

HFT project Overview and Status May 11, 2010

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Introduction

- Organization
 - Today: talks by sub-system
 - Brief overview
 - Progress since pre CD-1 review
 - Reporting requirements
 - Plans towards finalizing design
 - Development plans
 - Even, if not in talks, identify issues that needs attention for the project as a whole to move towards full funding
 - Afternoon
 - Preparation for WBS , CD-2/3 review and TDR

Content this talk

- Status of CD-homework
- Status of CD-1 approval
- Homework status
- Preparations for CD-2/3

Due Date	Description of Documents	Action
12/31/09	1) Ladder system test plan; (including air cooling effects) 2) Annual breakdown of project cost, by institution, including WBS 1.6	Done on time (12/31) Done on time (12/31). Later request for adding names onto each institution submitted ~Early Feb.
1/31/10	3) Updated PEP, with procedures for monitoring redirected and contributed labor, plus strategy for dealing with cost overruns 12) Re-evaluation of CD-4 deliverables was added mid-january as req for PEP	Strategy for “monitoring ..” send to DOE by end Jan; Included in current pPEP. Only by April did we get feedback on PEP Many discussions on cd-4 parameters to finalize.
3/1/10	4) Evaluation of SSD vs. 2 nd IST layer 4a) not recommendation, but APD chip issue	4) Submitted on time 4a) Report written
Prior to scheduling CD-2 review	4) Simulations justifying detector performance requirements, spelling out physics impact of shortfall in meeting requirements, especially radiation layer thickness and low-pT coverage 5) Compare significance of HFT results to earlier anticipated PHENIX results with VTX, FVTX	Draft reviewed by S.Vigdor (4/12) with comments- back in HFT group. Submitted last week.
Prior to CD-2 review	7) Triggering strategies and PXL replacement strategies 8) Grounding and shielding plan (include radiation damage effect on regulators) 9) Added milestones to define critical path 10) Consistent methodology for project contingency, including risk of design changes resulting from engineering run 11) Identify scope contingency and possibility of installing descoped HFT for Run 14 12) Re-evaluation of CD-4 deliverables 13) Increase project management team subject matter expert support 14) Include el engineer on management team	- not part of recommendation - Work in progress as part of internal design review.

CD-1 status

- The documents need for the SESAP review is pPEP and AS.
- First docs were available at pre CD-1 review; No comments until next version with updated CD-4 parameters. Only last month real comments back from Helmut.
- On Friday Nand and I spend a little over an hour to discuss the pPEP with Helmut on a telecon (latest version send to Helmut last Monday). We are indeed converging, only a table of change control levels seems to be a real issue; Other outstanding items are very minor. By Monday morning he should get a next version, pending another answer to a question send to him. The pPEP and AS have had some initial feedback for OPA. I understood from Helmut that if he has no more issues with the next version he will send that/ and discuss with OPA (Ray Won, who Nand has been in contact with), and if they have no or only minor comments he will request scheduling of the ESAP review.
- Helmut seems to agree this should be done by this month (end).

Updated PEP and CD-4 parameters

- Major Updates; cd-4 parameters & workforce/
- In tc we agreed to relax parameters for pixel. We still strive for the thinner layers, There are clear implications if this cannot be achieved in terms of running time.
- Have had several iterations with Helmut Marsiske and tc to progress towards acceptable solution.
- Divide into multiple levels (following slides)

CD-4 parameters org.

TECHNICAL SCOPE; KEY PERFORMANCE PARAMETERS

The performance requirements listed below are selected so that if the detector meets those requirements, the detector will be able to achieve the physics requirements. Fulfillment of the performance requirements can be completely determined shortly after the installation of the HFT. The high-level key **parameters that the instrument must be capable** of are given below. The physics goals of the HFT instrument can be achieved when these parameters are met. **These parameters can be calculated from low-level key performance parameters.**

The lower-level performance requirements can be demonstrated (without beam) by building to design specifications, survey measurements, and bench tests. See Appendix A for further details and additional functional requirements.

