

FFAG'2017 Tour

Friday, September 8, 2017

CBETA: the first multi-turn SRF ERL.

Cornell physicists, working with Brookhaven National Lab, are constructing a new type of particle accelerator called CBETA at Cornell's Wilson Lab. This Energy Recovery Linac (ERL) is a test accelerator built with permanent Fixed-Field Alternating Gradient (FFAG) magnets as well as electro magnets.

CBETA is composed of five main parts, most of which are built and can be viewed at Wilson Lab:

*The **Photoinjector** creates and prepares high-current electron beams to be injected into the **Main Linac Cryomodule** (MLC). The MLC accelerates the beam through several passages and then decelerates the beam the same number of times to recapture its energy. Four **Spreaders** and four combiners, built with electro magnets, separate beams at four different energies after the MLC to match them into the FFAG return loop and then combine them again before re-entering the MLC. **FFAG Magnets** residing in the return loop cause very strong focusing so that beams with different energies can be transported simultaneously. The high-power **Beam Stop** is where the electron beam is discarded after most of its energy has been recaptured.*



