



COMPUTATIONAL RESOURCES FOR STATISTICAL DATA ANALYSIS AND NUMERICAL SIMULATIONS IN ASTROBIOLOGY

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Resources

- ❖ the Institute of Space Science is involved in GRID activities related to CERN experiments since 2001.
- ❖ the Institute's contribution to the ALICE collaboration: more than 400 cores computing power and over 200 TB storage capacities.
- ❖ over the last years the Institute's GRID infrastructure has provided computational resources to international collaborations such as Cluster, Venus Express, Planck, Euclid, Auger and JEM-EUSO.



Expertise

- ❖ Advanced statistical **data analysis** for high energy physics and astrophysics experiments (ALICE @ CERN, VERITAS, AUGER, JEM-EUSO).
- ❖ **Numerical simulations** using Monte Carlo methods employing software applications such as CORSIKA, GEANT4, FLUKA.
- ❖ **Embedded systems**
- ❖ **Ray tracing** based optical design.
- ❖ **Database** design and maintenance.
- ❖ **Web** technologies.
- ❖ Advanced **programming languages** (VDL, VHDL, IDL, C/C++, Perl, Python, Fortran, HTML, CSS, JAVA) used on Linux/UNIX, Microsoft OSs.

Ongoing Projects

GROUND-BASED CALIBRATION OF ORBITAL UV TELESCOPES

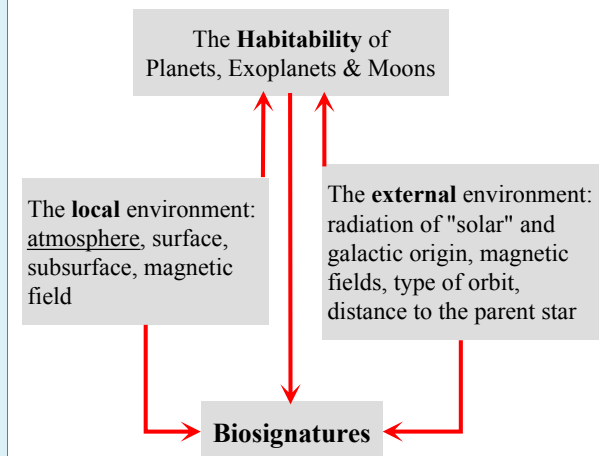
- ❖ design a **ground-based calibration system** for orbital UV telescopes such as Mini-EUSO, JEM-EUSO and TUS.
- ❖ numerical simulations have been performed using **GBSatCal** (Ground-Based Satellite Calibration), a custom developed software package, that allows us to consider different types of
 - **radiation sources** (lasers, Xe-flashers, high-power UV LEDs),
 - **focal surface detector geometries** and
 - **atmospheric models** (US Standard Atmosphere 1976 and NRLMSISE-00),as well as to determine the optimal calibration geometry.

THE KEPRO PROJECT

- ❖ develop an innovative ultra-high precision experimental model of a modified scanning **Kelvin Probe** capable of rapidly mapping under full control the surface potential of samples with surface areas of the order of 50 x 50 mm² with a precision of better than 0.05 mV rms per point.
- ❖ the instrument is ideally suited for materials science, the semiconductor electronics industry as well as for **biological** and **biomaterials** medical applications (the study and monitoring of skin wounds, skin transplants, tendon damage regeneration).

Areas of Interest

SCIENCE



TECHNOLOGY

Research data management:
storage, access, sharing, synthesis

Hardware development for detection of habitability and biosignatures