The NUSES mission

enabling new observation methods and technologies from space

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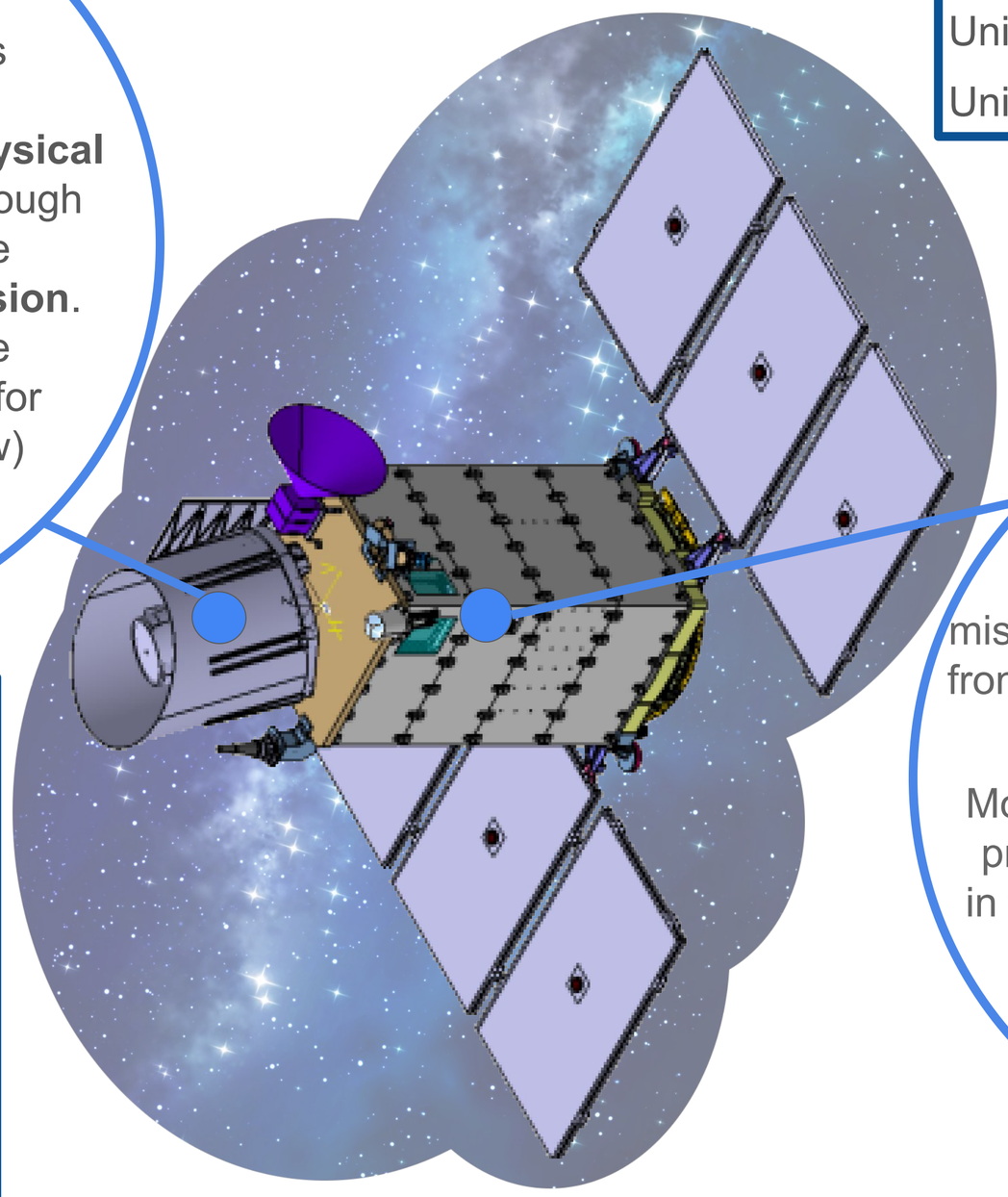
Science Goal of the NUSES mission

NUSES (**N**e**U**trino and **S**eismic **E**lectromagnetic **S**ignal) is a space mission conceived as a pathfinder for new observation **methods** and **technologies** in the study of **high** and **low energy radiations** enabling new sensors, tools and methodologies.

