## Written questions asked from IDAG to LoI groups before Tsukuba meeting

**ILD**

1. The vertex detector is sensitive to machine backgrounds. Can you assess what "headroom" there is if backgrounds are higher than planned? For example, what is the flavor tagging behavior - purity vs. efficiency - in the presence of added background. In addition, the tagging is evaluated at the Z pole. What is the response at higher energies?

2. What is the impact of misalignments of the several hundred million independent channels on the tagging behavior? How long will an alignment take - both initially and after each push-pull cycle?

3. For the TPC what would be the impact of increased machine background? What is the tracking alignment plan and how long does it take? Once aligned how are field distortions and temperature/pressure variations monitored? Is the speed of monitoring sufficient to track machine transients?

4. What is the impact of a range of machine noise and misalignment of the TPC on the physics performance?

5. The ILD calorimeter has ~ 100 million channels. How will manufacturing uniformity be maintained? Is there sufficient industrial capacity to supply the silicon? How will the calibration be first made and then maintained? Why is there no "constant term" in the resolution due to cracks, supports, cables, and other non-uniformities in the medium or errors in calibration?

6. When will there be a test of power pulsing with B field? For example CDF have had difficulties with wire bonds. Is power pulsing required or is there an alternative?

**SiD**

a) The choice of beam pipe radius and vertex detector inner radius are driven by machine background (mainly incoherent pairs from the IP). Can you provide additional information on your assumptions on background rates, on safety margins and on impact on performance if the background would be higher?

b) The detector is expected to be read out separating each bunch crossing (mainly by means of the KPiX circuit). Is this assumption going to be valid also for the vertex detector?

c) How extensive a study has been made of the robustness of the tracking against failure of one or more detector planes? The vertex detector is glued, replacement of parts seems unlikely. Similarly how much impact does the loss of one or more planes make on PFA performance..

d) Can you provide more details concerning the choice of 4.5 interaction lengths for the depth of the HCal? How sensitive is it to assumptions on PFA algorithm? How much can be obtained from the Muon system used as a tail catcher for the hadronic showers, which is mentioned as an option?

e) Current PFA analysis provides rms90 = 4.0 GeV in M(Z->qq) from ZZ at 500 GeV, with most of the uncertainty due error in tracks/clusters matching. The Gaussian width of the Z(jj) appears significantly wider in the studies of benchmark channels. The LOI mentions that the performance of the algorithm is expected to be improved, can you provide some more details about it?

**Fourth**

1. We would like to see a more detailed description of the algorithm used, and details of the simulation, for the cluster counting tracking. Most generally, we would appreciate some enlightenment on why the He-based gas, with lower ionization and thus less 'collected information', should give better resolution than the traditional Ar-based mixtures. More specifically, we would like to understand the performance as a function of occupancy by multiple tracks; the effect of the Lorentz force (and possibly different B field operations) on the drifting electrons: the impact of the cluster-finding electronics on performance; and the degradation from diffusion of charge, or ion buildup.

2. What is your plan to develop the forward tracking design? What are the impacts of added silicon disks either within or outside the tracking chamber enclosure? How would forward toroidal magnets improve forward momentum resolution, and how would they be integrated?

3. IDAG would benefit from a clear summary of the expected calorimeter performance with only a fiber dual readout calorimeter, and with the combined BGO/fiber calorimeter (there are many resolution numbers that are sometimes hard to keep track of). Please give us some detail on the algorithms used for the combination of the BGO and fiber signals. Can you justify the separate BGO calorimeter with its added cost and integration complexity? We would also like to understand more clearly how the simulations and DREAM measurements (both fiber only and BGO/fiber) compare. For example, is the 64%/sqrtE stochastic term seen in DREAM (Fig. 16) fully explained by the lateral leakage? Are the differences in Figs. 46 and 47 between DREAM and simulation understood?

4. We would like some additional discussion of calorimeter calibrations.

What is your plan for test beam calibration versus in situ calibration? For the calibration in ILC, how many Z's do you need to obtain a 1% calibration? How do you obtain the pion calibration in situ, and what is the time required, compared to your estimated time over which the response may drift? Is a single calibration at some high energy (~40 GeV) sufficient to calibrate the response for low energy particles (<10 GeV) and for the differences among particle types?

5. Can you compare the benefit to physics, cost, and MDI complexity for a dual solenoid approach compared with one with iron return yokes. Is the dual solenoid an optimized choice? Is there demonstrable physics benefit from a second muon momentum measurement over outer muon identification with its momentum taken from the inner tracker?