Quarterly report for BRAHMS Construction

First Quarter FY99 BRAHMS Activities

Summary

Readiness for the June commissioning run is still on track, and BRAHMS will be in position to detect collisions. The infra structure for the MRS and Front Forward platforms, and magnets is essentially done. The construction and assembly of the detectors is coming well along. Significant progress has been made on the readout systems for the TPCs and the DAQ. We have concern for access to engineering of some detector stands, and for the tight installation schedule in April and June.

Infrastructure and Installation (WBS 2.7.1)
The front forward platform was installed and approved for weight loading. Magnet D2 was installed on the platform.

Installation of experimental clean AC power in the IR beagn in Dec. The distribution of AC power for the mid-rapidity and front forward platforms is expected to be completed in Jan.

The FEH and counting house had ORR's conducted in early Dec. The buildings are now ready for the experiment.

The contractors made substantial progress on the installation of the water system. The system is expected to be operational in March. This is about three months behind schedule but appears to have no impact on the experiment.

The design of the back forward platform is progressing well. Most parts and materials have been ordered. It is expected that the tracks for the platform will be installed before end of March. The platform should be ready for installation in April.

Magnets (WBS 2.7.2)

The magnet D1 has been assembled and setup for mapping in the AGS area. The mapping of 1/2 of the gap volume has been completed. The other half will be completed in February. The results will be corrected for temperature drifts and rotations. Following this D1 is ready for installation on the front forward platform.

The assembly of the magnet D3 is almost completed at AGS and mapping can begin after the completion of the D1 mapping.

Detectors WBS (2.7.3)

The manufacturing of the **C1** Cherenkov detector at the shops is done, the inside of the box has been painted mat black. Small mirrors were mounted to define the 32 cells of the detector. Big mirrors are also in place. Entrance and exit walls are ready, they are made with 0.002 inches aluminum foils. Following the mounting of the PMTs the detector will be leak tested. The design of the filling vessels is completed, we are getting estimate from the shops and will submit it after design checker is done.

Tests of the **Drift Chamber** prototype have been continued in our laboratory with radioactive sources and cosmic rays. All tests have been performed using 2735DC amplifier-discriminator card from LeCroy, which is no longer available, and construction of new equivalent card is in progress. The prototype of new amplifier-discriminator card will be ready by the end of February. In beam test of the Drift Chamber prototype with new amplified-discriminator card is planed in March at the electron synchrotron of the University of Bonn. Our results confirm correctness of our design.
Design of the T4 and T5 detectors is completed and required parts are ordered. Assembly of these detectors will start in middle of February.

The base mount and first 20 PMTs for the **RICH** detector have arrived.

The mounting framework for the **Multiplicity Array** has been completed and will be shipped to Brookhaven in early February. The scintillator tiles for the array have been fabricated at BNL and several of these tiles have been tested and found to perform as expected. Delivery of the phototubes needed for the tiles is expected by late January. The Si strip detectors have been ordered and a total of eight detectors (including two obtained earlier for the development program) have been delivered. A total of 26 Si strip detectors should be available by late March.
The development of the front-end electronics package (preamplifier-shaper) for the strip detectors is well advanced. A single channel of the electronics has been tested and found to perform well. A prototype of the eight-channel board needed for Brahms is under construction and should be completed by late January. This prototype will allow tests of channel cross talk and will also test the scheme being developed to apply a pulser signal to the electronics.
 The stand needed to support the multiplicity array off of the Brahms central pivot is being designed. As soon as this stand is completed it will be possible to locate several of the scintillator tiles at their final positions for an early implementation of the multiplicity array.

Monte Carlo for the **ZDC** now contains timing information but is not yet implemented into GBRAHMS. Seven fiber bundles have been produced and tested with cosmic rays. The design of the box that encloses the fibers has been finalized and the parts should be completed by January 18th. A set of drawings (in English) has been sent to Sebastian White. The side plates that hold the weight of the tungsten have been cut and will chemically blackened this week. This will protect them from rust and help absorb any stray light that enters the box. Alexei Denisov is now at BNL and a new student Andrei Makeev from Protvino has joined the Texas A&M group..

DAQ (WBS 2.7.4)

The design of the DAQ Online network has been completed and we have begun purchasing the necessary hardware. Discussions with RCF personnel concerning the DAQ/RCF interface are underway. A decision has been made to write the raw data directly to disks in the counting house using software RAID, before they are transferred to RCF.