NUSES hosts 2 payloads…

Terzina

Pathfinder of future missions devoted to the detection of **high-energy** (E>1 PeV) **astrophysical neutrinos and cosmic rays** through space-based detection of the **atmospheric Cherenkov emission**. The telescope will look at the atmosphere limb (just above) for **CR detection** and (just below) for **neutrinos detection**.



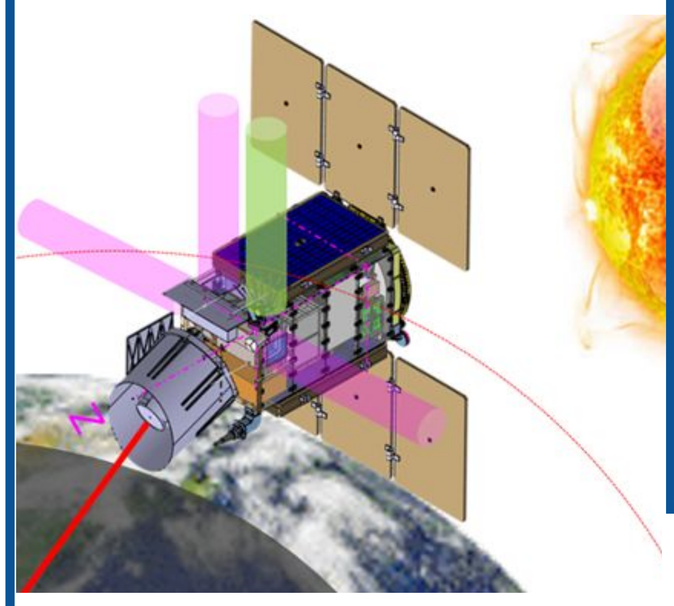
Zirè

Possibility to study **solar/galactic** cosmic rays. Pathfinder of future missions to measure **MeV gamma-rays** from **stable** and **transient** astrophysical sources.

Monitor of the **variations** of the flux of protons and electrons (E<250 MeV) in the ionosphere and magnetosphere possibly correlated with seismic activity.

