

Hi All:

I've made it through the revised (v17) HFT CD0 proposal. I put much less red ink on it than the previous version. I'm hoping that means we are close to converging.

Regarding my previous major concerns:

-- I like the tweak to the Executive Summary for the SVT. Below, I propose a simple modification when the SVT gets mentioned in Chapter 3. Between them, the SVT shouldn't cause any trouble.

-- The claim is that the pile-up question can't be resolved in a timely manner using the simulation scheme that I proposed in my previous note. Therefore, below I give some suggestions that hopefully can get us past this hurdle. [Much, much more will be needed for the CD1 and CD2 stages. The proposal already says that, so we can't be accused of ignoring the problem.]

-- Given the response to my question about the pile-up in the prototype, I suspect we would isolate HFT prototype measurements to the second half of AuAu fills. That's not death. In contrast, I doubt there is any chance for the prototype detector to handle the pile-up in pp collisions unless we reduce the luminosity dramatically. (Note: That can't happen for more than a very short time if we are to have any chance to measure W's.) Maybe the best thing here is to say nothing. After all, a "prototype" isn't expected to have the full functionality of the final product.

Here are my comments/suggestions. Note that I don't include anything about "trigger" mods here. The description of those mods in the reply sounded pretty good, so I assume that problem will be fixed when those mods actually propagate into the text. I'm also assuming that the changes that Hans Georg described to address Huan's remarks will appear in the next version.

-- Pg 41, below Fig 11: It appears that revised text was inserted here without editing the previous text to mesh. This has left some redundancies (e.g., 6K and 22K events appear twice). Needs a simple clean-up.

-- Pg 48, first para: "... to address measurements of weakly decaying hyperons. The thickness of the SVT is too large to provide event-by-event charm identification because of multiple scattering. Furthermore, the SVT electronics can not operate at speeds much higher than 100 Hz, making it incompatible with the DAQ1000 upgrade which is underway. Therefore, the Collaboration decided after extensive review to remove the SVT after Run 7."

OK, good text.

-- Pg 54, Fig 19: Indicate in the caption whether these estimates are for kaons or for beta=1 particles.

OK, done. The figure is for kaons.

-- Pg 60, Table 6: The 10 barn number is too high. It includes mutual photo-dissociation. I suggest you just delete the line. The collision rate number provides what you need. Then if someone complains about the relation between the luminosity and the rate, you can say you chose to be conservative.

Yes, you are correct. However, I like the number ... it allows the reader to instantly do the rate calculation and, as you say, it is conservative. If you really insist, I will remove the line from the table ... but for now I have set the cross-section equal to “~10 barns” and I have explained in the table caption that the hadronic cross-section is actually 7.0 barns.

-- Pg 65, Sect 3.5.1, para 2: If I read the line "... efficiencies were sufficient to carry out the physics program" as a referee, I would immediately grab my wallet. It sounds like something you might hear from a used-car salesman!

I agree!

The reply quoted estimates that pile-up would reduce the single-particle efficiencies by approximately 90% at layer 2 and 96-97% at layer 1. If I assume these losses are independent, and must be squared for a D^0 , it looks like the efficiency might be reduced by a factor of ~0.75 relative to Fig 32. My suggestion is to revise the text as follows (unless what I'm suggesting is lying!!!):

"... estimated using auxiliary calculations at a later date. Current estimates, which are consistent with previous complete simulations that used a different geometry, are that the D^0 reconstruction efficiency with full pile-up will be ~75% of that shown in Fig. 32. This will be verified with complete simulations for the current geometry in the near future."

The truth is that we have to do our homework and there is no way to beat around the bush. I agree that the paragraph is wishy washy and I have removed it. The text in the last paragraph of the previous section already says that the pile-up calculations are homework for the future ... and there is no need to repeat it.

On a technical note, hand calculations suggest that the effects of pile-up are, in fact, not large. This remains to be verified through the STAR reconstruction chain and is part of our homework.

-- Pg 68, below Fig 27: "To be conservative, we assume the total production cross section for charm is 560 ub, which corresponds to the lower limit ..."

Good idea, done.

-- Pg 72, Fig 31: Last time I suggested adding a lower panel with the lower curve on a linear scale. This is one of your money plots, and you want the peak to jump out at the referee. The reply was "Yes, good point", but it hasn't happened as of the current version.

Guilty. I forgot. I will ask a young expert to prepare a new figure.

-- Pg 73, Fig 32 caption: Following up on the suggestion above for pg 65, I suggest appending a sentence along the lines of: "The current best estimate is that the D^0 reconstruction efficiency with full pile-up will be ~75% of the values here."

I don't think the effects of pileup will be so large ... and it depends on the detector configuration. Hand calculations tell me that the effects of pileup are small if IST2 is not used. If IST2 is used, the efficiency of the tracking system actually decreases due to the large number of ambiguous hits across the long strips in IST2.

(See <http://rnc.lbl.gov/~jthomas/public/HFT/CarlQuestions.pdf> for more on this point.)

Please let me think about how to present this story ... however, for the purposes of the proposal, I think that honesty is the best policy: we homework to do and we shouldn't quote number until the homework has been done.

-- Pg 76, para above Fig 35: I think you mean to imply that the re-fit was NOT done for the tracks from the primary vertex. If so, I suggest you say that explicitly. The way it reads right now, it appears you are saying that the displaced vertex can be made even narrower, but the primary vertex is what it is. If I'm misunderstanding the point, then this needs some other, more appropriate edit to clarify what's going on.

Yes, you are correct. The paragraph is confusing and we have re-written it for both the Au-Au and the p-p figures. New figures are in preparation that also resolve the confusing story of "what does root(3) mean?"

The text currently reads:

Error! Reference source not found. shows the primary vertex resolution compared to the displaced vertex resolution for D^0 mesons and shows that the two peaks are separated by a distance that is comparable to their width. In our reconstruction, the D^0 vertex was reconstructed using a re-fit daughter track helix assuming perfect hit resolution in the PIXEL detector; the procedure can still be improved and would result in a narrower peak. Note that the primary vertex peak in the figure did not go through the re-fit algorithm; this is why the primary vertex is broader than the primary vertex in the figure."

This text may be edited again, once the new figures are added.

-- Pg 102, last para: (FYI: I didn't notice this one last time. Sorry!) The text says the noise is 2000 electrons. $\sqrt{2000} \sim 45$. So how does CDS get the noise down all the way to 14 electrons?

-- Pg 120-22, Figs 69-71 and related text: The mechanical support discussion states that the IST will be supported off the east end of STAR, with only flexible supports on the west end. Does that mean the cables can run to the east and have the electronics mounted there? It won't make any difference to a referee. But we would like minimal mass on the west, since that's where the EEMC is located. So it will make a big difference to STAR!

-- Pg 126, para 2, 2nd last line: Delete the word "probably". With 900K channels at up to a kHz, we WILL need zero-suppression.

-- Pg 128, Sect 5.11, 2nd line: We are no longer planning to have a "forward silicon tracker". If this is meant to refer to the forward GEM, edit accordingly. Otherwise, simply say "... all working parameters of the IST."

-- Pg 136, Sect 6.2.3, line 5: "STRIP" --> "IST"

-- Pg 138: Delete the last two sentences. They already appear on pg 137 at the beginning of this paragraph.

-- Pg 148, Table 22: It would still be appropriate to add a couple of level-2 milestones involving the Ultimate detector. For example, you should indicate when the Ultimate silicon sensors will be procured, and perhaps when the final read-out mods for the Ultimate system will be designed and/or completed.

That's it,

Carl