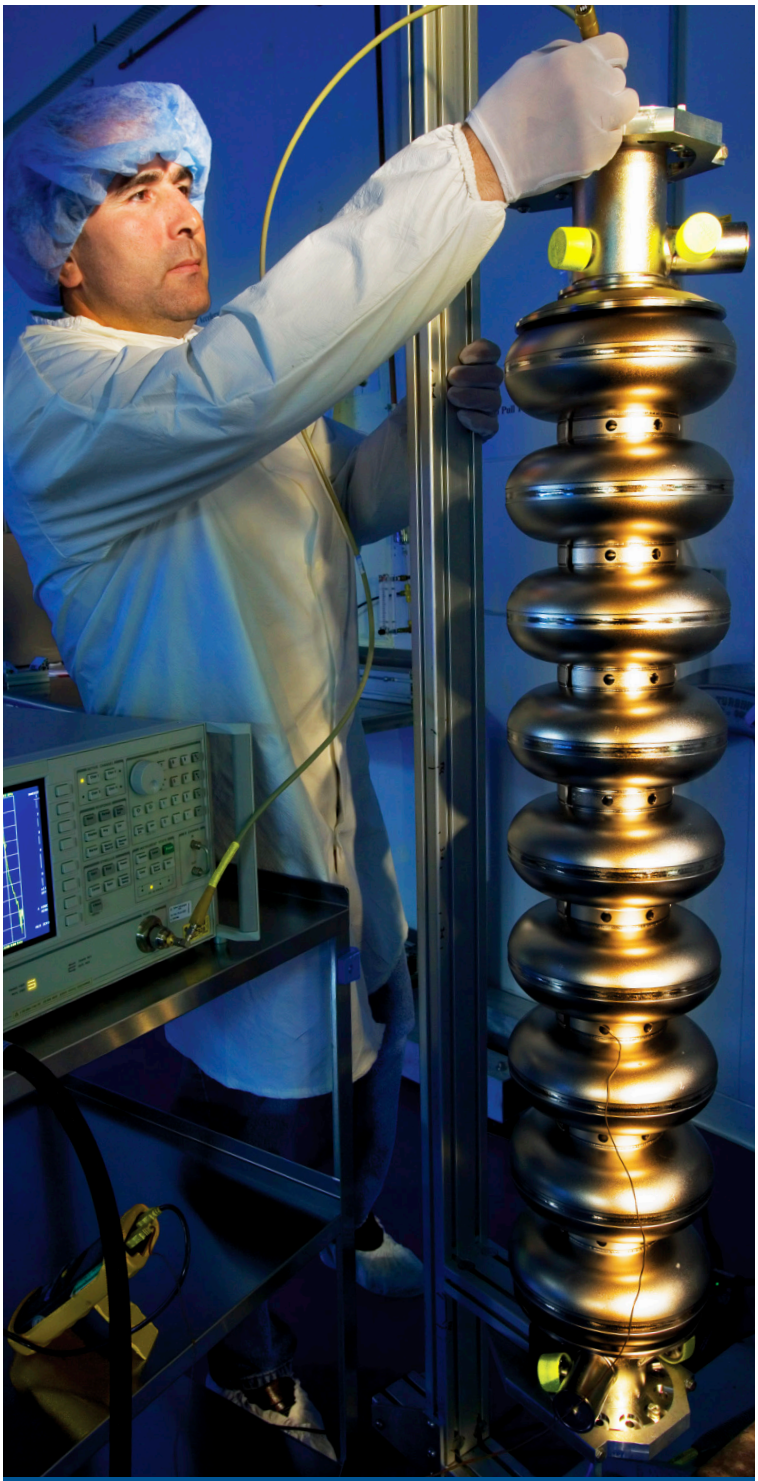
SRF Accelerator Research & Development

Technologies developed at Fermilab will be used in the next generation of particle accelerators and will spur innovation to meet the challenges of America's future.



Fermilab scientist with SRF cavity.

One of the first SRF cryomodules designed, built and tested at Fermilab.

R&D for Future Accelerators

Superconducting radio-frequency technology

Superconducting radio-frequency (SRF) cavities are the technology of choice for the next generation of particle accelerators, and Fermilab is a world leader in their development and testing. Fermilab partners with U.S. industry and other institutions around the world to design and build SRF cavities in cost-effective ways. The technology has potential applications in medicine, nuclear energy and materials science, as well as basic research.

Superconducting radio-frequency test facility

Fermilab operates the most advanced complex of SRF science and technology facilities in the United States, with broad capabilities ranging from basic materials science and superconducting characterization to cavity and cryomodule design, processing and testing. The infrastructure enables fundamental SRF research and allows developing and testing components for modern state-of-the-art and future accelerators. Currently, Fermilab is developing cryomodules for two major projects: its own proposed high-energy superconducting particle accelerator, called PIP-II, and SLAC's next-generation X-ray laser, LCLS-II. Scientists are also developing a 460-foot-long electron beam test accelerator, a unique facility for advanced beam physics research.

Fermilab's proposed accelerator

Fermilab is planning an upgrade to its accelerator complex to produce the world's most intense beam of difficult-to-study neutrinos. Known as PIP-II, the plan is to deliver this high-intensity beam in time for the future Long-Baseline Neutrino Facility, based at Fermilab and Sanford Lab in South Dakota, to begin operations in 2025. The project involves the construction of a new, 800-MeV superconducting radio-frequency linear accelerator, capable of delivering continuous, rather than pulsed, particle beams to multiple experiments.