Irradiation facilities in New Mexico

Sally Seidel, UNM
seidel@unm.edu

Los Alamos National Laboratory

Beam Status (login required)

search s

LANSCE Los Alamos Neutron Science Center

ABOUT LANSCE | FOR USERS | SUBMIT A PROPOSAL | FACILITIES | NEWS & EVENTS

Los Alamos National Laboratory

https://lansce.lanl.gov/facilities/wnr/flight-paths/target-2/

Target 2

Target 2 provides experimenters direct access to the 800 MeV proton beam as well as several flight paths.

Instrument Scientist
Steve Wender
(505) 665-1344
Email

Instrument Assistant
Kranti Gunthoti
(505) 665-8594
Email

LANSCE User Office
Email

Target 2 Overview

Target 2 is housed in the **Blue Room** in MPF-7 at LANSCE and provides experimenters direct access to the LANSCE proton beam. The Blue Room is a domed room with a diameter of 40 feet. The main floor of the Blue Room is constructed primarily of aluminum and elevated 20 feet above the basement floor to minimize neutron wall return for experiments sensitive to such effects. The proton beam enters the Blue Room from the northeast and then exits to the southwest on its way to Target 4. During Target 2 operations, the beam line is removed in the middle of the Blue Room and experiments are installed at the center of the room in the path of the beam. The Blue Room also has several secondary flight paths for use in coordination with targets installed at Target 2.

Target 2 can use either the LANSCE linac beam directly, or the high peak intensity stacked beam from the Proton Storage Ring (PSR). The linac beam to the Blue Room can normally be run up to 80 nA with substructure available for experiments that require it. Normal linac operations provide 800 MeV protons, but the facility is capable of delivering protons with energy from 200 MeV to 800 MeV. The PSR beam can run from pulse-on-demand up to 40 Hz, and up to 1 μA average current. PSR beam pulse intensity can be as high as a few 1013 protons/pulse.

Gamma Irradiation Facility and Low-Dose-Rate Irradiation Facility

Sandia National Laboratories, in Albuquerque, NM

Gamma Irradiation Facility and Low-Dose-Rate Irradiation Facility

The Gamma Irradiation Facility (GIF) provides high-fidelity simulation of nuclear radiation environments for materials and component testing. The GIF can produce a wide range of gamma radiation environments (from 10^{-3} to over 6.5 x 10^2 rad/second) using cobalt-60 sources and can irradiate objects as small as electronic components and as large as an Abrams M1 tank. The GIF provides in-cell dry irradiations in three test cells and in-pool submerged irradiations.

Contacts

Don Hanson
djhanso@sandia.gov
(505) 844-6969

Audrey Rotert
aevelan@sandia.gov
(505) 284-3830

Research and other activities

Radiation fields at the GIF are produced by high-intensity gamma-ray sources. The sources used at the GIF are cobalt-60 pins. The facility offers gamma dose rates from 10^{-3} rad/s to over 6.5 x 10^2 rad/s. The GIF can house a wide variety of gamma irradiation experiments with various test configurations and at different dose and dose rate levels. The in-air irradiations are conducted using three concrete test cells: two cells are 3 m × 3 m; one cell is 5.5 m × 9.1 m. Various objects are tested for their abilities to withstand the damaging radiation environments they might experience in space, near stored nuclear materials, or when they experience extreme radiation environments.

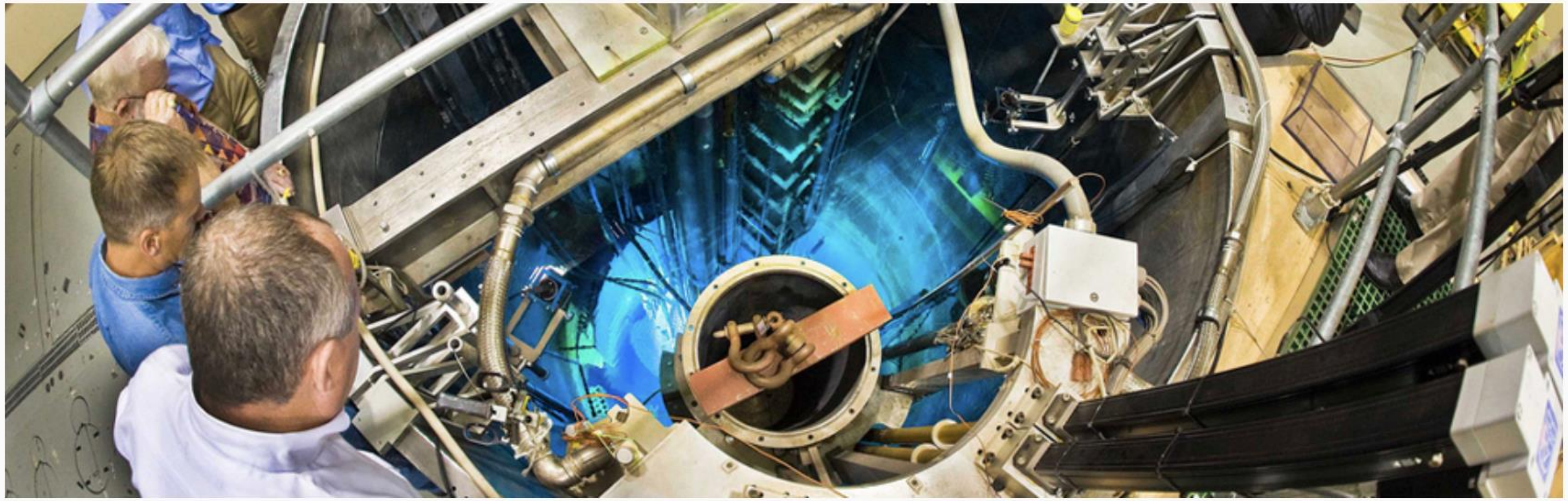
Special features and equipment

To accommodate specific irradiation needs for experiments, the following custom features have been incorporated into the GIF design:

