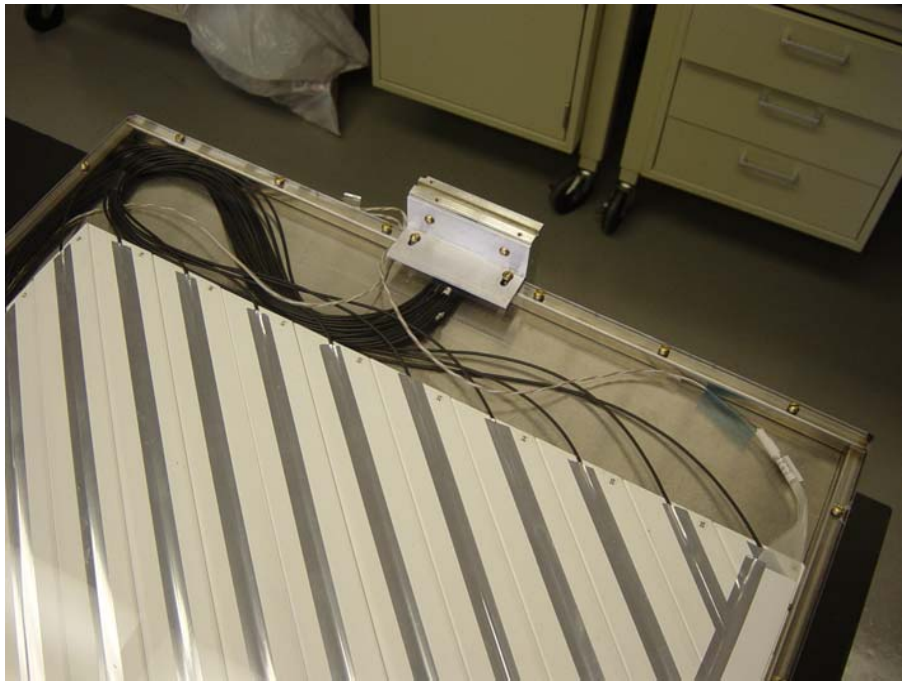
ILC Muon Detector Test Beam Plans

RPC, Scintillator, other Muon Detectors and

Various photo-detectors

What is to be tested?

¼ size planes: 2.5 X 1.25 m^2
1 X 4.1 cm^2 Scintillator
1.2mm WLS



Mech. Pre-prototype: 1 X 0.5 m^2

- 4 ¼ size planes with MAPMT readout.
- 2 planes with single ended readout; 2 w/ double ended: 64 WLS fibers/plane. 250 – 500 channels.
- After cosmic & RA source testing, planes can go to the test beam.

Test Objectives

- Bring up Test beam DAQ based on cosmic ray and calibration test systems.
- Measure performance with μ's and hadrons using existing hardware, Minerva and other prototype electronics as available.

  (1) μ/h separation, measure punch-through;

  (2) calibration of E_h (requires more planes – collaboration with NIU);

  (3) Eh missing due to SC coil;

