**HFT**

**Heavy Flavor Tracker**

MONTHLY REPORT

December 1-31, 2010

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| Performing Organization | Brookhaven Science Associates |
| Location: | Brookhaven National Laboratory |
|  | Upton, New York 11973-5000 |
|  |  |
| Contract Period of Performance | FY2010-FY2014 |



**HFT MONTHLY PROGRESS REPORT**

**December 2010**

**I. Contractor Project Manager’s Assessment**

Technical Progress and Accomplishments

Issues and Concerns

**II Detailed STATUS by WBS**

**WBS 1.1 Project Management**

The monthly teleconference with DOE HQ was held on December 14 (?-check)

The HFT face-2-face meeting was held on December 8-9. The meeting was focused on the cost and schedule issues and progress, but did also present technical progress for all sub-systems. The talks are available on an internal STAR webpage

There has been several discussions with BNL PO management and DOE site office on schedule and follow-up on management issues. It seems that the documents needed for the pre CD2/3 review are also requested for the BNL read cost % schedule and technical review. This set the timetable for the cd2/3 process. It appears that a target date for mid-february for these documents is quite achievable.

Establishing documents to ensure that we have dealt with all recommendations for the pre-CD1 review , as well as the comments in the review report. Each sub-system is actively reviewing, updating and providing documentation for the items.

The update of the PEP to match the 413B proposed layout is underway. The next documents to be revisited are the Acquisition Strategy plan and the Risk Management Plan.

**WBS 1.2 PXL detector**

Mechanical

Detailed design for the rails in the PXL transport box has been completed.

The final element in this design is a read out system that accurately determines when the box rails are aligned with the support rails in the STAR experiment. The original concept for this system was getting too complicated and a new approach is being developed which will be more intuitive in its operation.

A significant amount of time and people effort has continued this month to explore ways that the Adept database system can be made usable for people not at the BNL site. Again most of this effort has been devoted to trying to overcome obstacles imposed by BNL cyber security. It is still not known if the Adept approach will be workable for west coast operation.

Sensors and Electronics

PXL electronics Monthly Report

During the month of December we made significant progress on PXL electronics and sensor tasks.

We held a sensor design review on December 6-7 at BNL. Most all preparatory material including extensive documentation and design process back up material is now available on the review website at <http://rnc.lbl.gov/hft/hardware/docs/sensor_review/>. The review went very well. While the review report is not yet available, there were no findings that will delay the submission of the prototype for the final sensor. The final preparation is underway and on schedule for a submission of this design to the AMS foundry in mid-January.

The Phase-1 sensor test boards at the University of Texas, Austin are under test and preparation for configuring into a telescope configuration. We have moved the beam testing date from a tentative test beam time at Fermilab of February 2-16, 2011 to a tentative testing time of April 2011 where we plan on joining the STAR FGT for a beam run in the test beam facility at DESY. This delay is to allow us to coordinate our work with the FGT and to concentrate of a higher priority Latch-up test planned for the HI running period at STAR. Work is progressing on the readout firmware and software in support of this telescope test to measure the sensor efficiency to MIPs as a function of various bias settings.

We are designing a testing board that will allow us to test the Mimosa-26 sensor on both regular and high-resistivity substrate for latch-up in the STAR environment. We plan to fabricate, test and install this test setup just outside of the endcap magnet iron in the area of the highest measured radiation dose. This is expected to provide a tie between the measurements done at latch-up testing facilities and what can be expected in the STAR environment.

Cost & schedule

The cost and schedule documentation have been significantly updated in preparation for the next set of reviews. Other documentation including supporting documentation for the design and Basis of Estimate work is ongoing as is organization of the document into a review package.

**WBS 1.3 IST detector**

Mechanical

The kapton flex hybrid design for the ladder prototyping is in its last stages before production. The design is being adapted to the design rules of the hybrid manufacturer. The main change is to facilitate 4/4 design rules by changing the copper thickness from 1 Oz to 1/2 Oz. An issue with the large size of the solder masks also needs to be resolved. The design is expected to be ready by January 14, 2011.

Sensors and electronics

It was decided that it would be financially more beneficial to have the Silicon sensor prototypes directly ordered by BNL rather than by the sub-contracting MIT. On January 26 this order will be reviewed at BNL and it is expected that the order will go out by February 1.

In the mean time a official request for quotation will go out to Hamamatsu and the purchase order is being prepared by BNL. If all goes according to the current schedule the 8 Silicon sensor prototypes are expected by the endof July, 2011.

The IST readout system consists of an Wiener MPod crates, APV Readout Modules (ARM's) and APV Readout Controllers (ARC's). The first ARC's, which accept STAR triggers and provide the interface between DAQ and the ARM's, are still being tested at Argonne National Laboratory (ANL).

The ARM design was almost finished in December; only the +/-5V supply needs to be added and the pinout and connections of the main FPGA need to be defined.

