NCC and FVTX Review

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WARNING!

- This instant review result is entirely from my notes at the closeout!
- The committee may not agree with all of these conclusions, since they haven't seen them yet!

All the mistakes, misunderstandings, and omissions are entirely my fault.

Review Charge

The review should focus on physics case, feasibility of measurements, viability of detector technology as well as management plan, budget and schedule. Here's a list of specific questions – not necessarily complete – which you could use as guide line:

Is the physics case presented convincingly?

Are the planned measurements feasible?

Is the proposed detector and readout technology viable and suited for PHENIX?

Is there a convincing strategy for integration into PHENIX?

Does the collaboration have sufficient strength and expertise to carry out the project?

Are budget and schedule sound and realistic?

Is there a defendable management structure in place?

Axel Drees

Agenda

NCC

Rich - Overview/Physics 20 min
Edouard Design/performance issues 20 min
Andrey - gamma/pi0 detector 15 min
Don Lynch - Integration 15 min
Vasily - test beam results 15 min
Edouard - R and D/Budget/schedule 15 min
Rich – Funding/Collaboration/Mangement/ 15 min

FVTX

FVTX Intro. / Exec. Summary Mike Leitch 15 min. + 15
Physics Motivation and Performance Melynda Brooks 25 min. + 25
Detector Technology Gerd Kunde 20 min. + 20
Integration into PHENIX Walt Sondheim 10 min. + 10
Cost, Schedule and Management Plan Dave Lee 20 min. + 20

Reviewers

- John Haggerty (chair)
- Vince Cianciolo
- Tony Frawley
- Vlad Pantuev
- Veljko Radeka
- Vinny Polychronakos

Also offering advice:

- Ed O'Brien
- Cheng-Yi Chi

Charged by:

Axel Drees

Review Material

Transparencies

- https://www.phenix.bnl.gov/cdsagenda//fullAgenda.php?ida=a05462

Proposals

- https://www.phenix.bnl.gov/WWW/publish/seto/NCC/ncccdr.pdf
- https://www.phenix.bnl.gov/phenix/WWW/publish/leitch/fvtx/fvtx_3dec05.pdf

Timeline

- (Mostly) internal review of rather elaborate proposals
- The proposals are being prepared to submit to Tom Ludlam (BNL Physics Department) in January
- Ludlam will probably have an external review of the proposals in late January-early February
- BNL will submit successful proposals to DOE in time for their "March budget retreat"

General Remarks

- Both proposals reflect a lot of thought and effort, and both are clearly directed at very important physics problems that can be addressed at RHIC
- Both proposals made considerable progress recently, spurred on by creation of the proposals and the review
- Both proposals have gaps and holes both in the physics case and in the detector design
- Both proposals can be improved greatly with another month of work
- The forward upgrades are being pursued in isolation from each other, even though they need each other for success (i.e., you can't do forward direct photons without some detector like FVTX for charged particle identification)
- Triggering in the forward direction must be addressed, and it may be better to do that in a way that covers the NCC and FVTX together
- In both cases, it has not been clearly shown how the detectors would perform in central Au-Au events
- Both proposal need rate estimates based on RHIC and RHIC II luminosities

NCC Physics Case

- The physics case is built around:
  - Direct photons in the forward direction
  - Detection of photons from $\chi_c \rightarrow \psi\gamma$
- The physics case for χ_c was particularly compelling if it can be done
- The case for χ_c was not yet sufficiently convincing

NCC Detector

- The detector appears buildable and within the capabilities of the group (maybe with some more help)
- The energy resolution may not be as good as hoped for, resolution, $30\%/\sqrt{E}$
- Is even that resolution adequate? What is the effect on the physics if it's significantly worse?
- "The technology choices should do the job"
- The segmentation into pre-shower, post-shower, electromagnetic calorimeter, hadron calorimeter is confusing, and a case for the design segmentation must be made

NCC Budget and Management

- The budget numbers are a shambles and can't presently be shown outside of PHENIX

FVTX Physics

- The physics case clearly has to revolve around selecting b and c decays, but the case is not yet succinct enough
- Track matching from the MUTR back into the FVTX should be clearly demonstrated

FVTX Detector

- The readout of the FPIX or PHX chips must still be worked out, and some of the possibilities are very hard and involve a large mass of cables
- The sensors are specified as 200μ thick, which is probably not necessary

FVTX Budget and Management

- Plausible budget (although further study to see if it really supports all 8 layers)
- There is a glaring hole in the organization chart of no lead electronic engineer

Scorecard

- The FVTX had better presentation, and a much more plausible budget
- The NCC had some prototype devices and beam test results
- Both need more work
- Neither seems to have insuperable problems
- Both need help
  - Physics case and simulation
  - Detector development
  - Development of defensible cost and schedule