

# ASIF initiatives in support of Italian irradiation facilities

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ASI's ASIF (ASI Supported Irradiation Facilities) program aims to establish a coordinated set of the Irradiation Facilities, throughout the national territory, serving the whole space community.

The primary objectives are:

- a) to grow the sensibility and knowledge of national entities for the needs regarding space radiation qualification and measurements of radiation effects on electronics components
- b) to make available, for national and international users, an interactive network of irradiation facilities operating with recognized standard within the ESCC and ECSS framework

The ASIF project derives from the synergy between several institutional bodies, engaged with technologies and research related to the effect of radioactive environments on the survival in orbit of space hardware/assets, which are of great interest for the scientific and industrial space society. The Italian irradiation infrastructures are a primary asset in the European panorama, in many ways unique, and a structured exploitation in space research would encourage:

- ✓ increasing knowledge about human and hardware behavior in hostile environments
- ✓ transfer of knowledge from the world of research on high energy and space physics, and particle detectors to the industry and the scientific space community, with undeniable competitive returns in both industry and space research.

The program envisages the standardization and intercomparison of the operative procedures, the definition of protocols for access to the use of the beams and the experimentation, the qualification and validation of processes and test procedures, against the European reference standards, the certification of the test results, the launch of experimental research projects in cooperation with other institutions, industry users.

Within ASIF additional and correlated actions are required with respect to the:

- ✓ understanding of physical mechanisms,
- ✓ modelling of radiation space environment, transport codes, etc.
- ✓ accessibility to models and test facilities opened to (national and international) manufacturers,
- ✓ growing of the designing and testing capabilities of national entities.

The first phase of the program was focused to settle and validate the operative procedures for testing of Space EEE components and devices, characterization and assessment of facility's capabilities (beam time and parameters, fluence intensity, uniformity, dosimetry, operative procedures) of selected INFN and ENEA facilities. i.e.,

ENEA:

- Calliope – photon irradiation facility at Casaccia Centre (Rome)
- FNG - Frascati neutron generator
- TAPIRO - fast neutron reactor at Casaccia Centre
- TRIGA RC-1 - neutron reactor at Casaccia Centre

INFN:

- LNF - Laboratori nazionali di Frascati, high energy electrons facility
- LNL - Laboratori nazionali di Legnaro, protons facility
- LNS - Laboratori nazionali del Sud (Catania), heavy ions facility
- TIFPA -Trento, high energy protons facility.

In the current second stage, two additional facilities from ENEA are involved: the proton TOP-IMPLART plant and REX electron source. In addition, the ASIF gateway is under development. Such a tool will allow institutional, industrial and research users to request and benefit of a series of 'end to end' irradiation services.

The ASIF gateway and support center shall be localized in the Physic Dept. of the University of Milano-Bicocca through a dedicated agreement involving ASI/University of Milano-Bicocca. In addition, the support center in Milano-Bicocca is hosting the servers to exploit the SR-NIEL, HelMod and GeoMagsphere codes for TNID, TID and SEE calculations, the forecasting of cosmic ion-species propagation through heliosphere and the particle transport through Earth magnetosphere.