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To: Files
From: Nobu Toge
Subject: Minutes of the CCB Hearing on BDS CCR Cost Implications

Date: Friday, 2006/08/25
Time: 13:00-14:30GMT
Present: Seryi, Barish, Angal-Kalinin, Kubo, Blair, Schulte, Toge, Garbincius, Shidara, Markiewicz, Funk, Mishra, Yamamoto, Schulte

1. Opening
   - Toge welcomed the participants, and noted that the purpose of this hearing is for CCB to understand the costing implications of the BDS CCR that was submitted on 2006/07/29. The emphasis is on seeing the composition of cost impacts and their perceived error bars, and not on reviewing the costing methodology or the full details of WBS.

2. Confidentiality Confirmation
   - Garbincius described the GDE confidentiality rules and noted that those who have not agreed to the rules now need to make an oath on this occasion.
   - GDE members who were newly confirmed: Kubo, Toge, Mishra, Blair, Schulte.

3. Presentation by Andrei Seryi
   - A "neutralized" version of Andrei's presentation file has been distributed separately (For CCB's internal archive, it is [CCB-590]).
   - Presentation was organized in the form of responses to six questions that had been sent by CCB earlier.
   - Q1: Overall Cost Impacts?
     1. 2/20 cost composition - common:IR20:IR2 = 0.324:0.275:0.401
     2. IR14 ~ IR20, and there will be ~2% additional reduction
     3. In conclusion, cost ratio of 14/14 relative to 2/20 is 0.843. The 15.7% BCD cost reduction substantially exceeds the Class-2 "threshold".
   - Q2: Impacts on CF/S?
     1. CF/S cost savings are dominated by the change of accelerator HW (reduced power requirement, shorter vacuum line, etc)
   - Q3: Composition of Cost Deltas?

	Relative Initial cost	Relative Reduction	Error(+)	Error(-)	
Vacuum	7.1%	1.4%	1.4%	-0.7%	
D&C	4.6%	1.0%	1.0%	-0.5%	
Mag	19.3%	4.6%	1.7%	-0.6%	
CF/S	58.4%	5.6%	0.1%	-2.5%	water
			2.0%	-0.1%	other
Instr	2.0%	….			
Control	2.3%	….			
Installation	6.0%	….			
Cryogen	0.3%	….			
Sum	100.0%	15.6%	6.2%	-4.4%	

1. Some cost updates since Vancouver: Magnets that were not accounted for at Vancouver have been added; refined rating of some PS; cost updates to large ext magnets taking into account complexity; costs of kickers, sweepers, septa and antisolenoids: corrected errors in crab cavity estimate → increase for both 20/2 and 14/14 and slight decrease of the cost reduction. Cost reduction with WBS 1.7 is 13.8%.

- Q4: Impacts on the operating budget?
- Q5: Composition of the impacts on the operating budget?
    1. Power consumption at 1TeV for IR2 and IR14 are 60.9MW and 11.3MW, respectively
- Q6: Specifications of linac angles in BDS BCD?
    1. Previous 20mrad relative linac angle was determined by the 2/20mrad IR crossing angle *and* the desire to allow higher energy operation at ILC in the future while using the 20mrad IR as the high energy IP. If adopt 14/14, it is natural to choose 14mrad as the relative linac angle.
    2. Two two IPs in this case will not be equivalent. There will be no big bend for the 1st IP, and there will be a pair of 14mrad bends for the 2nd IP. At 1TeV CMS the emittance at the 2nd IP will increase by 10% and its luminosity will be smaller than the first IP by 5%.
    3. Question remains if this is a text to appear in the BDS section of BCD.

4. Discussion / Q&A
    - Q: (Slide 9 of Andrei's presentation) Does this pie chart reflect the relative importance of each system to the BDS Cost or to the cost difference between 2/20 and 14/14? (Markiewicz)
    - A: the BDS cost. (Seryi)
    - Q: (Slide 19 of Andrei's presentation) What does "swing" of the 20/14 BDS refer to? (Markiewicz)
    - A: to the net transverse bend of the collimation+FF system. (Seryi)
    - C: 14mrad crossing angle of MLs should be stated in the Parameter + Layout section. Will contact the responsible parties for that. Need to update the layout diagram, too. (Toge)
    - C: Should handle the layout update expeditiously. (Barish)
    - Q: The inclusion of corrections/updates since Vancouver has reduced the relative size of the cost saving. Please explain. (Funk)
    - A: The largest changes increased the relative power requirements for the larger-angle IRs and thus reduced the advantage of going from 2 mr to 14 mr.
    - C: I would like to see that the BCD gets revised so that it reflects only the 14 mr crossing angle. The version of BCD submitted for this review has 20 mr/ 2 mr and 14 mr. The new document should refer to only the current BCD. (Mishra)
    - All other versions (20, 2, 0mrad) now defined as alternatives in the BCD. So, it seems it should not be a problem to mention them, to compare them and list the R&D issues associated with them. The TDR perhaps should only focus on 14mrad and mention other versions very briefly. (Seryi)
    - C: The WWS/MDI realizes that 2mrad scheme has been identified to pose a major technical challenge, more substantial than with larger crossing angles. The WWS/MDI also understood from the BDS AG leaders that it is significantly more expensive in terms of construction cost and power consumption at this stage of accelerator development. Hence, WWS/MDI does accept the 14mrad with the understanding that a small crossing angle be continued to be studied as part of an alternative scheme. (Yamamoto)
    - C (post-meeting remark): MDI minutes states, "The 2mrad crossing angle is clearly desirable than larger crossing angles for the slepton search, and R&Ds related to2mard should be encouraged". While there is a general preference towards a smaller crossing angle, attentions must be paid to the fact that "all other conditions" actually can never be

equal, and we should not sacrifice robust running conditions by adopting a small crossing angle scheme at this premature stage of technical development while major issues are already clearly recognized. I felt that was the majority opinion of MDI. (Markiewicz)

- C (post-meeting remark): I was referring to the agreement from WWS OS which considered that the minutes from the MDI minutes were not strongly strong enough in encouraging the R&Ds for 2mrad. (Yamamoto)
- Q: What physics channels other than the coannihilation region slepton measurement would benefit from lower crossing angles? (Garbincius)
- A: The slepton search is not the only one. (Yamamoto)
- C: (post-meeting remark): There are several SUSY-like events which give topologies similar to the coannihilation region slepton signals:
    1. Sleptons decaying into lepton and neutralino, the worst and most important case for the coannihilation scenario of the dark matter being the stau particle.
    2. There is another similar case where the stop quark is light and almost degenerate with the neutralino and decays into a quark, most likely a charm quark.
    3. It may also happen that the neutralino is almost generate in mass and with the chargino (and with the second neutralino) releasing very little energy in detector.

  Clearly these scenarios show how ILC can be a strong/indispensable backup for LHC. What we know for sure is that all these scenarios have a very threatening background; gamma-gamma physics which has an enormous cross section. In a more model independent language, one can say that we want ILC to be able to observe objects which, due to some degeneracy in mass, decay releasing a very small energy in the detector (Richard).

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