Calliope

GAMMA IRRADIATION FACILITY

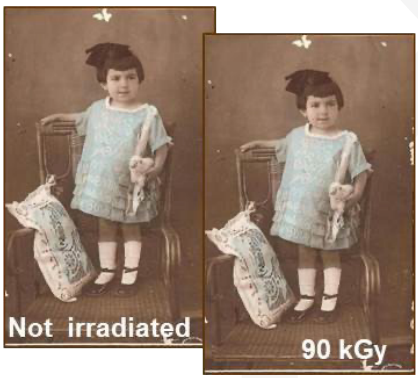
ENEA Nuclear Department

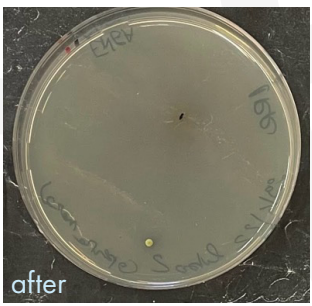
Ionizing radiations for Cultural Heritage Preservation

Artefacts of natural origin (paper, textile, parchment, and wood) are easily subject to biological attack when stored in bad conditions or in case of natural or anthropic calamities (floods, earthquakes, wars).

Ionizing radiations (gamma radiation, electrons, and X-rays) are successfully applied for Cultural Heritage preservation in several countries. Optimizing irradiation conditions ensures artefacts' integrity and long-term preservation.

The environmentally friendly irradiation technology ensures the disinfestation and disinfection of the artefacts from insects and microorganisms (fungi, molds, bacteria, and spores), responsible for their biodegradation and harmful for Cultural Heritage operators.

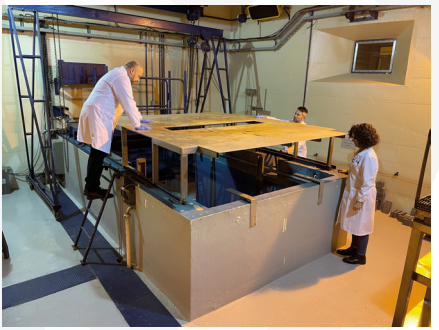




Gamma radiation biocide effect on fungi and molds communities

CALLIOPE Facility

Calliope facility consists of a 60-Cobalt source in a large volume irradiation cell (7 m x 6 m x 3.9 m). Dosimetric and characterization laboratories and accelerated ageing test equipment are available.



Gamma radiation vs traditional preservation methods

- no additional reagents (no toxic chemicals or gases)
- artefacts readily available after irradiation (no quarantine, no radioactive)
- no residues left inside the irradiated materials
- no temperature increase (room temperature process)
- quick treatment (large amount/ large volume artefacts, surface/bulk)
- no need of packaging or wrapping removal
- complete elimination of all the living organisms (insects as well as spores)

Relevant projects:

- *PERGAMO*: Biodegradation recovery with physical methodologies and characterization of historical and archival heritage (funded by the Excellence Center of the Technological District for Culture DTC of Lazio Region, Italy, 2022–2024)
- *IAEA CRP*: Advancement of the Application of Ionizing Radiation for Cultural Heritage Preservation (funded by the International Atomic Energy Agency, 2023-2028)

ENEA Casaccia Research Center
Via Anguillarese, 301
00123, Rome – ITALY

CONTACTS
Calliope Facility Director: Dr. A. Cemmi
alessia.cemmi@enea.it

enea.it