STAR-SVT Project
Quarterly Report, 1/00-4/00

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SVT Project Summary

The project highlight of the second quarter of FY00 was the successful assembly of the first eight detector carriers for the SVT. These assemblies signal the transition into a production-like construction effort that can be monitored on the basis of a monthly throughput of finished parts.

A new assembly schedule has been developed based on this approach. The main assemblies to be monitored are the detector carriers and electronics carriers. Based on continued hybrid bonding problems the assembly plan has been changed to allow assembly of detector carriers independent of assembly of the related electronics carriers. Also, the SVT group has decided to assembly the full detector in two stages, which corresponds to assembly in two independently mountable half-shells.

For the first year of running (May-July 00) we plan to install a second RDO box to read-out the single SVT ladder that was installed in the last quarter of 99. Presently four out of the seven mounted wafers are being read-out to the West Side of STAR. By mounting a second box on the East Side the remaining three wafers can be read out as well. It is planned to install this second box during the anticipated 'PHOBOS shutdown' in May.

WBS 4.1.1. Mechanical Structures
Personnel:
BNL: Rolf Beuttenmueller, Bill Leonhardt, Bob Soja
Sao Paulo: Jun Takahashi
WSU: Rene Bellwied

The production of electronics carriers (Carbon-Fiber parts) at BNL proceeds on schedule.

The Beryllium end-ring order has been placed and the parts are anticipated by the end of June. An additional set of end-rings has been ordered to allow for the installation of one SVT half-shell into STAR in September.

Outstanding mechanical procurements are: the struts connecting the two end-rings, the stand-offs connecting the ladders to the end-rings, the brackets connecting the detector to the water manifold, and the water manifolds themselves. All pieces haven been designed and are awaiting procurement. None of these parts are on the critical path.

All assembly fixtures, transport units, and storage units for parts of the SVT during assembly have been fabricated and delivered to BNL.

WBS 4.1.2. Wafer Production

BNL: W. Chen, D. Elliott, V. Eremin, I. Ilyashenko, Z. Li, L.J. Zhao
WSU: S. Pandey
Sao Paulo: J. Takahashi

The wafer production at SINTEF has been completed and all wafers delivered to BNL have been tested. The final count is slightly above the required 250 wafers (216 wafers for the SVT, 34 spares). All wafers have been one by one allocated to specific ladders. Ladder components were chosen in a way to match the test characteristics. We are presently assigning specific hybrids to specific ladders as well. This process is expected to be completed by May.

WBS 4.1.3. Cooling System

Personnel:
BNL: Bill Leonhardt, Bob Soja

The main commercial components for the SVT water system are expected to be delivered in May 00 for installation during the summer shutdown of 00.

The air conditioning system for SVT/TPC is in place and operational for year-1 running.

WBS 4.1.4. Miscellaneous Systems

Personnel:
OSU: Helen Caines, Tom Humanic, Evan Sugarbaker, Robert Willson
BNL: Bill Leonhardt

The SVT slow controls system is in place for year-1 running. It allows to not only to monitor the main detector features, like HV, LV, air, water, and detector temperature, leakage current etc., but also to read out actual data through the slow controls link.

The air conditioning monitors are included in the global interlock system.

WBS 4.1.5. Assembly and Testing

Personnel:
BNL Physics: P. Kuczewski, B. Leonhardt, D. Lynn, B. Soja
BNL Instrumentation: R. Beuttenmueller, D. Pinelli
LBL: B. Minor
WSU: R. Bellwied, S. Pandey
OSU: R. Willson

Sao Paulo: J.Takahashi
UT Austin: J. Hoffmann, G. Ott, J. Schambach

Based on information obtained in the first quarter of FY00 we had to further modify the assembly plan as listed in the last quarterly report. The continuous hybrid bonding problems were largely solved, but the actual hybrid throughput in BNL Instrumentation is at best six hybrids/day. The hybrid production facility (EMTRON) will match this throughput with their hybrid delivery schedule. Based on long-term projections of the complete assembly process we have decided to install the SVT in two detector halves. This allows to decouple the detector carrier assembly from the electronics carrier assembly in an efficient way. All components for the detector carrier assembly (detector carriers, wafers, HV boards) are in house and thus we have decided to move ahead with detector carrier assembly. The present throughput of this assembly is about 3 carriers/week. After the first 18 carriers have been assembled we will switch the assembly line to the electronics carriers. At this point (early May) sufficient hybrids will be bonded to commence electronics carriers assembly. We anticipate to complete 36 electronics carriers by early July and have the full ladder assemblies by mid-July. The projected completion date for the first half-shell including testing is mid-August.

