

ASI FUTURE PLANS IN ASTROPHYSICS AND FUNDAMENTAL PHYSICS



Agenzia Spaziale Italiana

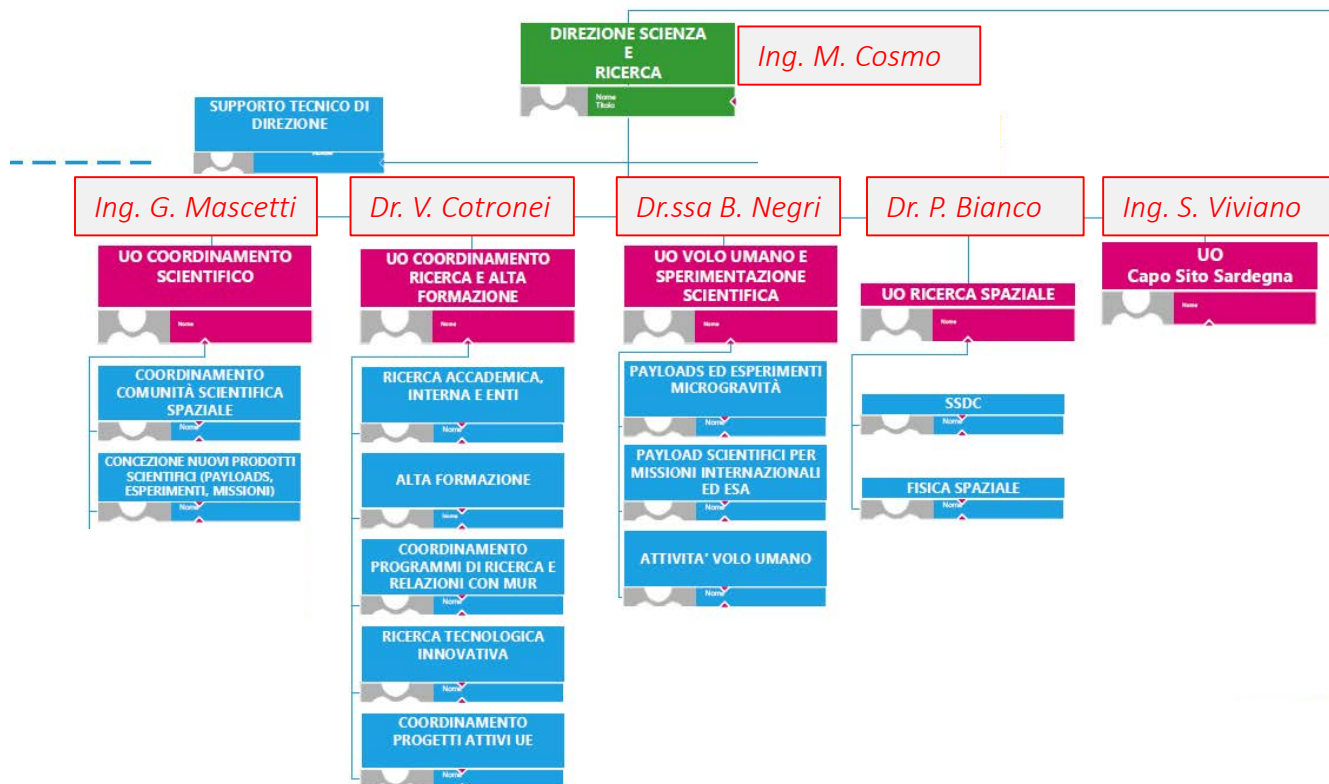
ELISABETTA CAVAZZUTI
SCIENTIFIC COMMUNITY COORDINATION OFFICE

SCIENCE AND RESEARCH DIRECTORATE

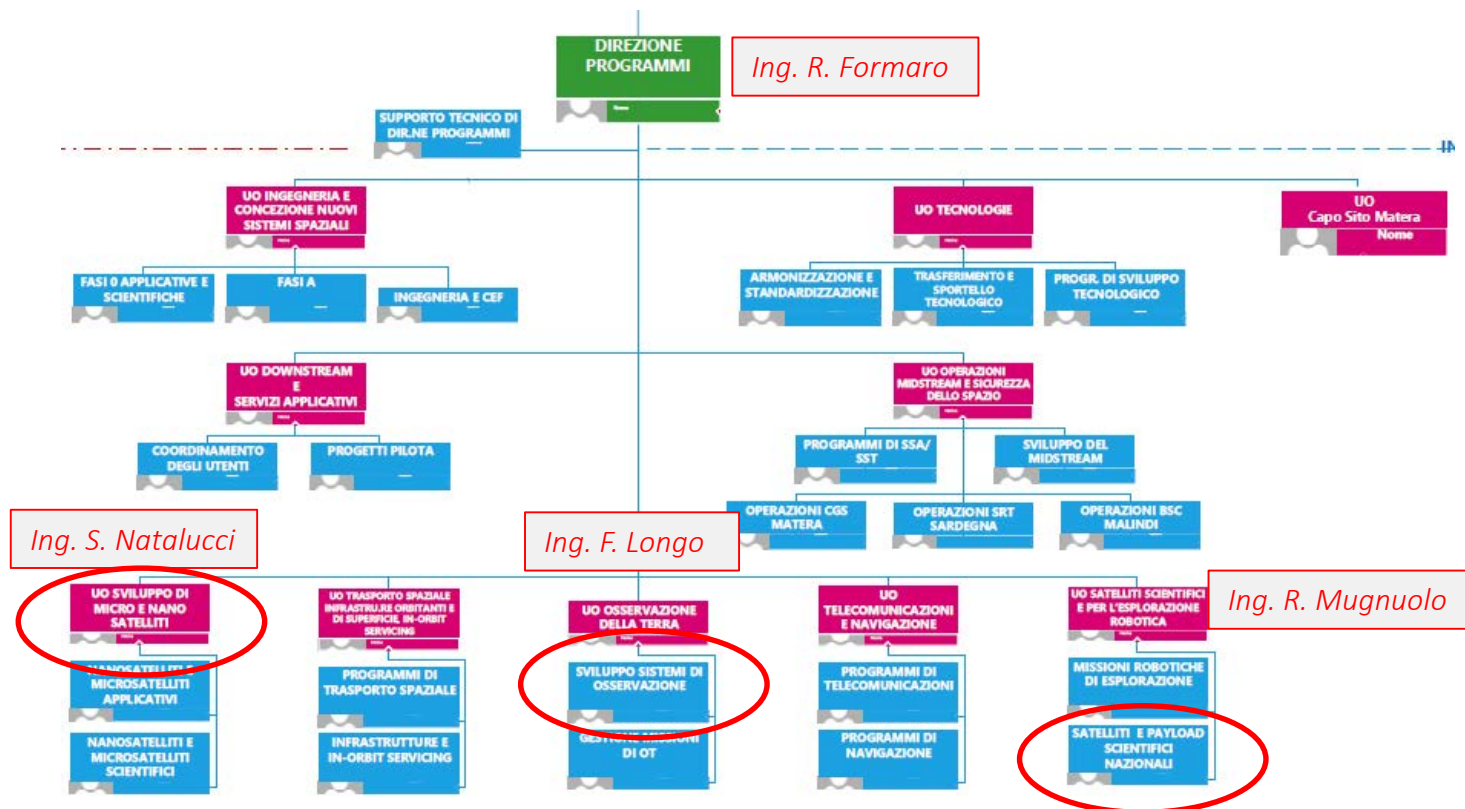
- ∞ funds and leads scientific space programs, since Phase 0 studies, i.e. from paperwork only through R&D to final delivery of the payloads and (for national missions) disposal of the mission.
- ∞ synergic with all programs is the Space Science Data Center (SSDC) where data from all missions funded by ASI end up being archived and distributed.
- ∞ ASI owns an equatorial ground base in Malindi (Kenya), involved in many space programs. Currently it is supporting AGILE, Swift, NuSTAR, IXPE.