The +/-5V supply can be a slightly modified copy of an existing design. It is expected that these designs can go into production soon enough in January 2011 to get the boards back for testing by the end of January or the begin of February.

**WBS 1.4 SSD detector**

Ladder Board

The prototype ladder card printed circuit board is scheduled to be shipped from the vendor on January 5. This is a slight delay from last month’s report due to the holiday season.

The USB debug annex to the ladder card has been submitted to a vendor for fabrication. It provides the interface to USB and to a JTAG header; this card will be used to configure and to test the ladder card on the bench. It should be ready when the components of the ladder board are installed.

RDO Board

Work continues on the last remaining functional block of the RDO slave FPGA firmware: to implement a firmware replacement for the integrated circuit (TI 74ACT8990) that was used in the previous implementation to provide a link between Slow Controls software and the JTAG chain on the ladder. The implementation is largely finished. Remaining is the more complicated verification that the firmware functions as required.

No work has taken place on the TRG/DAQ and VME FPGA firmware this month because manpower was used to work on the Ladder Board USB card.

Project Management

Significant work was done on the cost and schedule worksheet. Cost estimates and schedules were refined.

**WBS 1.5 Integration**

Global Structures

Materials for the fabrication of the carbon fiber laminates of the IDS ( WSC, ESC, and OSC) were ordered. The mandrels for the ESC and the OSC were ordered.

Cost and Schedule

Efforts at BNL focused on defining the cost and schedule for supporting the assembly and installation of the HFT at STAR. Cost estimates for modifications of the “clean room” were produced as well as for the assembly where multiple detectors are assembled on the IDS. Initial schedule for installation of the prototype IDS with the FGT next summer were developed. Efforts for installation of electronics in racks on the south platform were made.

Safety

The safety requirements for separating the shroud HV bias were discussed with the FGT group. The cable needs to be separated from other lower voltage cables in the tray. The cables for the PXL were reviewed and one cable was found not to be appropriate for tray. The PXL electronics manager selected another cable. Current limiting for the PXL lower voltage power cables was discussed. Either circuit breakers or fuses are allowed for the 6V DC cables. A C-AD supplemental guide on cables was distributed to the subsystem managers. The PXL connectivity document will be submitted to C-AD engineers for an initial review.

**WBS 1.6 Software**

1) A new simulation production (~10K events) was completed. Its focus was the enhancement of statistics for the Ds particles for pt higher than 4 GeV/c and also the introduction of D\*. This analysis of this latter one, and the anticipated HFT reconstruction capabilities, will complete the entire charm sector (with the only exception of prompt J/Psi reconstruction). First analysis results are expected by the end of January.

2) A first version of the Offline Software WBS schedule has been completed.

3) Some progress in the D+ reconstruction and analysis was reported.

**Financial Status**

Project funds have been received for initial efforts in the balance of FY10 through March of FY11 at LBNL. The contract will have to be extended to cover the efforts from March and on in FY11. The effort of identifying the task based on the updated WBS, and writing of the contract will be done during late January to ensure no delays in funding will be incurred. A draft SOW for the efforts at MIT is being prepared and has been circulated between MIT and BNL The draft was completed, and is being reviewed by BNL procurement to ensure that this can be dealt with as a multi-year contract with an initial installment of approximately 200k. It is important that this is treated as one over procurement to ensure BNL contract overhead is only applied on the first 600k$.

The distributions of cost at completion on other WBS items are to be determined at base lining.

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| --- | --- | --- | --- | --- | --- | --- |
| **WBS** | **Title** | **Monthly Actual** | **FY to Date** | **Project to Date**  **k$** | **Commitments**  **K$** | **Cost at Completion**  **K$** |
| 1.1 | Management | 4.06 | 13.97 | 18.05 | 0 |  |
| 1.2 | PXL | 14.65 | 63.84 | 71.21 | 31.80 |  |
| 1.3 | IST | 0 | 0 | 0 | 0 |  |
| 1.4 | SSD | 0 | 0 | 0 | 0 |  |
| 1.5 | Integration | 16.28 | 24.51 | 31.78 | 25.16 |  |
| 1.6 | Software | 0 | 0 | 0 | 0 |  |
|  | R&D | 0.69 | 12.07 | 271.88 | (14.39) | 280 |
|  | Contingency |  |  |  |  |  |
|  | Total | 35.7 | 114.4 | 392.92 | 42.57 |  |

In addition to these cost and commitments requisitions for about 85 k$ for PXL and integration Carbon-fiber related procurements has been placed just before the December holidays.

**Acronyms**

IST Inner Silicon Tracker

IDS Inner Detector Support

OFC Outer Field Cage

FPGA Field Programmable Arrays

WSC West Support Cylinder

ESC East Support Cylinder

OSC Outer Support Cylinder

FGT Forward GEM Tracker

MSC Middle Support Cylinder