If the hybrid bonding keeps up the present production throughput we will be able to complete and install the second half-shell by christmas.

The problems we reported in the last quarterly report regarding the clocking and triggering of the SVT year-1 ladder were resolved in January. The year-1 ladder is ready for data taking.

WBS 4.1.6. SVT Electronics
Personnel:
BNL Physics: David Lynn, Phil Kuczewski
BNL Instrumentation: Rolf Beuttenmueller, Don Pinelli
LBL: Bob Minor
OSU: Robert Willson
Sao Paulo: Jun Takahashi
UT Austin: Jerry Hoffmann, Granville Ott, Jo Schambach

As stated in the last quarterly report all Preamplifier/Shaper-IC's (PASA) and all Switched Capacitor Arrays (SCA) are produced. As of April 1st, 2000 around 40% of the hybrids is completed, but only about 15% of the hybrids have been successfully bonded. The hybrid bonding remains the critical item for the project. Slight changes to layout have been implemented in the last few weeks and first tests seem to indicate that a significant improvement in the bonding throughput can be anticipated in the coming months. One additional effect of the continuous bonding attempts is that the number of PASA spares is decreasing to a level where the bonding tests require continuous monitoring.

All final modifications to the readout electronics components (the AMB (Analog Multiplexing Board), the PTB (Power-Timing Board) and the FOB (Fiber-Optic Board)) are in production. A fully instrumented second RDO box for the year-1 ladder is scheduled to arrive at BNL on May 1st. The remaining (24), fully instrumented and tested boxes will arrive at BNL in June/July.

As of April 1st around 40% of the SVT cables have been installed. The final cable order will be completed by July 2000 and installed during the summer shutdown.

WBS 4.1.7. SVT DAQ
Personnel:
UT Austin: Jerry Hoffmann, Granville Ott, Jo Schambach
BNL: Mike Levine, Tonko Ljubicic

We continue to order SVT-DAQ components through Mike Levine and his group. All SVT receiver boards are close to completion and will be installed during the summer shutdown.

WBS 4.1.8. SVT Computing
Personnel:
OSU: Selemon Bekele, Helen Caines, Robert Willson
WSU: Rene Bellwied, Claude Pruneau
Sao Paulo: Patricia Fachini, Marcelo Munhoz, Jun Takahashi
UT Austin: Jo Schambach

The analysis of cosmics data taken in December has been successfully completed. Data sets taken with the TPC cosmics trigger have been analyzed and compared to data taken with a rudimentary level-3 trigger developed to enhance the probability of a coincidence between a cosmic hitting the TPC and the SVT ladder. A track extrapolation program was developed and successfully applied to connect a TPC track with a spacepoint on the SVT ladder. The SVT cluster finder was used to determine the hit position on the SVT. All programs worked well.

SVT Online monitoring software has been implemented in the STAR online software framework.

SVT slow controls software is ready for year-1 data taking.

WBS 4.1.9. SVT Installation
Personnel:
BNL: Bill Leonhardt, Bob Soja
OSU: Robert Willson
WSU: Rene Bellwied, Sanjeev Pandey
OSU: Robert Willson
Sao Paulo: Jun Takahashi

The remaining air handling hardware has been installed in February 2000.

The design for the SVT/SSD/FTPC installation platform has been completed and the platform is in fabrication. We expect the platform to be available for a possible FTPC installation by the end of May.

SVT status
Beryllium Detector Carrier production: completed (Sep.99)
Front-End Electronics production: completed (Dec.99)
Air Cooling system: completed (Dec.99)
Silicon Wafer production: completed (Mar.00)
Electronics Hybrid production : 30
Electronics Carrier production: 30
Readout Electronics production: 25
Water Cooling System: 20
Ladder assembly (first halfshell): 15
SVT installation (first halfshell): completed by 9/1/00
Ladder assembly (second halfshell): completed by 11/15/00
SVT installation (second halfshell): completed by 12/15/00

SVT milestones and critical path
All wafers, processed and cut 5/15/00
18 detector carriers assembled 6/1/00
Hybrid processing completed 8/1/00
Readout Electronics delivered 8/1/00
18 ladders assembled 8/1/00
first SVT halfshell completed 8/15/00
first SVT halfshell installed 9/1/00
Readout Electronics installed 9/15/00
Hybrid wire bonding completed 10/1/00
second SVT halfshell completed 12/1/00
second SVT halfshell installed 12/20/00