  ……

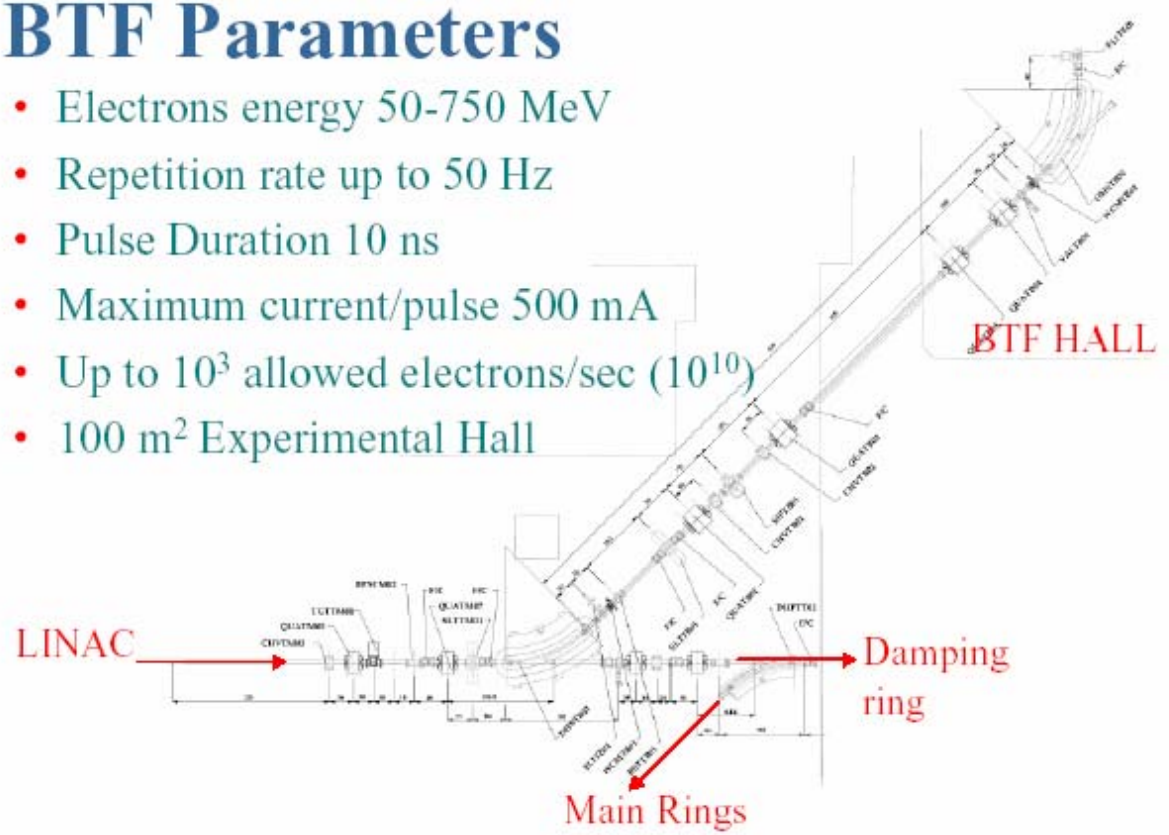
Beam, etc.

- **Beam Conditions:** E = few – 100 GeV; e, π, p, μ. Beam rate < 10^6 Hz.
- **DAQ:** FE will be custom development with FPGA logic and digitization, using CAMAC and LINUX software debugged in cosmic ray running. <= Best guess now, i.e. 2005
- **Dates:** Earliest is probably late 2005.
- **Where:** Fermilab – Mtest.

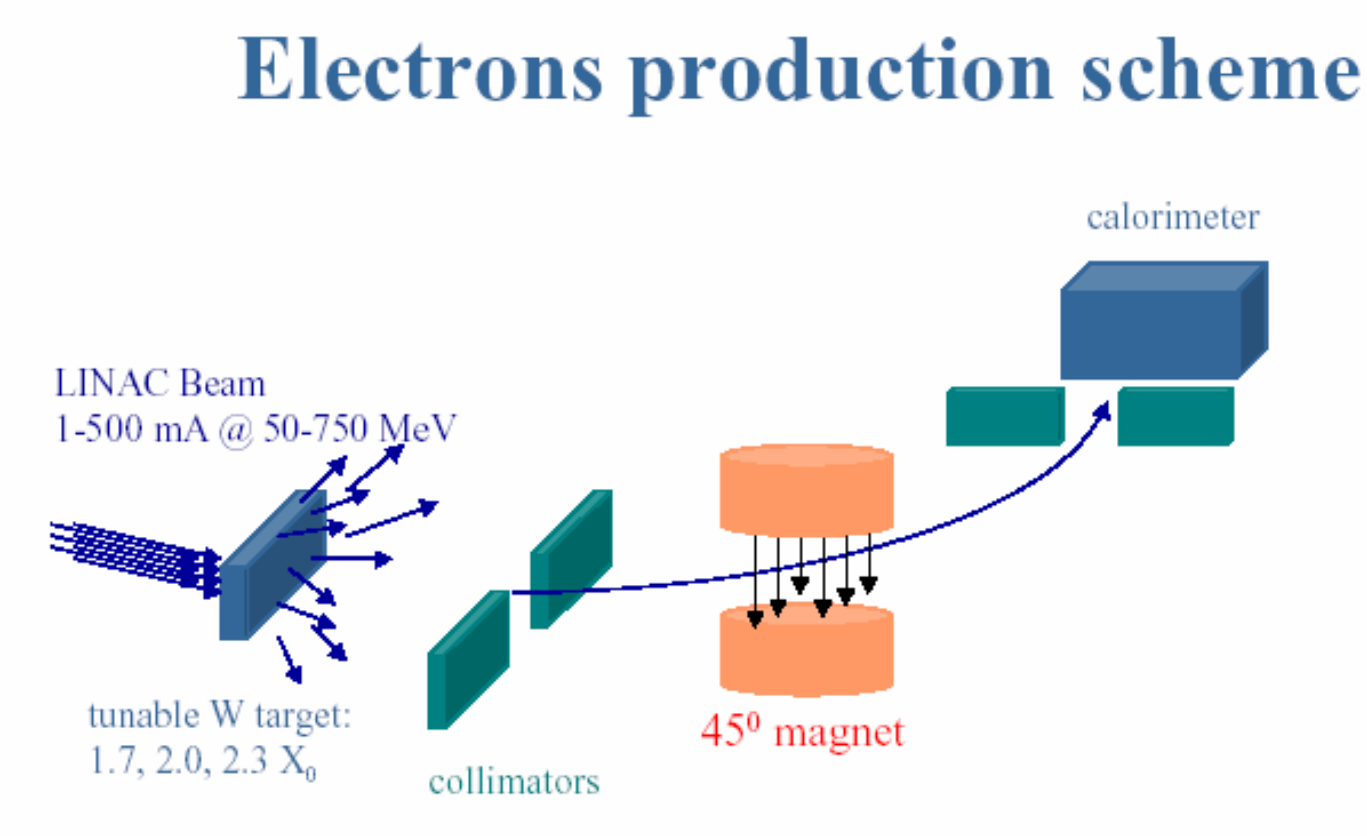
The Frascati **T**est **B**eam **F**acility