- Configurable radiation sources that provide different geometries for the source array (e.g., point, planar, and circular)
- Shielded windows that enable experiment observation during irradiation
- Remote manipulators that can be installed to facilitate experiment or source handling
- Pass-throughs in the shielding walls so that experiment power and instrumentation cables can penetrate the shield walls
- A movable wall that measures 5.5-m (~18-ft.) wide in the large cell, providing access for large components (e.g., space vehicles or military vehicles)
- Removable cell-roof-shield plugs that provide access for large and/or massive experiments
- An overhead bridge crane that spans the facility's high bay and that can access the cells through the cell-roof-shield plugs
- Dry experiment canisters are available for in-pool irradiation experiments
- In-pool experiments can be heated and purged with air or other gas

https://www.sandia.gov/research/gamma-irradiation-facility-and-low-dose-rate-irradiation-facility/

Annular Core Research Reactor facility



Nuclear science photo

At the Annular Core Research Reactor (ACRR) facility, Sandia researchers can subject various test objects to a mixed photon and neutron irradiation environment featuring either a very rapid pulse rate or a long-term, steady-state rate.

Sandia National Laboratories, in Albuquerque, NM

Special features and equipment

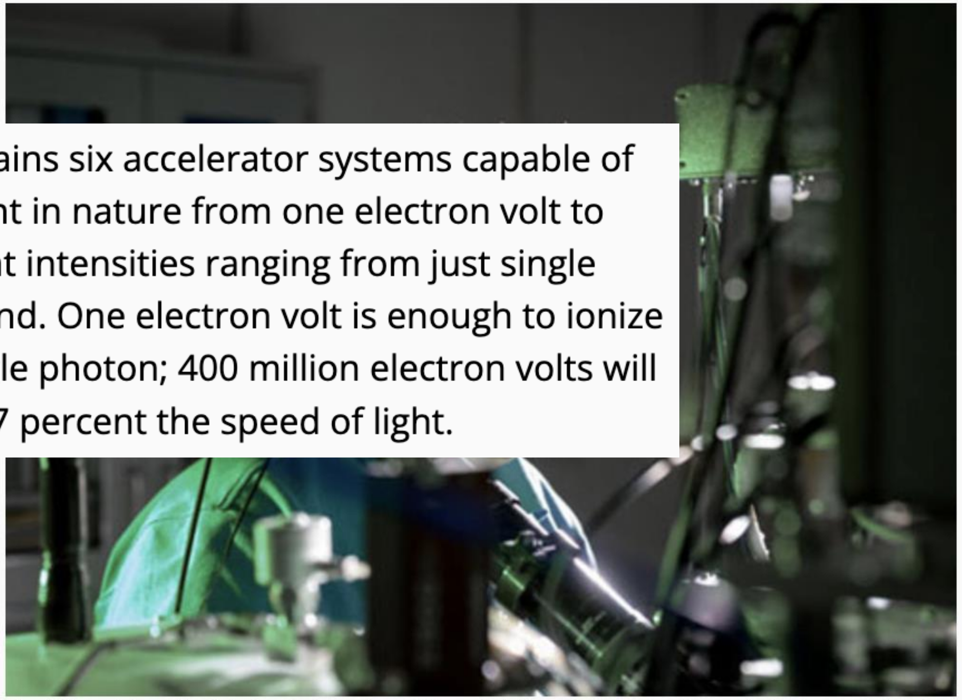
The ACRR offers several special features:

- A large central cavity with very little radiation gradient, despite a capability for high radiation intensity
- The ability to determine with a high degree of accuracy the actual radiation dose delivered to each test article
- A limited capability to tailor the neutron energy spectrum and reduce or increase the photon intensity by selecting the appropriate interaction material to be positioned between the core and the test article

https://www.sandia.gov/research/area/radiation-effects-and-high-energy-physics/annular-core-research-reactor-facility/

Ion Beam Laboratory (IBL)

Sandia National Laboratories, in Albuquerque, NM



The IBL's unique structure contains six accelerator systems capable of generating ions of every element in nature from one electron volt to 400 million electron volts, and at intensities ranging from just single ions to trillions of ions per second. One electron volt is enough to ionize a single atom or energize a single photon; 400 million electron volts will accelerate the heaviest ions to 7 percent the speed of light.

The IBL enables scientists to study and modify materials systems using ion and electron accelerators.

Single ions from H to Au are available at the 6MV tandem at 1 – 40 MeV.

Capabilities and Resources

The IBL is available to perform the following analyses:

- Compositional and depth profiling of materials
- Elastic recoil detection using a high energy, heavy ion beam
- Ion channeling to probe the atomic structure of a material in the near surface
- External ion beam analysis on a variety of materials that cannot be placed in a vacuum system
- Quantitative elemental analysis using particle-induced x-ray emission with detection sensitivities
- 3-dimensional elemental distribution maps

https://www.sandia.gov/research/facilities/ion-beam-laboratory-ibl/