

SRF at Fermilab: SRF Accelerator Test Facility

A Superconducting Radio Frequency (SRF) Accelerator Test Facility is being constructed at Fermilab in the existing New Muon Lab (NML) building. The accelerator will consist of an electron gun, injector, beam acceleration section consisting of three TTF-type or ILC-type cryomodules, multiple downstream beam lines for testing diagnostics and conducting various beam tests, and a high power beam dump. This facility will initially be capable of generating an 810 MeV electron beam with ILC beam intensity.



SRF Test Facility is now testing the first U.S. 1.3 GHz cryomodule.

Each 12-meter-long cryomodule will contain eight superconducting cavities in a vacuum-sealed container that will be cooled down to 1.8 K. Together, the three cryomodules plus the RF power systems will make up one complete RF unit for ILC R&D. While the first two cryomodules will be of the 3rd generation design (Type III+), the final cryomodule will be the new 4th generation design (Type IV). This 4th generation cryomodule will be the first one ever built, and testing it will play an important role in determining the final cryomodule design for the ILC. A 5 MW RF system, located right outside the test cave, will power these first two cryomodules. Current plans call for installing a 10 MW RF Marx modulator, developed by a team at SLAC, to generate the extra power necessary to operate a complete RF unit. This new type of modulator has already passed preliminary performance tests at SLAC and, if fully successful, will make it feasible to provide power to accelerate particles in a more reliable and less expensive way.

Expansion plans of the facility are underway that will provide the capability to upgrade the accelerator to a total beam energy of 1.5 GeV and will open up further possibilities for beam physics and beam technology experiments. While the main purpose of this facility is to test cryomodules with beam, scientists from around the world will also be able to use the facility for a number of other R&D purposes including the testing of controls, diagnostics and instrumentation.

Adjacent to the SRF Accelerator Test Facility, the new Cryomodule Test Facility (CMTF) building is being constructed. CMTF will house a large cryogenic plant and SRF cryomodule test stands. The goal is to build a state-of-the-art complex for testing SRF cryomodules with beam for the development of next generation high intensity linear accelerators, such as Project-X and the International Linear Collider.