

MDI Questions

FROM the Co-Chairs of the Worldwide Study of Physics
and Detectors for the ILC.

MACHINE DETECTOR INTERFACE QUESTIONS WHICH THE ILC DETECTOR CONCEPT GROUPS ARE ASKED TO ANSWER AS FULLY AS THEY CAN BEFORE SNOWMASS.

These questions are urgent. Concept groups are encouraged to give the best answers they can before Snowmass - as guidance to the decisions which the GDE wishes to make on the baseline machine design by the end of 2005. They have been prepared in close consultation with the Machine-Detector Interface Panel of the WWS (P.Bambade, T.Tauchi and

M.Woods) and with the Working Group 4 conveners of the ILC Study (A.Seryi, T.Sanuki, G.Blair).

PLEASE REPLY - IF POSSIBLE BY 1 AUGUST - TO THE WWS CO-CHAIRS (BRAU, YAMAMOTO, MILLER)

If you find you cannot answer any of the questions, as put, please tell us why and give whatever relevant information you can.

1. What factors determine the strength and shape of the magnetic field in your detector? Give a map of the field, at least on axis, covering the region up to ± 20 m from the IP. What flexibility do you have to vary the features of this field map?

2. Provide a GEANT (or equivalent) geometry description of the detector components within 10 meters in z of the IP and within a radial distance of 50 cm from the beamline.

3. Would you mind if the baseline bunch-spacing goes to ~ 150 ns instead of ~ 300 ns; with $\sim 1/2$ the standard luminosity per crossing and twice as many bunches?

4. For each of your critical sub-detectors, what is the upper limit you can tolerate on the background hit rate per unit area per unit time (or per bunch)? Which kind of background is worst for each of these sub-detectors (SR, pairs, neutrons, muons, hadrons)?

5. Can the detector tolerate the background conditions for the ILC parameter sets described in the Feb. 28, 2005 document at www-project.slac.stanford.edu/ilc/acceldev/beamparameters.html ? Please answer for both 2-mrad and 20-mrad crossing angle geometries. If the high luminosity parameter set poses difficulties, can the detector design be modified so that the gain in luminosity offsets the reduction in detector precision?

6. What is your preferred L^* ? Can you work with $3.5\text{m} < L^* < 4.5\text{m}$? Please explain your answer.

7. What are your preferred values for the microvertex inner radius and length? If predicted backgrounds were to become lower, would you consider a lower radius, or a longer inner layer? If predicted

backgrounds became higher, what would be lost by going to a larger radius, shorter length?

8. Are you happy that only 20mr and 2mr crossing angles are being studied seriously at the moment? Are you willing to treat them equally as possibilities for your detector concept.

9. Is a 2mr crossing angle sufficiently small that it does not significantly degrade your ability to do physics analysis, when compared with head-on collisions?

10. What minimum veto and/or electron-tagging angle do you expect to use for high energy electrons? How would that choice be affected by the crossing angle? How does the efficiency vary with polar angle in each case?

11. What do you anticipate the difference will be in the background rates at your detector for 20mr and for 2 mr crossing angle? Give you estimated rates in each case.

12. What is your preliminary evaluation of the impact of local solenoid compensation (see LCC note 143) inside the detector volume, as needed with 20mr crossing angle, on the performance of tracking detectors (silicon, and/or TPC, etc.)

13. Similarly, what is your preliminary evaluation of the impact of compensation by anti-solenoids (LCC note 142) mounted close to the first quadrupole?

14. Do you anticipate a need for both upstream and downstream polarimetry and spectrometry? What should be their precision, and what will the effect of 2 or 20 mr crossing angle be upon their performance.

15. Is Z-pole calibration data needed? If so, how frequently and how much? What solenoid field would be used for Z-pole calibration? Are beam energy or polarization measurements needed for Z-pole calibration?

16. Would you like the e-e- option to be included in the baseline, and if so what minimum integrated luminosity would you want?

17. What will be your detector assembly procedure.

18. What size is required for the detector hall?

There are, of course, many more questions to be answered and studies made before the ILC CDR at the end of 2006. The MDI group's report at (<http://www.hep.ucl.ac.uk/~djm/MDIpanelreportJune05.doc>) gives a fuller overview of the issues to be addressed.