

Argonne Tandem Linear Accelerator System

The national user facility for low-energy nuclear science

ATLAS is the only US user facility for nuclear physics research at energies in the vicinity of the Coulomb barrier.

- ATLAS provides a wide range of beams ranging from Hydrogen to Uranium.
- The ions can be accelerated up to 20 MeV per nucleon.
- Nearly 40% of the available beam time is used for radioactive isotope beams.



GAMMASPHERE, an array of over 100 Compton-suppressed Ge detectors, and HELIOS, a novel superconducting solenoid spectrometer, are examples of forefront instruments which are available for experiments at ATLAS.

Scientific endeavors

Research programs at ATLAS focus on key questions that are central to our understanding of matter and the astrophysical processes responsible for the origin of the elements.

Endorsed by numerous scientific reviews, the issues being addressed at ATLAS span nuclear science and specifically include

- the quantum shell structure of nuclei
- the evolution of nuclear structure as a function of neutron excess
- the characterization of exotic decay modes
- the determination of masses of exotic nuclei
- tests of the fundamental symmetries
- measurements of nuclear reactions of astrophysical importance
- investigations into the properties of the heaviest nuclei
- applications of accelerator mass spectrometry

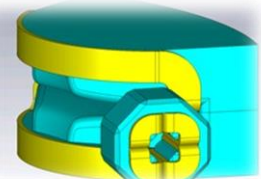
THE USER COMMUNITY

- 400** Yearly ATLAS users from the US and abroad
- 100** Yearly graduate student users
- 12** Yearly Ph. D. theses based on ATLAS research
- 70** Yearly peer reviewed scientific publications

Recent and future facility upgrades

Since its inception in 1985, the ATLAS facility has continually been upgraded to remain at the forefront of nuclear research as guided by the science demands of the community.

- **The Californium Rare Ion Breeder Upgrade (CARIBU)** currently provides accelerated neutron-rich fission fragments from a one-Curie ^{252}Cf source for astrophysical studies on the origin of the heavy elements and nuclear-structure studies of rare nuclei.
- **ARRA-funded efficiency and intensity upgrades** of ATLAS were completed in 2013 and world-record accelerating fields were achieved for the superconducting resonators.



Construction and installation of the new high-intensity superconducting accelerator upgrade module and the design of AGFA, the Argonne Gas-Filled Analyzer to be used in studies of the heaviest known nuclei.

- **An in-flight separator** has been designed to increase the intensity of radioactive isotope beams by a factor of x100 with its construction to soon commence.
- **Novel experimental equipment** is continually being developed for use with the ion beams produced by ATLAS, including the availability of a beta-decay Paul trap used in the capture of short-lived ions produced at CARIBU for astrophysics, next-generation reactor fuel cycles and stockpile stewardship.