BTF Parameters

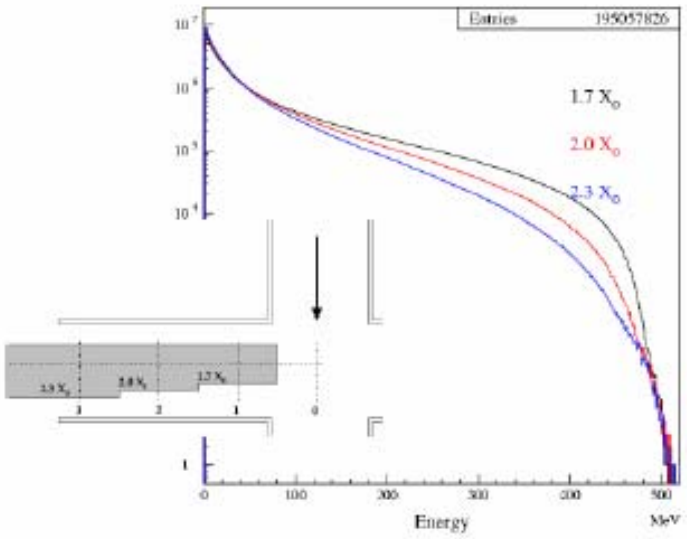
- Electrons energy 50-750 MeV
- Repetition rate up to 50 Hz
- Pulse Duration 10 ns
- Maximum current/pulse 500 mA
- Up to 10^3 allowed electrons/sec (10^{10})
- 100 m^2 Experimental Hall