Pointing resolution of HFT system (750 MeV/c kaons)	< 50 μm
Single-track efficiency for HFT system (1 GeV/c pions)	> 60%
Compatible with STAR DAQ-1000 system	
Software and procedures ready	Tested and functional software

Lower level parameters

- Low-level key performance parameters: experimentally demonstrated at Project Completion

1	Thickness of first PXL layer	$< 0.6\% X_0$
2	Internal alignment and stability PXL	$< 30 \mu\text{m}$
3	Internal alignment IST and SSD	$< 300 \mu\text{m}$
4	PXL integration time	$< 200 \mu\text{s}$
5	Detector hit efficiency PXL	$> 95\%$ sensor efficiency and noise from all sources $< 10^{-4}$
6	Detector hit efficiency IST	$> 96\%$ with 98% purity
7	Live channels for PXL and IST	$> 95\%$
8	PXL and IST Readout speed and dead time	$< 5\%$ additional dead time @ 500 Hz average trigger rate and simulated occupancy
9	SSD dead time	$< 9\%$ at 500 Hz
10	Software and procedures ready	Tested and functional software

Other supporting parameters

- These are in appendix. Kind of two few - should be expanded for TDR.

A	Active sensor length of PXL layer 1 & 2	≥ 20 cm
B	Active sensor length for IST	≥ 46 cm
C	Pseudo-rapidity coverage for SSD	$ \eta < 1.15$
D	PXL RDO data path integrity	BER $< 10^{-10}$

Post CD-1

- Once we get CD-1 more stringent reporting and control will go into place. Discussion for tomorrow- will put burden on sub-system managers.
- Even the R&D received so far will have to be reported and accounted for.
- Formally reporting is at WBS level 3, but for us this is (at least internally) marginal useful (e.g. 1.2.1 == PXL-electronics)

CPM

- Manage the cost and schedule of the HFT Project and provide monthly cost and status reports using progress reports received from the Level 2 managers.
- Submits quarterly status reports to the BHSO Federal Project Director and participates in monthly and quarterly teleconferences with NP

Subsystem Managers

- providing a monthly status on progress, schedule, and budget.

Reporting/control

- Redirected labor will be tracked by each institution on a monthly basis and will be appropriately included in the Total Project Cost (TPC).
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- Contributed labor will be tracked from reports by institutions which will reflect the overall fractional time spent by individuals on the HFT project. This information will be reported at the DOE NP annual review.
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- Progress on all tasks will be monitored by sub-system managers by having sufficiently frequent milestones at level 4, such that task completions are noted, and changes to the schedule float (+/-) can be evaluated as soon as possible.
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- Non-DOE contributed labor will be tracked by monitoring milestones set forth in the MOUs.

Pre next Review

- Significant work to be done for CD2/3 as you can see from previous slide. Particular complete design and resource loaded cost and schedule.
- We need before going to DOE to have internal design and cost review so this is in good shape.
- We will talk more about this later, I think the earliest we can have a review is September (Experience from CD-1 review, and needed internal reviews).

Schedule

- Need to setup realistic schedule for all these tasks.
- Revisit at afternoon discussion.

Observations on technical Progress

- The Integration design is moving well
- The integration discussions has shown that early projection do not always hold (Weight increase of IDS+detector support)
- Software has been focused on response, but need to develop calibration scheme (workshop this week, milestone for Q3FY10!)
- Beampipe – PHENIX has resolved how to deal with NEG coating. We will have to go same way.

Near term meetings

- IDS requirements and production readiness review
 - End of May (Is date settled?)
 - Important for WSC production and FGT production
 - (FGT will have BNL/DOE review for project on June 14 at BNL)
- PXL electronics design review (June). Internal organized by Leo.
- Software workshop this week