About 50 technologists and researchers covering most of the topics

NEW ASI ORGANISATION



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SCIENTIFIC TOPICS DEVELOPED IN AND SUPPORTED BY THE SCIENCE AND RESEARCH DIRECTORATE

- ∞ Astrophysics from space, at all wavelengths
- ∞ Astroparticle
- ∞ Cosmology
- ∞ Exoplanet
- ∞ Solar system exploration (interplanetary probes)
- ∞ Sun and astrometry
- ∞ Life science (eg. on board ISS)
- ∞ Human flight

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SCIENTIFIC COMMUNITY COORDINATION OFFICE

Working groups to discuss and define scientific roadmaps



Identification of innovative scientific fields and relative technologies



Calls to support new ideas for experiments/missions, technologies

SCIENCE AND RESEARCH DIRECTORATE

Working groups

- Space Weather
- Astrobiology
- Moon
- Astrophysics (at all wavelength) and Astroparticle
- Solar System (exoplanet, planets, Sun ...)
- Life Science: Integrated Physiology, Microbiology, Biological Life Support Systems and Radiation
- Technology: multi purpose Italian-based ASIC

SCIENCE AND RESEARCH DIRECTORATE

Calls and funding streams

- Facility Aspis (space weather)
- Workshops on Moon, Astrobiology and Small missions
- Astrobiology call
- Reasearch Days
- Topical Teams
- Data analysis of astrophysics and solar system mission data call
- New technologies call
- Technology transfer Earth <-> Space

SCIENCE AND RESEARCH DIRECTORATE

Calls and funding streams

In view of the human exploration of the deep space, habitability and coexistence with environment

3.700.000,00 €

36 months lasting programs



SCIENCE AND RESEARCH DIRECTORATE

Calls and funding streams

To foster synergy
between academy
and industrial fields

3.000.000,00 €

24 months lasting
programs

27 proposals
submitted

The screenshot shows the ASI website with a dark background and a satellite image of Earth. The ASI logo is prominently displayed in the center. The main headline reads: "BANDO DI FINANZIAMENTO PER PROGETTI DI RICERCA E SVILUPPO A MEDIO TERMINE RELATIVI ALLE 'GIORNATE DELLA RICERCA ACCADEMICA SPAZIALE' (RESEARCH DAY) ASI 2020 AFFERENTI AI TAVOLI TEMATICI 'STRUMENTAZIONE SCIENTIFICA, CYBERSECURITY E MATERIALI AVANZATI'". The last three words of the thematic areas are highlighted in yellow. The top navigation bar includes links for "BANDI", "CONCORSI E OPPORTUNITÀ", "EVENTI", and "ASITV". The bottom left corner features a circular icon with a checkmark and a gear.

IN PRIMO PIANO: Scoperte le potenziali tracce delle prime stelle dell'universo

Privacy - Amministrazione trasparente IT

BANDI CONCORSI E OPPORTUNITÀ EVENTI ASITV

ASI

HOMEPAGE ▶ BANDI ▶ BANDI ASI ▶

BANDI PER CONTRATTI DI FINANZIAMENTO DI RICERCA, SVILUPPO E INNOVAZIONE ▶

BANDO DI FINANZIAMENTO PER PROGETTI DI RICERCA E SVILUPPO A MEDIO TERMINE RELATIVI ALLE "GIORNATE DELLA RICERCA ACCADEMICA SPAZIALE" (RESEARCH DAY) ASI 2020 AFFERENTI AI TAVOLI TEMATICI "STRUMENTAZIONE SCIENTIFICA, CYBERSECURITY E MATERIALI AVANZATI".

