LABORATOIRE DE L'ACCÉLÉRATEUR LINÉAIRE

Combined Test Beams

- Definition of Combined Test Beams
- Why would we want them?
- Why we might not want them?
- Host laboratory issues?
- Experimenter issues – Test Protocol?
- Examples of combined Test Beams
- Panel Discussion

What is a combined test beam?

- One or more detector modules in a test beam that is dedicated to ILC test studies; it is likely that the modules would be associated with a given "detector concept".
- One beam line for the whole experiment? Determined by experimenters and management, but probably a given concept needs access to more than one beam line. => Regional test beams.
- Linear Collider has instrumentation development needs e.g. IP background meas. & there is need for irradiation facilities for beam inst and HEP detector radiation tolerance measurements.
- No doubt host laboratories will want help with such facilities.

LABORATOIRE DE L'ACCÉLÉRATEUR LINÉAIRE

Why would we want Combined Test Beams?

- "Concept teams" can do simultaneous detector hardware tests with coherent testing plans, coherent triggers, etc.
- Possibility for use of common DAQ and analysis software, which could evolve to "experiment software".
- Would allow parallel algorithm development for tracking, calorimetry, electrons, muons, jets, etc.
- Combined Test success would require significant early development of carefully thought-out goals and methods to reach them: track matching with calorimeter energy deposition, etc.
- Could compare "facility defined" objects with "concept defined" objects. "facility" = test beam instr.; "concept defined" uses data from detectors under test.

Pros for Combined Test Beams

- <u>Can compare different technology detectors.</u>

  e.g. GEM vs. RPC calorimeter readout or digital vs analog readout; same beam conditions, same or different number of ADC bits.
- Comparison of dead regions/efficiency, angular dependence, jet environments, background impacts, fake tracks in high occupancy environment, e/π rejection, efficiency vs. purity, tagging tests(?).
- To get fair test comparison would require careful plans including hardware mechanical construction and electronics, and…….

LABORATOIRE DE L'ACCÉLÉRATEUR LINÉAIRE

Combined Test Beams

LABORATOIRE DE L'ACCÉLÉRATEUR LINÉAIRE

Combined Test Beams

We might not want Combined Test Beams!

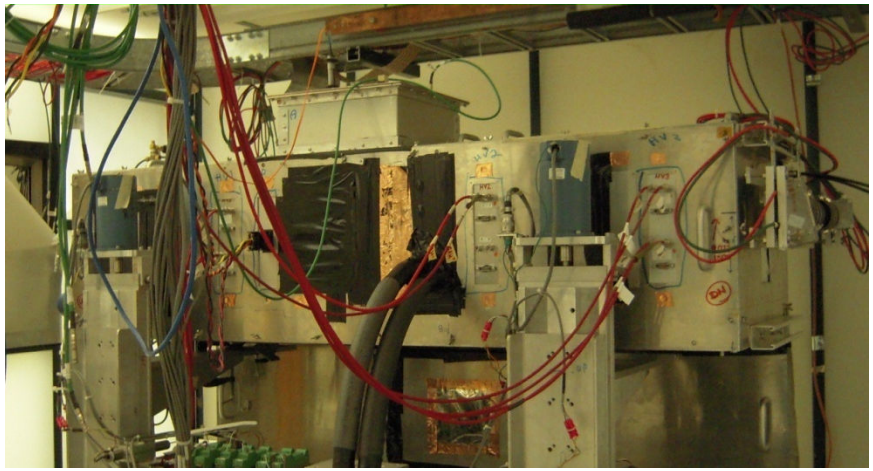
- Testing at CERN, DESY, KEK, SLAC, Fermilab is going OK; Why complicate our lives?
- CALICE, Dual Readout Calorimetry, DESY, KEK, SLAC and Fermilab projects have established testing and project status at existing facilities. Combined Test Beams would increase entropy and decrease rapid through-put at existing facilities.
- Development of combined test beams would take years to setup, finance, administer. I'm not getting any younger!
- How would the politics be handled? In country vs. Out of country requests; How could impartial review for Combined Test Beam running be insured for foreign test beam users?
- Sounds like a lot of bureaucracy is needed but not desired!
- Impartial test beam scheduling committees – big science!

Combined Test Beams Protocols

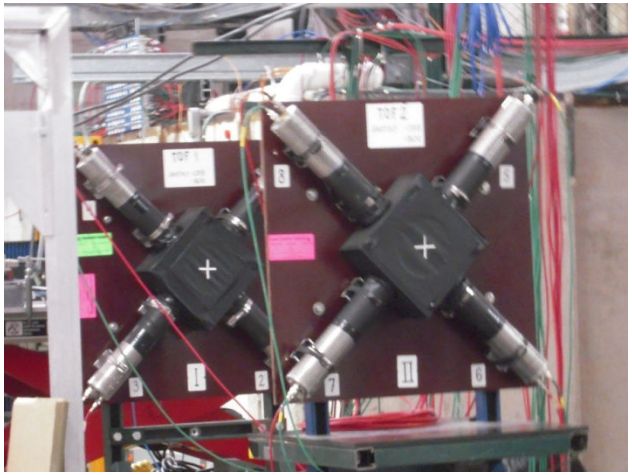
- In the treatment of medical illnesses there are often protocols developed to reduce risk and achieve success. Our equivalent documents are Memoranda of Understanding, proposals and agreements, etc. that layout the studies program, the responsibilities of the host labs and the participating scientists.
- Name participants, state objectives, describe apparatus and tests to be conducted, costs, beam conditions, expected beam and local monitoring hardware, safety considerations and training, hazards and their mitigation, nasty international problems like visas, taxes, support personnel, equipment support personnel, computing needs and expectations,

Example Combined Test Beam

High precision beam x,y telescope



Beam coincidence counters



CALICE Calorimeter

Tail-catcher/Muon Detector

Alignment & DAQ sys

LABORATOIRE DE L'ACCÉLÉRATEUR LINÉAIRE

Combined Test Beams

From exquisite pictures we reach beautiful conclusions …

.. Only at the test beam!

LABORATOIRE
DE L'ACCÉLÉRATEUR
LINÉAIRE

Combined Test Beams

LABORATOIRE
DE L'ACCÉLÉRATEUR
LINÉAIRE

Combined Test Beams