Testing of the 6U prototype TPC receiver board for BRAHMS has now been successfully completed and the layout of the final 9U production version is nearing completion. Meanwhile, the prototype board is being used in collaboration with F.Bieser to find and fix bugs in the STAR FEE readout Board.

The readout code for the CAMAC and FASTBUS crates has been completely rewritten and successfully tested. A prototype DAQ event builder computer running Linux, a gigabit-Ethernet switch, two FASTBUS crates, one CAMAC crate, and a simulated TPC readout. Development has started on the software for sinking raw data into HPSS and we plan to perform a number of HOSS tests as part of the Mock Data Challenge II. Work on integrating an Objectivity database into the online system had begun.

Off-line Software (WBS 2.7.4)

The BRAHMS Software group successfully completed the first Mock Data Challenge (MDC-I) in the RCF at the beginning of the past quarter. Many subtle bugs in the code were identified and rectified. In the end, the code ran without crashing all events that had been simulated for MDC-I.

After the completion of MDC-I, modifications were made to the software based on what had been learned in MDC-I as well as what had been planned for the next refinements of the code. These modifications included:
1. Generating some general track matching classes.
2. Generating some general track matching routines.
3. A volume database manager class to simplify volume management

In addition, a first Event display was written and implemented. There was also a software meeting in Copenhagen in mid-November among the European representatives to plan software activities in Europe. There was also a follow-up meeting in Bergen in mid-December to plan actual concrete coding tasks.

GBRAHMS was modified after the completion of MDC-I to contain and include the latest information on the various BRAHMS detector subsystems. The description of T1, T2 and TPC2 has been finalized. The Bergen group has incorporated final geometry for H1 and H2 including supporting frame and PMT's. A prototype type TOFW build by multiple identical panels has been added as option.
The geant output generated by BRAT has been modified to accommodate internal changes. The output has been very much reduced by only writing sub-events with valid

hits. The header also has information on the vertex position, and the impact parameter. The Brat BrGeantInput input class as well as the utility program dumpcdat is changed accordingly.

Management (WBS 2.7.5)

The expenditures for the first quarter of FY99 distributed per month and WBS category is given in the table below. Actual costs per month are given. The introduction of the new requisition system at BNL has caused delays in several procurements, and even complete loss of POs later to be re-issued due to lack of feedback to the requisitioner. The system is presently not well suited to track expenditures in detail e.g. like the legacy account payable, open commitments.

Readiness for the June commissioning run is still on track. Infrastructure is essentially complete (funding wise). Detectors have much planned spending left. All systems have in essence started spending substantial amounts, and it is still on target for the June commissioning

WBS			description	Actual cost oct	Actual cost nov	dec	total Actual Cost
			Brahms Cost Requisitions and Commitments to date			**12/31/98**	
	1.1		Infra	43,801	33,132	126,854	
	1.2		Installation	9,035	9,718	0	
2.7.1			**Infrastructure&Installation**	**52,836**	**42,850**	**126,854**	**1**
	2.1		Magnets	2,832	3,425	3,726	
	2.2		PS	0	0	4,167	
2.7.2			**Magnets&Power supplies**	**2,832**	**3,425**	**7,893**	
	3.1		FS TPC	**0**	**0**	**0**	
	3.2		H1,H2	**0**	**0**	**0**	
	3.3		C1	**4,407**	**8,165**	**6,683**	
	3.4		RICH	**0**	**570**	**0**	
	3.5		DC	**0**	**0**	**75,000**	
	3.6		MRS TPC	**272**	**0**	**0**	
	3.7		TOFW	**17,903**	**38**	**0**	
	3.9		Beam	**15,380**	**244**	**0**	
	3.10.0		MULT	**0**	**2,430**	**3,958**	
2.7.3			**Detectors**	**37,963**	**11,447**	**85,641**	
	4.1		DAQ	11,703	25,238	5,987	
	4.2		triggering	0	0	0	
	4.3		Offline Computing	0	0	0	
2.7.4			**DAQ, Triggering&Offline**	**11,703**	**25,238**	**5,987**	
0.0	5.1		**Management**	**0**	**555**	**0**	
Totals			**BRAHMS**	**105,334**	**83,516**	**226,374**	**2**