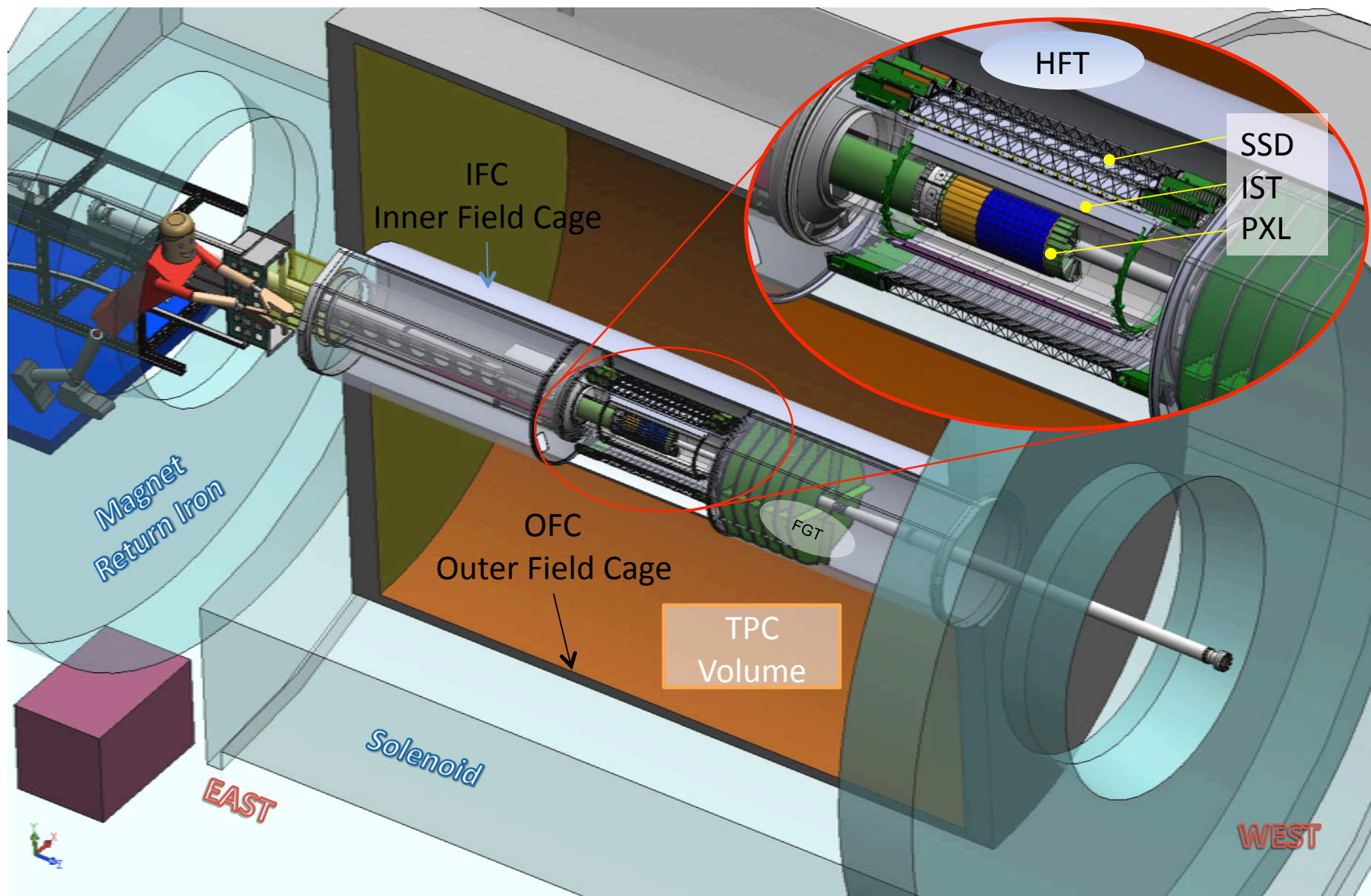
Request

- During today's reports I like to hear, even if not requested ahead of the meeting concern issues, particular for creating cost & schedule, final design, and development (manpower).
- This will be revisited at the end discussion (I already collected a number of points to bring up, but like to hear from each sub-system first so a comprehensive overview can be assembled.

Conclusion

- Plenty of work to be done to succeed

HFT Detector within STAR IFC



Naming Conventions

IDS

East Support Cylinder
Outer Support Cylinder
West Support Cylinder

MSC

Pixel Insertion Tube
Pixel Support Tube

Assembly via bolted interfaces

MSC installed into IDS after IDS assembled (detectors not shown)

IDS w/MSC installed into STAR

