Illinois Accelerator Research Center

Developing breakthroughs in accelerator science and translating them into applications for the nation’s health, wealth and security.

Mission
The mission of the Illinois Accelerator Research Center, or IARC, is to partner with industry to translate technology developed in the pursuit of science into the next generation of industrial accelerators, products and applications.

Vision
IARC’s vision is to be the preeminent technology source for accelerator-based products and services, serving as the seed for industry growth.

Application areas of accelerator technology
Accelerator technology has applications in water and biosolids treatment, cargo scanning, material modification using electron beams, medical sterilization (X-ray and electron beam), industrial electron-beam-driven chemistry, advanced manufacturing, environmental remediation and food sterilization.

Available infrastructure
At IARC’s Office, Technology and Engineering Building, partners have access to 47,000 square feet of office and meeting space, including a state-of-the-art auditorium that accommodates 175 people. In addition, there is an experimental area in the adjacent Heavy Assembly Building that offers:

- 42,000 square feet of development and demonstration space
- 50-ton and 10-ton overhead cranes
- 600-watt, 4-Kelvin cryogenic refrigerator
- 1.5 megawatts of power
- 2.0 megawatts of chilled water
- Radiation shielding

A brand new facility – A2D2
The new Accelerator Applications Development and Demonstration (A2D2) Facility is a test platform that fosters development and evaluation of new radiation-driven chemical processes and new ideas for electron-beam- and X-ray-based nondestructive inspection and testing. Several research partners, including federal agencies, universities and industrial firms, are already using the platform to conduct proof-of-concept studies for various applications.

Impact on Illinois universities
Regional universities, including the University of Chicago, University of Illinois, Illinois Institute of Technology, Northern Illinois University and Northwestern University, have active research programs at Fermilab.

By providing state-of-the-art facilities for visiting scientists, students and entrepreneurs, IARC will strengthen Fermilab’s links to Illinois universities and industry and harness their creative energy to create new accelerator-technology-based applications and industries.

IARC developmental partnerships
IARC works with technology companies to develop high-reliability, high-power coupler development and other accelerator components.

IARC also has secured funding from the U.S. Department of Energy’s Accelerator Stewardship Program for the conceptual design of an electron accelerator for biosolid waste treatment with the Metropolitan Water Reclamation District of Greater Chicago.

Recently, IARC was awarded a grant from the National Nuclear Security Agency for a study to evaluate the costs of switching to electron-beam-based sterilization for medical products.

Besides these, there are ongoing multimillion-dollar R&D efforts in conduction cooling and accelerator development for pavement applications with other federal lab partners.

The Heavy Assembling Building at IARC offers our partners 42,000 square feet of experimental area with state-of-the-art infrastructure.

The Illinois Accelerator Research Center at Fermilab provides office space and offers a total of 89,000 square feet of space for industrial partners, with access to leading experts at the lab.
The Accelerator Applications Development and Demonstration (A2D2) Facility is a test platform that is currently accepting applications from industry to evaluate new ideas that require MeV electron beams or X-rays.

IARC will help Illinois become a world leader in accelerator technology.

### Strengthening our economy

**Extending the life of paved surfaces**
By cross-linking modified bitumen or other binders, mobile, truck-mounted electron accelerators could transform a newly constructed paved surface into a tough, long-lasting material, significantly extending the life of public roads and airport runways.

**Enhancing additive manufacturing**
A compact, portable, energy-efficient electron beam printer could transform the advanced manufacturing landscape in both civilian and defense applications by opening the door to new materials and methods.

**Improving coatings technology**
High-power, portable machines could allow for greater use of solvent-free paint and coating materials in the field, from painting the lines on a highway to applying specialty coatings to the deck of an aircraft carrier, both reducing the time from application to use and improving the properties of the material itself.

### Protecting our citizens

**Strengthening national security**
Improved accelerator and detector technology could be used to detect threats, such as special nuclear materials in ship-born cargo containers and at stand-off distances before the materials enter U.S. ports.

**Improving environmental quality**
Reliable, cost-effective electron accelerators could be used to sterilize municipal sludge and waste water while simultaneously destroying harmful pathogens, pharmaceuticals and organic contaminants.

**Protecting human health**
Electron beam processing is an effective means for eliminating bacteria from foods and hard surfaces and eradicating live insects from crops. A compact, mobile accelerator could be used to treat crops before they are even shipped.