SCIENCE AND RESEARCH DIRECTORATE

Calls and funding streams

To foster synergy
between academy
and industrial fields

2.000.000,00 €
24 months lasting
programs

The screenshot shows the ASI website homepage with a dark background featuring a satellite image of Earth at night. The ASI logo is prominently displayed in the center. The main headline reads: "BANDO DI FINANZIAMENTO PER PROGETTI DI RICERCA E SVILUPPO A MEDIO TERMINE RELATIVI ALLE 'GIORNATE DELLA RICERCA ACCADEMICA SPAZIALE' (RESEARCH DAY) ASI 2020 AFFERENTI AI TAVOLI TEMATICI 'ANALISI DATI E IMMAGINI' E 'PROXIMITY OPERATIONS'". The text "ANALISI DATI E IMMAGINI" and "PROXIMITY OPERATIONS" are highlighted in yellow boxes. The top navigation bar includes links for "IN PRIMO PIANO:", "BANDI", "CONCORSI E OPPORTUNITÀ", "EVENTI", and "ASITV". The bottom left corner features a blue circular icon with a white clock and a checkmark.

SCIENCE AND RESEARCH DIRECTORATE

Calls and funding streams

Cooperation between private and public entities in **earth observation and extra terrestrial habitats**

80.000.000,00 €
36 months lasting
programs up to 2026



IN PRIMO PIANO: AstroSamantha al comando della Iss

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BANDI CONCORSI E OPPORTUNITÀ EVENTI ASITV

ASI

HOMEPAGE • BANDI • BANDI ASI •

BANDI PER CONTRATTI DI FINANZIAMENTO DI RICERCA, SVILUPPO E INNOVAZIONE •

BANDO DI FINANZIAMENTO – PER LE “ATTIVITÀ SPAZIALI” (TEMATICA 15), DI CUI ALL’AVVISO MUR N. 341 DEL 15/03/2022, PER “PARTENARIATI ESTESI ALLE UNIVERSITÀ, AI CENTRI DI RICERCA, ALLE AZIENDE PER IL FINANZIAMENTO DI PROGETTI DI RICERCA DI BASE”

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Next calls and funding streams

- Small national mission
- Topical Teams
- Data analysis of astrophysics and solar system mission data (since 2007)
- New technologies (since 2007)
- Technology transfer Earth <-> Space

SCIENCE AND RESEARCH DIRECTORATE

Next calls and funding streams

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Proposal selections based on international peer-review system

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Next calls and funding streams

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In synergy with INAF, INFN, MUR/EU et al calls

SCIENCE AND RESEARCH DIRECTORATE

Next calls and funding streams

Italian PI-ship new mission in collaboration with INAF

Tematiche e obiettivi per futuri programmi
scientifici spaziali

20 Aprile @ 10:00 - 22 Aprile @ 12:00



4 panels:

Solar system, Heliophysics and space weather,
Astronomy, Fundamental physics cosmology and
astroparticle

1° call to identify interesting science themes

2° call in 2022 based on identified science themes

Italian PI-ship, international collaboration, equatorial
LEO, P/L 100kg, launch in 10 years, TRL 4-5, no R&D

