

# Accelerator Lab: Particle Beam Science and Engineering: Simulating Space Radiation Field

Field of Accelerator and Nuclear Reactor Systems Engineering, Department of Quantum Energy Engineering, Graduate School of Engineering, Tohoku University

## Purpose of the training:

High-energy particle beams play a vital role in various fields. These include space exploration, nuclear fusion, as well as therapy. Here we demonstrate an experiment that will involve irradiating semiconductor devices (such as pn diodes, transistors, and cameras) with MeV-class proton beams in order to simulate the radiation effects in outer space.

Degradation and malfunction caused by irradiation are being observed via remote control from accelerator operation room. Then methods to protect the images through adjustments to shielding materials and circuit and enclosure designs will be devised. The objective is to offer a practical experience that covers accelerator operation, the basics of cosmic radiation, sensor evaluation, and electronic device fabrication. The phenomenon of device failure will be used as a starting point to explore the advantages and precautions associated with the use of radiation.



1

Operation of Accelerator



2

Observation



3

Protection



4

Verification



## Hands-on Flow

## Equipment Available for Experiments

- 1 MV tandem accelerator (you may enter the facility during non-operation) (Faculty of Engineering, Tohoku University; Subcritical Experiment Facility) ⇒
- Electrical measurement equipment



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Reference: Matsuyama-Kada Laboratory Website (<https://web.tohoku.ac.jp/matsuyamalab/>)