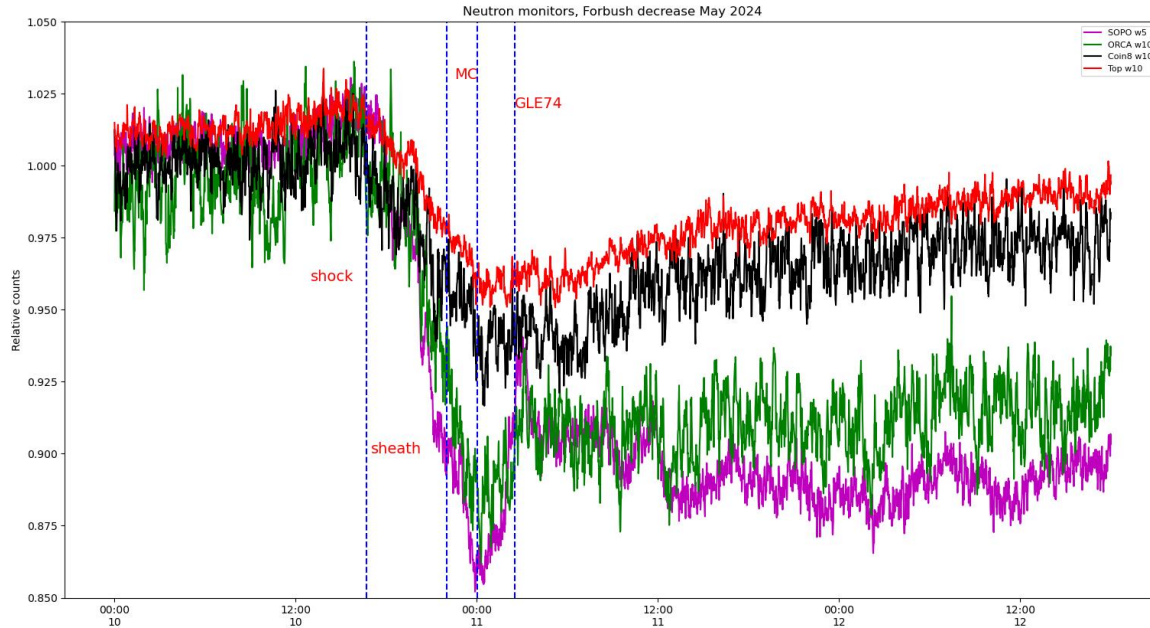
CaLMA



SRG-UAH neutron monitors



NEUTRON MONITORS AND MUON TELESCOPES

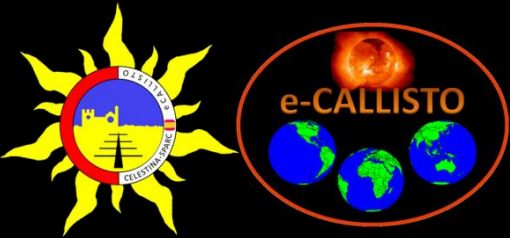


Features:

- Three operational stations
- One mobile detector
- Integrated into international networks
- 24/7 measurements of cosmic ray flux

Products:

- Solar activity monitoring
- Real-time data
- Dose from solar activity and cosmic rays (particles)



CELESTINA-SPARC project:
SPace Awareness and Research Center

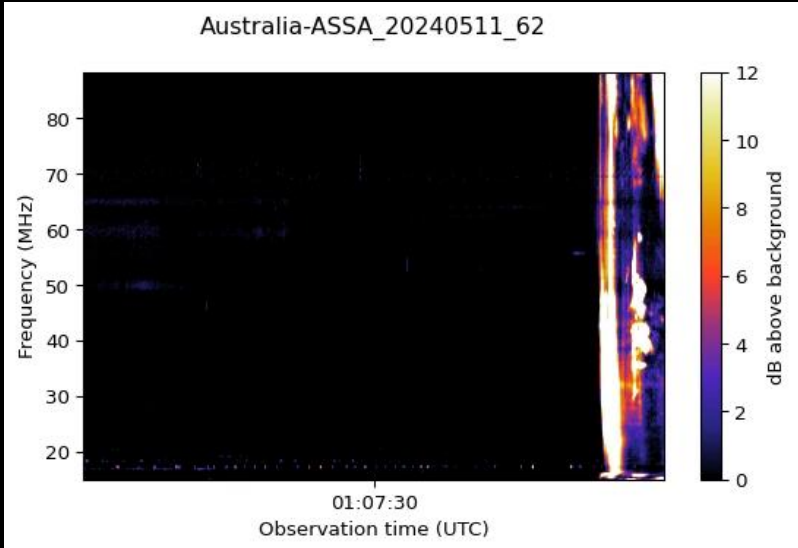


eCALLISTO SPAIN 2026:

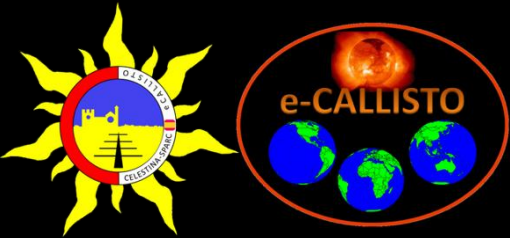
J Bussons + M Prieto become coPIs of eCallisto Network (Prof. Monstein)
executive decisions, international coordination, network expansion, next-generation instruments

ASTRODONCEL.UAH.ES: new eCallisto Data Center (Sigüenza, Spain):

- Goal → to provide services conducive to:
 - substantial reduction of analysis time and effort by the end user
 - more efficient response to potentially disruptive Space Weather episodes
- Transition from manual SRB identification to automatic (ML)
- New Event Summary, daily cross-match with flare + CME lists (NOAA, GOES, CDAW, ...)
- Improved real-time info about status of each station
- SRB Catalog (SC24, SC25): traceable, interoperable, with confidence metrics and links to complementary instruments either ground- or satellite-based missions and geophysical observations



eCallisto Solar Radio Bursts Database										
Solar Radio Bursts (3245)										
10	entries per page			Search:						
▼ Date	Time	Type	Intensity	Stations	Min. Long.	Mid. Long.	Max. Long.	Remarks	Actions	
20260603	11:45-11:45	---	1	BIR, NORWAY-EGERSUND, SWISS-HB95CT, SWISS-HEITERSWIL, SWISS-Landschlacht, MRO, INDIA-GAURI	-7.9	9.1	77.5			
20260603	11:20-11:38	---	3	BIR, GLASGOW, SPAIN-SIGUENZA, SPAIN-PERALEIDS, HUMAIN, NORWAY-EGERSUND, GERMANY-ESSEN, SWISS-PHLWA, SWISS-MUHEN, SWISS-IRSOL, SWISS-HEITERSWIL, SWISS-Landschlacht, TRIEST, AUSTRIA-OE3ELB, AUSTRIA-UNIGRAZ, POLAND-BALDY, FINLAND-BUUSALO, MRO, ROMANIA, EGYPT-Alexandria, EGYPT-SpaceAgency, INDIA-UDAIPUR, ALMATY, INDIA-COOTY, INDIA-GAURI, SRI-Lanka	-7.9	14.6	80.5			
20260603	10:08-10:09	---	3	BIR, GLASGOW, SPAIN-SIGUENZA, SWISS-PHLWA, SWISS-MUHEN, SWISS-HEITERSWIL, AUSTRIA-UNIGRAZ, POLAND-BALDY, MRO, INDIA-GAURI	-7.9	8.6	77.5			



CELESTINA-SPARC project:
SPace Awareness and Research Center



eCALLISTO SPAIN 2026:

More to come @ Astrodoncel:

Alert levels, full-day spectrograms, quick search, on-line data analysis

e-Callisto strengths:

- ISWI instrument
- Low cost: easy installation/operation, educational/humanitarian side
- Geographical coverage, geo redundancy
- Broad frequency range: 45 – 870 MHz native, 20 – 80 MHz with LWA

In addition, we provide:

- Support for e-Callisto expansion, connect potential stakeholders
- RFI monitoring (site survey campaigns)
- Support for data processing
- Hands-on training → COSPAR Capacity Building
- ML/AI experience and infrastructure for data analysis of solar radio bursts
- Antenna modeling and design

SPT. IGN



MESPA



RAEGE. Azores



NRIAG. Egypt



In a nutshell:

- Integrated space weather observation capabilities
- Strong synergy between instrumentation and science
- Robust backbone for future developments