Several Phase A then downselection



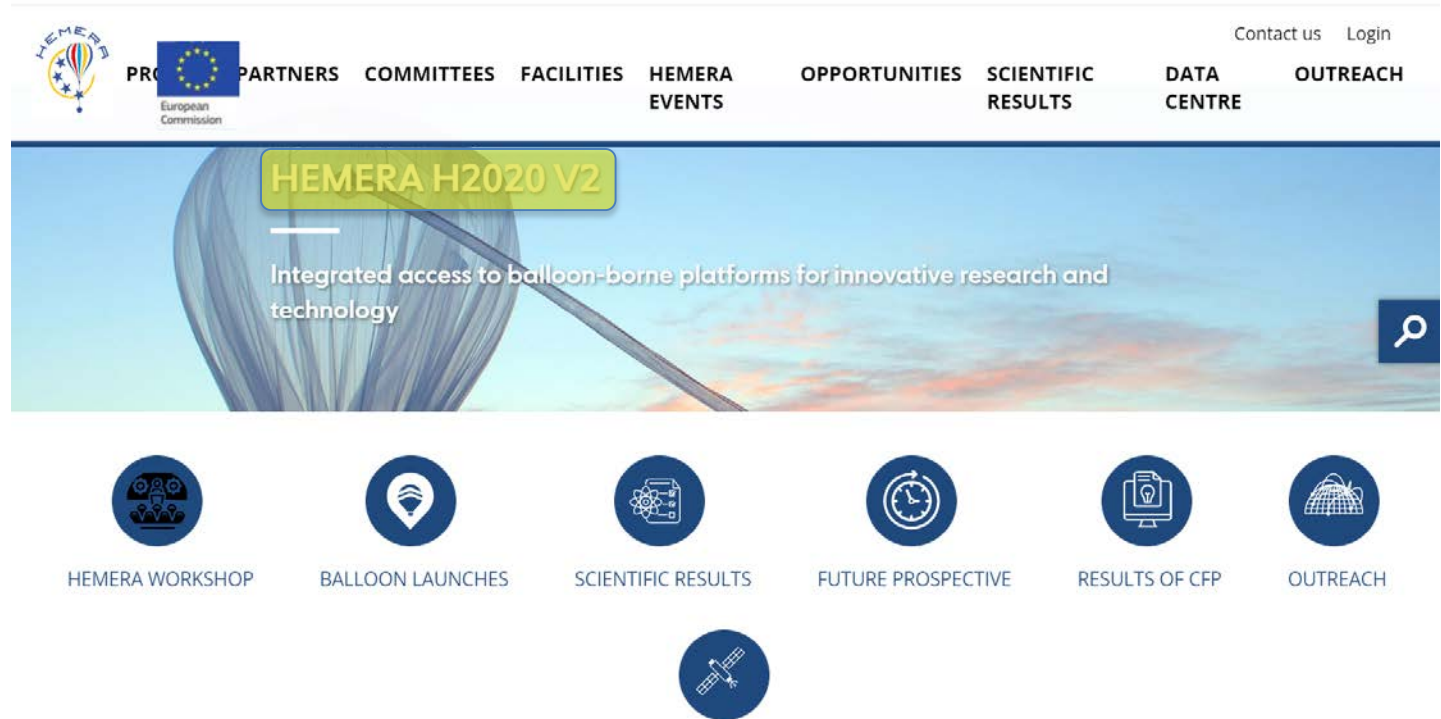
SCIENCE AND RESEARCH DIRECTORATE

P/L for ballon flights

Programme
Directorate PoC for
the HEMERA EU
project, for ASI

Science and Research
Directorate funds the
payloads

21 italian
payloads selected, 9
have been supported
in 2021



ON ORBIT MISSIONS AND EXPERIMENTS SUPPORTED BY ASI

Via dedicated funding streams



VERITAS
Juno
Osiris-REX
DAWN
MRO
Hayabusa
SWIFT
FERMI
IXPE
NuSTAR
AMS-02 (DoE)



CHEOPS
Solar Orbiter
Bepi Colombo
ExoMars
MarsExpress
GAIA
INTEGRAL



CALET



MiniEUSO

AGILE
LARES 2 (DP)
LiciaCube (DP)

MISSIONS AND EXPERIMENTS IN THE DEVELOPMENT PHASE



COSI
Europa Clipper
MUSE



EUCLID M2
PLATO M3
ARIEL M4 + Comet
Interceptor
ENVISION M5
M6 CANCELED !!!
JUICE L1
ATHENA L2
LISA L3
eXTP MoO (CAS)
LiteBird MoO (JAXA)



Solar C



Agenzia Spaziale Italiana

HERMES



HERD CAS

LSPE Roma1-Bicocca U.

EUSO-SPB2 Chicago U.
GAPS Columbia U.