Conceptual view of the facility

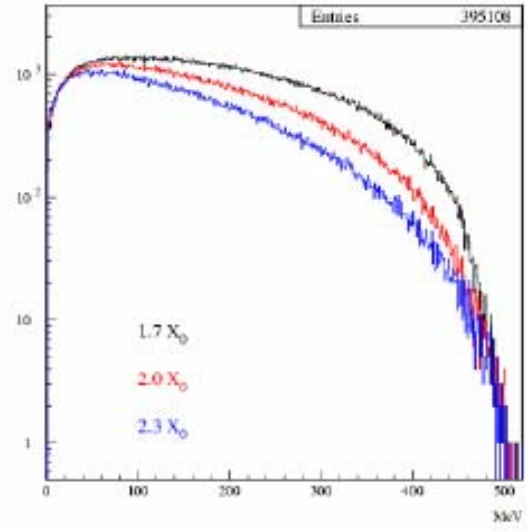


Electron energy distribution after target



Electron energy distribution
Outgoing TGMTT001

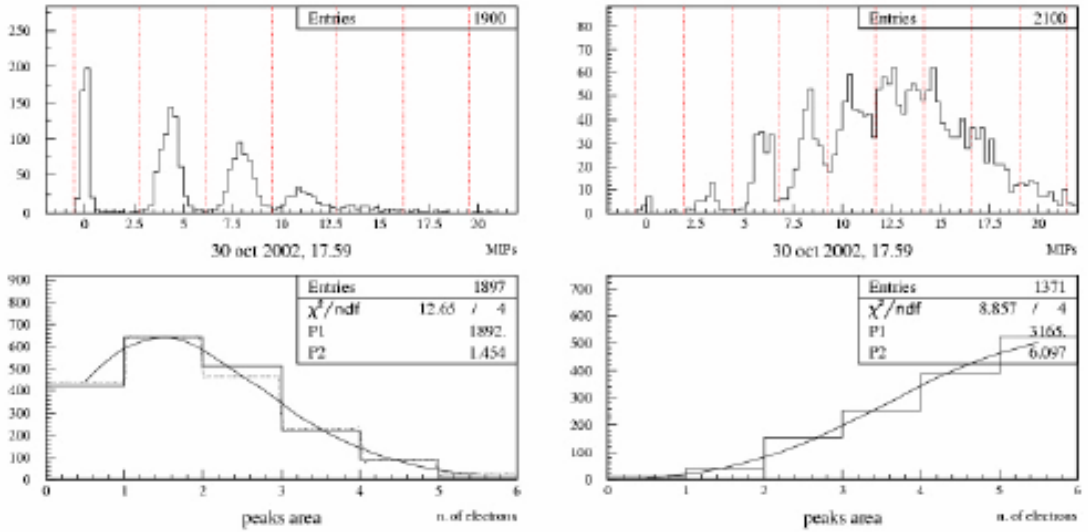
Electron energy distribution in the chamber acceptance before the bend DHSTB001



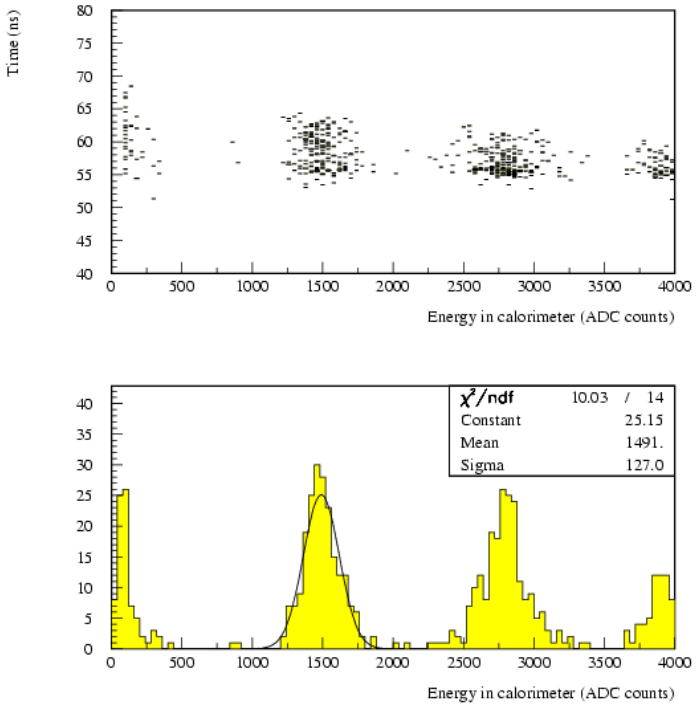
Particle multiplicity

Energy selector system and transport optics can be modulated in order to obtain the desired electron number distribution at different energies

The efficiency depends on energy and on the transport optics (the quadrupoles)



Beam performances at low current



- Here is the typical behavior of the beam at low multiplicity.
- The upper part shows the correlation between pulse height and timing in the calorimeter.
- Lower plot shows pulse height and separation of the various particles content.

Summary

- Frascati BFT is allocating time both in primary and parasitic mode.
- Beams have linac time structure and the number of particle impinging on a detector can be tuned between 1 and 10^4.
- Energy and beam spots can also be tuned.
- Good testing ground for different types of detectors (Calorimeters, rpc's….)