LCTW09 **Resources and Infrastructure for ILC testbeams**

Combined testbeams and a potential request for permanent (standing) ILC testbeam sites.

1. What is the definition of "combined testbeams"? Ans. One or more test beams that are dedicated to ILC studies. With the array of ILC detectors to be tested it does not seem feasible or desirable to attempt to design one beam line that would satisfy all linear collider test beam needs. In addition to the rather demanding requirements for testing HEP detectors there are also accelerator needs that would not easily be satisfied with typical experiment driven test beams. For example, the diagnostics needed for understanding the interaction point (IP) collision phenomena have special test requirements as do facilities for understanding radiation damage and radiation tolerance of some beam monitoring equipment and Si detectors that are located near the IP.

2. Involvement of visiting scientists in the development of test beams. Host laboratories with accelerator facilities to develop will want some help from visiting physicists, computing scientists, engineers, technicians, for designing and setting up or maintaining test beam facilities for an ILC project they don't yet have. What are the arrangements for meeting such needs? Inter laboratory proposal? What specific group would be responsible for working with us to setting up this international effort?

3. Why would we want combined testbeams?

   Different beams for different testing purposes:

   a) electrons, low and high energy;
   b) hadrons
   c) tagged K_L
   d) (tagged) neutrons
   e) radiation damage measurement beams.

   Would lead to open reviews of detector development projects – at least from a testing perspective; Would open discussion on running time and beam needs; Would promote discussion on common interests and lines of development in front-end electronics, signal digitization, signal and noise measurements and calibration issues.

   Would help us understand the need for parallel spigots and other schedule issues such as power and cooling requirements, beam instrumentation such as charged particle telescopes, etc .

   Combined test beams might cause us to look again, as a larger group, at common DAQ and analysis software needs that exist or that need to be developed.

List how *combined test beams* specifically benefit our physics goals?

4. Why we might NOT want combined test beams?

    a) Testing at CERN, DESY, KEK, Fermilab is going OK; Why complicate our lives?

    b) CALICE, DUAL Readout calorimetry, DESY, KEK and Fermilab projects have established testing programs and project status at existing facilities. Combined facilities could increase the entropy and decrease the rapid through-put with existing facilities.

    c) How would combined test beams be setup, administered, financed, run, etc.

    d) How would politics be handled; e.g. scheduling "in" country vs. "out of" country requests; free for "in country" tests, charges for "out of country" tests? World bank economic rates, labor charges, or establish "free use for approved out of country tests" and "free in country use" or everything scheduled by an impartial Testbeam Committee with no charges for any approved tests.

5. Development of protocols or use of existing laboratory documents that layout the expected responsibilities for the host labs and the test beam users, such as Memoranda of Understanding (MOUs) used at Fermilab, CERN, etc.:

    a) Existing MOUs to define the participants/institutions, visiting scientist organization chart, scope of the tests, description of hardware, DAQ needs/requirements, anticipated special costs/conditions, beam intensity, tracking detectors, etc.
    b) Safety issues such as radiation, training, required documentation on mechanical and electrical hazards and mitigation. Safety sign-off procedures.
    c) Nasty international issues such as site security, import duties, visas, taxes, insurance, vehicles, health insurance, etc.
    d) Support personnel and facilities: draftsmen, beamline physicists, office space, work area space, computing equipment, electronics equipment pool, riggers, surveyors, electricians, gases and cooling fluid installation personnel, instrumentation personnel, a secretary, budget and budget authority, stores issues, org charts across international boundaries, etc.

6. Example: Combined Test beam for HCal Modules

    a) A remotely operable mechanical test bed has been engineered and set-up at DESY, CERN and Fermilab. It allows vertical and horizontal translation motion with respect to the incoming beam. It is therefore very desirable to use this for tests of different calorimeter loads. This would allow direct comparisons of the data as a function of sampling fractions for different energy beams and incoming particles. The effects of

sampling fractions for different loads or even for a given load ignoring alternate readout planes would allow direct measures of energy resolution. Different readout schemes (RPCs, GEMs, Scintillator, etc.) within the same beam and inactive plate material could be compared directly after necessary calibrations have been taken into account.

b) Combined use of the same test beam setup would promote the development of a written Test Protocol that each group would prepare before the beam tests. The protocol would define the specific tests, required beam, required calibrations, etc. They would provide documentation that would be prepared primarily for their own use regarding the hardware, etc.

c) Because the Combined beam-lines would be used by essentially all HCal experimenters it would be useful for user groups to make open presentations on how their hardware is designed to operate including preliminary calculations of what the test beam data are supposed to yield (MC calculations from standard software). This should promote the exchange of information on calibration techniques, analysis software, etc. Ultimately this should help all of us understand the capabilities of the tested detectors to confront physics questions.