FUTURE MISSIONS

STE-QUEST

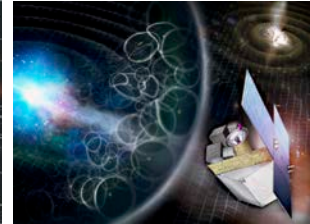
ASTROGAM

PLASMA OBS

THESEUS

ARAGO

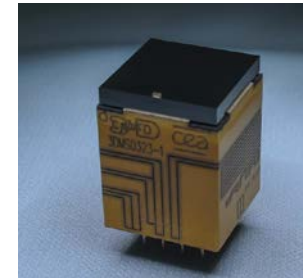
HAYDN



STAR-X

| STAR-X Goals | 1. Determine how stellar explosions work and how they fuel cosmic chemistry | 2. Understand the accretion processes that allowed massive black holes to form so early in the Universe | 3. Determine how the largest bound structures in the Universe form |
|--------------------|---|---|--|
| Decadal Priorities | Pathways to Habitable Worlds | New Windows on the Dynamic Universe | Unveiling the Drivers of Galaxy Growth |
| STAR-X Objectives | STAR-X: Stellar activity survey from exoplanet hosts | STAR-X: First light from supernovae, GW counterparts, Tidal Disruption Events, Extreme AGN Accretion | STAR-X: Nuclear black hole growth, Galaxy cluster formation from z=6 |

GRINTA



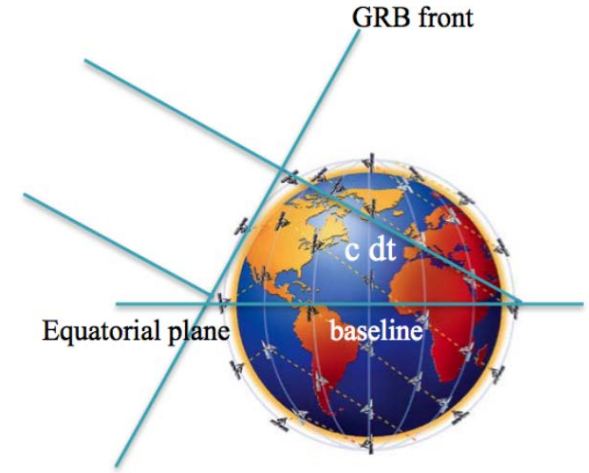
ESA FAST

HERMES (High Energy Rapid Modular Ensemble of Satellites)

The **HERMES (High Energy Rapid Modular Ensemble of Satellites)** mission concept implements an **all-sky monitor** to catch bright high-energy transients (e.g., Gamma-Ray Bursts possible counterparts of GWs, as in the case of the event GRB170817A).

The **telescope** is a constellation of nanosatellites spatially distributed in low Earth orbits and hosting X-ray detectors operating in a very broad energy band, from a few keV to a few hundred keV.

HERMES will localize the Gamma-Ray Bursts by the **measurement of the delays between GRB signal** arrival times on at least 3 satellites.



- Accurately locating GRBs has proved to be a winning strategy to find the EM counterparts of gravitational wave as in the event GW170817-GRB170817A, which opened the multi-messenger astronomy era.
- HERMES with its accurate localization of Gamma-Ray Bursts will play an important role in the counterparts of GWs events.

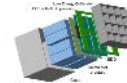
HERMES PATHFINDER: mission overview

HERMES PATHFINDER represents the precursor mission to demonstrate the feasibility of the «all-sky monitor» concept and to pave the way to the HERMES full constellation (composed by tens of satellites).

The HERMES Pathfinder mission is realized through complementary initiatives:

➤ **HERMES (2014): R&D agreement ASI:**

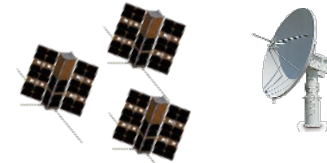
- first development of the detector



and many others....

