ILC@DESY Project Meeting

Friday 21.01.2005

Chair: N. Walker

Agenda:

1. General Announcements
2. Report on MDI workshop at SLAC - K. Büsser
3. Vibrations measurements at DESY - H. Ehrlichmann

General Announcements

N. Walker reported that discussions on the structure of the ILC@Snowmass workshop had begun. One option being considered is to have a 3-4 day formal ILC workshop (same format as in the past) at the beginning of the proposed Snowmass fortnight, with a core 'design group' staying for the rest of the time to agree on a baseline design for the CDR machine. T. Raubenheimer (SLAC) is preparing a first-draft outline to be sent to the Workshop Programme Committee and the conveners of the working groups outlining the goals for Snowmass (and the interim period).

E. Elsen noted that discussions had begun at DESY on the possibility of entering a new bid to FP6 under the current I3 call (deadline 3.03.05). Discussions are on-going over possible ILC SCRF related projects, together with a (separate) ILC Detector R&D proposal. Elsen noted Brussels expects new bids to come from DESY. He also noted on other DESY (non-ILC related) potential bids such as a PETRA-III proposal. With only five weeks until the deadline, the need to get organised is clear. A decision to proceed with a bid will be made next week.

Report on Machine Detector Interface Workshop at SLAC - K. Büsser

link to talk:

K. Büsser presented a summary of the recent MDI workshop, held at SLAC from 6-8th January. He noted that the area of BDIR/MDI was a very active one, with some 87 people attending the workshop (29 from SLAC). Büsser also noted that in this field there are many upcoming US-based workshops (LCWS at Stanford, Snowmass), and that the views presented tended to have a very North American bias. A tendency towards 'making decisions' without feedback or discussion with the relevant detector groups is also apparent.

The main areas of discussion were: energy and luminosity spectrum (energy-bias problem); high-precision spectrometry; high-precision polarimetry; crossing-angle geometry (BDS+IR layout); forward region diagnostics; beam-beam backgrounds; beam RF effects (particularly the vertex detector).

During the last year there has been much work on the problem of so-called energy-bias due to the wakefield driven energy-z correlation of the bunch. Estimates of the bias (which is difficult to measure) were reported. Energy spectrometers and Bhabha acolinearity alone are not sufficient to correct for this bias. Need beam dynamics modeling and other input from annihilation data, disrupted energy measurements etc.

For precision energy spectrometry two concepts are being discussed, both of which rely on the use of a precision spectrometer magnet, but differ in their approaches to measuring the beam bend angle. The WISARD system uses synchrotron light swaths projected to a suitable detector to determine the angle, while the magnetic chicane based system relies on nanometre-resolution BPM technology. Both systems will be prototyped and tested in end station A at SLAC.

The need for polarisation measurements both upstream and downstream of the IP still remains a contentious point. NLC-like designs of a precision polarimeter in the extraction line using a chicane were discussed, along with the TESLA TDR solution (upstream only). The question of how necessary the downstream polarimeter is has ramifications for the IR geometry (specifically for zero- or small-crossing angle solutions, where the feasibility of such precisions measurements in the extraction line are still in question). On a related note, the depolarising effects of both the beam-beam and the solenoid field (for a crossing-angle solution) where discussed. For the latter, a compensating serpentine correction winding on the solenoid has been proposed. A possible pitfall of this approach is steering of the spent beam and a the influence on detector backgrounds.

Instrumentation of the very forward region (head-on scheme) has the possibility to be used as a beam diagnostic on a bunch to bunch basis. The measured low-angle pair distributions can be used to reconstruct several of the macroscopic bunch properties at the collision point. Further (simulation) work using quasi-realistic simulated beams is on-going.

Discussions on beam-beam backgrounds focused on differences between 20mr and 2mr crossing angle schemes. The consensus is that levels are acceptable in both cases, although backgrounds are higher for the 20mr angle layout.

Shielding requirements for the two IRs to facilitate having people in one experimental hall while running beam to the other experiment were also discussed. The exact geometry of the IR layouts has an impact on the shielding requirements. Options such as 18m steel walls and 5m long magnetic toroids were discussed.

The discussions and presentation on the IR geometry continued those from the KEK workshop, where a so-called ‘strawman’ IR layout with one 20mr angle and one 2mr crossing angle was adopted. The main linacs are orientated to the 20mr crossing angle to accommodate ‘possible future multi-TeV options’. The 2mr angle solution is disliked by many people (particularly the SLAC group). The goal is (still) to make a decision on the baseline design by the Snowmass workshop.

Finally, the problems of Beam-induced RF on the detector was discussed. This was a notable problem for the SLD vertex detector. The SLD VTX detector will be removed with the goal of identifying what the problems where (using the SLAC beam).

Vibration Measurements at DESY - H. Ehrlichmann

H. Ehrlichmann reported on on-going R&D at DESY on ground vibration measurements. The recent programme of the last years was to make measurements of various sites around the world, specifically with the same equipment and conditions, with a goal to making consistent comparisons. An programme to catalogue and characterise these spectra is also well underway.

Ground motion spectra are characterised by a typical $1/f4$ power spectrum, with the well-known 0.14Hz peak due to ocean waves (the so-called 7 second hump). Above a few Hz the spectrum is dominated by man-made 'cultural' noise. Clear night-day differences (as well as weekend) have been clearly observed in noisy sites such as DESY (i.e. close to a major city). A join R&D programme with the University of Harbourg has been attempting to characterise the cultural noise, which appears to be dominated by traffic.

As part of this programme, as permanent seismic station has been setup in the HERA tuunel, (WL745) whose continuous (real-time) data is available on request. (The data is first sent to the University of Hamburg and then to the seismic network.)

A third area of R&D is the measurement programme for the cryomodule vibration in TTF. Vibration amplitudes (RMS) of a factor of ~2 above the ground motion in the vertical plane have been seen (100-200 nm). Horizontal amplitudes, both in the direction of the cryomodule axis and transverse to it, are higher at about 300nm RMS. (Both values have are for $f > 3$Hz.) These values are too high (both for the ILC and the XFEL). The measurement programme will continue with a goal to identifying and mitigating the vibration sources (vacuum pumps etc.).

As a related topic - and as part of the DESY EUROTeV programme - the group will begin to study the stabilisation of the cryomodule quadrupole. Also as part of EUROTeV, the group will collaborate with the the University of Annecy, where a test facility for stabilisation techniques is planned.

The next ILC@DESY Project meeting will be on Friday 4th February.

Nick Walker
25.01.2005