

RAD

CONFERENCE

FOURTEENTH INTERNATIONAL CONFERENCE ON RADIATION, NATURAL
SCIENCE, MEDICINE, ENGINEERING, TECHNOLOGY AND ECOLOGY

JUNE 15-19, 2026

HUNGUEST HOTEL SUN RESORT, HERCEG NOVI, MONTENEGRO



AGENZIA SPAZIALE ITALIANA

ASIF



Italy's National Space Irradiation Network
for Radiation Effects Testing and Component Qualification

Monia Vadrucchi
Rita Carpentiero
Marco Di Clemente

ASIF — ASI SUPPORTED IRRADIATION FACILITIES



Initiative by the **Italian Space Agency**

Main Goal: to test and qualify aerospace components and materials against space radiation.

Simulated Space Environment

It provides irradiation services with charged particles, photons, and neutrons to mimic the radioactive environment spacecraft face in orbit.

International Standards:

It operates according to the standards of the European Space Agency (ESA).

Accessibility:

Through the ASIF portal, institutional users, researchers, and aerospace companies can find information to request and book tests at the facilities.

The network joins top research centers and laboratories across Italy. This helps unify and boost Italian expertise in space electronic engineering.

ASIF — ASI SUPPORTED IRRADIATION FACILITIES



A Nationally Coordinated Network

- Active since 2015 under ASI coordination
- Multi-particle, multi-energy distributed architecture
- Common access rules and shared data standards
- QA procedures aligned with ESA / ECSS / ESCC requirements
- Complementarity and redundancy across facilities
- Scalable for future facility integration

Coverage

All particle types & energy ranges needed for space qualification

Redundancy

Multiple facilities per test type ensure mission continuity

Harmonisation

Unified dosimetry, diagnostics and access through ASIF Gateway

Autonomy

Advances Italy's technological sovereignty in space test infrastructure

ASIF NETWORK — IRRADIATION PORTFOLIO



60Co γ Source

~5 kGy/h dose rate

TID qualification

- **Neutron Gen.**
- **2 Reactors**

Thermal-fast

TNID · SEE ·

Displacement Damage

Electron LINAC

up to 5 MeV

TID · Quantum Tech
(NV centres)

2 Proton LINAC

2 – 71 MeV

SEE · TID investigations

Light & Heavy Ions

up to hundreds of MeV

SEE · Micrometric
resolution mapping

High-Energy Electrons

300 – 750 MeV

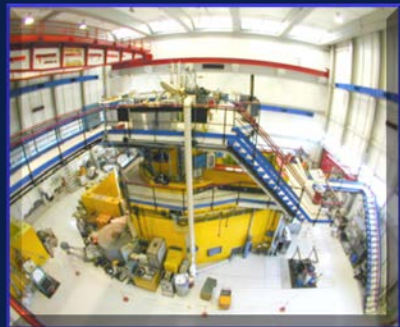
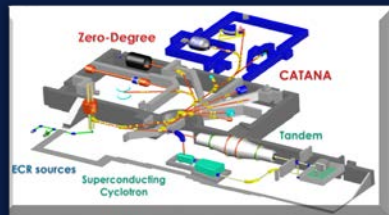
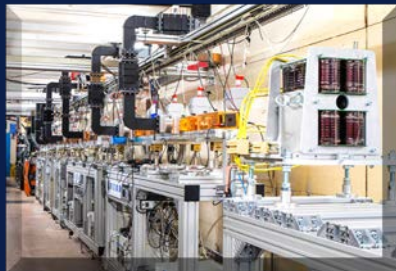
Displacement Damage ·
Detector calibration

Clinical-Range Protons

70 – 230 MeV

Component & sensor qualification

ASIF NETWORK — IRRADIATION PORTFOLIO



ASIF GATEWAY — UNIFIED USER ACCESS PORTAL



A single point of access for facilities, technical support, and computational tools

ASIF GATEWAY

asif.asi.it

SR-NIEL

Screened relativistic NIEL calculator for displacement damage

HelMod

Solar modulation model for GCR flux prediction at 1 AU and beyond

GeoMagSphere

Geomagnetic shielding model for trapped & solar particle environments

Services provided: Facility booking · Test campaign coordination · Dosimetry reports · Data archival

KEY APPLICATION: ACDC_Q PROJECT



EU-FUNDED
ACDC_Q

**Advanced Circuits for
Detection and Control of
Diamond Quantum
Sensors**

**Nitrogen-Vacancy (NV) Centres in
Diamond for Space Quantum
Magnetometry**

An ASIF network facility supports optimisation of NV centres in diamond for use as quantum magnetometers in the space environment.

01 Electron LINAC Irradiation

Up to 5 MeV electrons used to create and optimise vacancy defects in diamond lattice — precise dose control enables tuning of NV centre density

02 Quantum Magnetometry in Space

NV centres exhibit exceptional magnetic sensitivity — ideal for next-gen space sensors in harsh magnetic environments

03 Beyond Conventional Electronics

Demonstrates ASIF's ability to qualify cutting-edge technologies, expanding network's role in future space missions

QUALITY ASSURANCE & STANDARDS ALIGNMENT



ESA

European Space Agency requirements for component testing and qualification

ECSS

European Cooperation for Space Standardization — test procedures and reporting

ESCC

European Space Components Coordination — qualification procedures for EEE parts

Key QA Features

Harmonised Dosimetry

Calibrated detectors and unified dose measurement protocols across all ASIF facilities

Real-Time Diagnostics

Online beam monitoring, particle flux measurement, and in-situ test parameter recording

Multi-Facility Campaigns

Coordinated sequential or parallel tests using multiple facilities for complex qualification plans

Shared Data Standards

Common data formats, test reports, and traceability for regulatory and mission compliance

CONCLUSIONS & OUTLOOK



ASIF provides Italy and the international community with a comprehensive, ESA/ECSS/ESCC-aligned irradiation network operational since 2015

Distributed architecture delivers performance comparable to large centralised centres, with enhanced redundancy and national technological autonomy

Full particle portfolio — from γ and neutrons to heavy ions and clinical protons — enables complete space component qualification

ACDC_Q exemplifies ASIF's expanding role in qualifying cutting-edge technologies for future space missions

The ASIF Gateway provides unified access, real-time diagnostics, and advanced computational modelling tools (SR-NIEL, HelMod, GeoMagSphere)

ASIF continues to scale, integrating new facilities and supporting international research on radiation effects for space applications