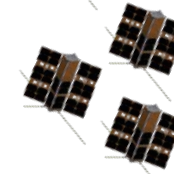
➤ **HERMES Technology Pathfinder – HTP (2018): grant MIUR lead by ASI**

- Agreement ASI-INAF: 3 + 1 payload units (1U) (on board of SpIRIT mission (ASA))
- Agreement ASI-PoliMI: 3 service modules (3U) + MLD G/S antenna



➤ **HERMES Scientific Pathfinder – HSP (2018): grant UE – H2020**

- Consortium INAF-PoliMI-others: 3 payload units (1U) + 3 service modules (3U) + preliminary design of G/S (MOC and SOC)



➤ **ASI industrial contracts (2022 selection on-going):**

- Development, realization and integration of G/S
- Launch service procurement



HERMES PATHFINDER STATUS: High synergy between HTP and HSP programmes:

- 3 HTP + 3 HSP satellites delivered by 2022
- HTP + HSP satellites to be launched by 2023
- Additional P/L delivered by Q2 2022 for integration on SpIRIT S/C, to be launched in 2023

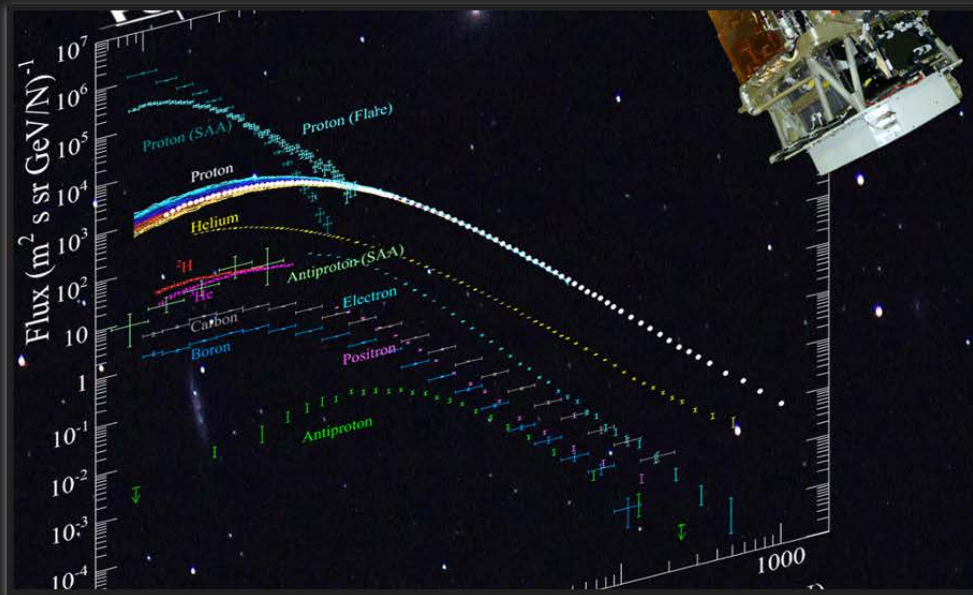


Space Science Data Center



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COSMIC RAY Database

Database for Charged Cosmic Ray measurements.

Version 3.2

[Login](#)

[Feedback and contacts](#)

Looking for cosmic ray data?

The present Cosmic Ray DataBase (CRDB) provides access to published data from missions dedicated to charged cosmic-rays measurements.

Have a look to our current (not comprehensive but in expansion) [data-set here!](#)

Data are organized in a SQL database and can be searched through **queries** based on particle species, measurement of interest and/or name of the mission. A refined search is also available.

Query results are accessible through a table, ready to be plotted, exported and downloaded in various formats. The set of returned information comprehends the published data points with associated uncertainties, and some meta-data. When, aside original data, more information are provided (e.g. the corresponding data obtained after some manipulation, as energy-rigidity conversion, change of units or similar), this is reported in the output file. Please, always consult the original publication before using the data.

Feel free to contact us for any comment, query, suggestion, for adding new data or signalling any possible inaccuracy.

Thank you for citing us when using the CRDB for your works!

[🔗 Most recent time-dependent AMS data available here!](#)

Search parameters:

Particle: ⓘ

Experiments:

Special datasets:

☐ SEP events

☐ trapped

Plot: vs

SEARCH

RESET

Thanks for your attention and to all the contributors who contribute

 Agenzia Spaziale Italiana