See Zirè dedicated poster

The Orbit

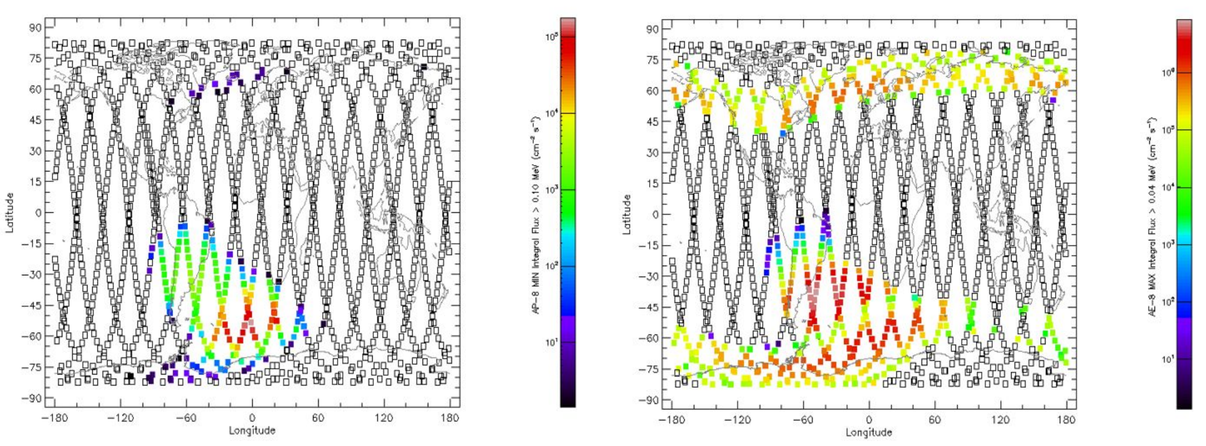


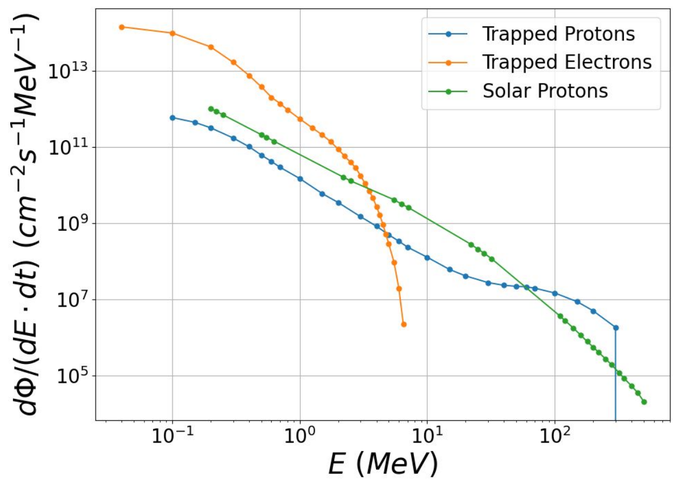
Low Earth Orbit with high inclination, **sun-synchronous** orbit on the **day-night border**

Orbit optimization for **Cherenkov photon detection**.

Balistic mission (no propulsion for orbital control)

Radiation Environment



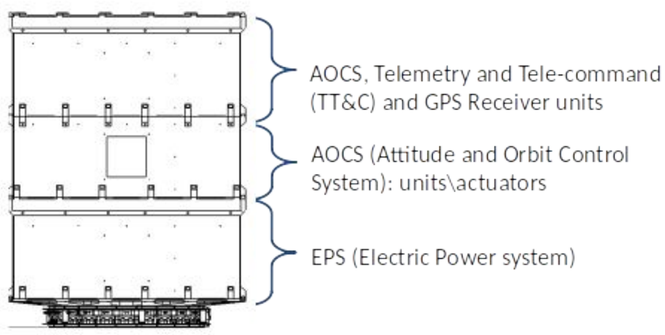


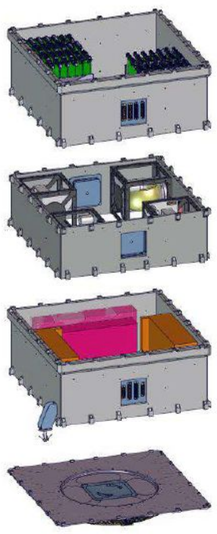
Differential fluence of trapped *p*, e^- and solar *p* as a function of the energy. Geographical distribution of trapped particles.

Expected data for 3Y mission along the nominal orbit.

NIMBUS (New Italian MICRO-BUS)

New platform concept which foresees a modular approach relying on standard trays.





The NUSES Collaboration

Counts 60+ members from:

INFN & Italian Institutions

- Gran Sasso Science Institute
- Laboratori Nazionali del Gran Sasso
- Roma “Tor Vergata” University and INFN-Roma2
- Torino University and INFN Torino
- Trento University and INFN-TIFPA
- Bari University and INFN Bari
- Padova University and INFN Padova
- Napoli “Federico II” University and INFN Napoli
- Salento University and INFN Lecce
- Italian Space Agency

University of Geneva (CH)

University of Chicago (USA)

References:
[1] I. De Mitri et al 2023 J. Phys.: Conf. Ser. 2429 012007
[2] M. F. Alonso et al 2023 PoS (ICRC2023) 139
[3] Instruments 2023, 7(4), 40
[4] EPJ Web of Conferences 283, 06006 (2023)