



**DISTRIBUTED
IRRADIATION**

FACILITY

DISTRIBUTED IRRADIATION FACILITY

WHAT IS THE DISTRIBUTED FACILITY?

The **ENEA Distributed Irradiation Facility** is a coordinated network of irradiation infrastructures located at the ENEA Casaccia and Frascati Research Centres. The platform enables the same type of sample to be exposed to **mixed radiation fields** including neutrons, protons, electrons, gamma and X rays, **reproducing realistic conditions for nuclear, aerospace and medical environments**.

The initiative simplifies stakeholders’ access to the entire ENEA irradiation infrastructure through a single technical and operational coordination point.

Main Applications

- Qualification of advanced nuclear components
- Space electronics testing and qualification
- Radiation damage studies on materials and organic matrices
- Biomedical and radiotherapy research
- Sensors and detector development
- Validation of numerical models and simulations

Target Communities

- Research organizations
- High-tech industry
- Advanced nuclear sector
- Aerospace
- Medical and radiobiology applications
- High Energy Physics Experiments

AVAILABLE RADIATION SOURCES

Facility	Radiation	Main Features
RSV TAPIRO	Fast neutrons	Near-fission spectrum up to 4×10^{12} n/cm ² /s
TRIGA RC-1	Thermal and epithermal neutrons	Multipurpose research reactor for testing. Flux from 10^8 up to 10^{13} n/cm ² /s
FNG	2.5 and 14 MeV neutrons	High-accuracy D-D / D-T source
TOP-IMPLART	Protons up to 71 MeV	Proton irradiation $I_{\text{pulse}} \hat{=} 15 \mu\text{A}$ @ 25Hz. Possibility of moving the beam on the target
REX	Electrons and X-rays	5 MeV electron LINAC $I_{\text{pulse}} \hat{=} 150 \text{ mA}$ @ 20 Hz
CALLIOPE	Co-60 gamma rays	High-dose gamma irradiation, from mGy/h up to e kGy/h dose rate (March 2026).

NETWORK FACILITIES

RSV TAPIRO

Fast research reactor providing a near-fission neutron spectrum and high neutron fluxes for accelerated testing. Radiation chamber of 2t m3 and vertical cross-section of 110 × 110 cm2. Possibility of conducting irradiation while devices are powered.

TRIGA RC-1

Thermal research reactor used for neutron activation, irradiation campaigns, calibration and applied research. Experimental samples up to approximately 10 cm in diameter. Possibility of conducting irradiation while devices are powered.

FNG

Compact neutron generator based on D-D and D-T fusion reactions producing quasi-monoenergetic neutrons at 2.5 and 14 MeV. Possibility of conducting irradiation while devices are powered and at high temperature (max 250 °C). Coming soon: under vacuum and at cryogenic temperatures (77 K).

TOP-IMPLART

Linear proton accelerator developed by ENEA for proton therapy R&D and proton irradiation testing. Possibility of conducting irradiation while devices are powered.

REX

Electron irradiation facility based on a 5 MeV electron LINAC, also capable of generating X-rays. Possibility of conducting irradiation while devices are powered.

CALLIOPE

Gamma irradiation facility equipped with Co-60 sources for qualification tests, and radiation hardness studies. Possibility of conducting tests under specific conditions of temperature, atmosphere (air, inert gas, modified atmospheres, vacuum), and under bias. Laboratories for dosimetric measurements and radiation-induced effects characterization of materials and organic matrices, accelerated ageing tests.

Certifications

The facilities within the network are ISO 9001 certified (with TOP-IMPLART and REX currently undergoing accreditation); additionally, the Calliope facility is in the process of obtaining ISO 17025 accreditation.

Integrated ENEA Services

- Integrated experimental planning
- Radiation protection support through the ENEA Radiation Protection Institute (IRP)
- Numerical simulations and irradiation modelling
- Dosimetry and radiation field characterization
- Technical and scientific support for irradiation campaigns

ENEA Research Center

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