

SBS Newsletter #2

April 26th, 2010

Letter from the Editor

The newsletter will be a forum for progress reports updating the collaboration on our response to the Technical Review's [report](#). At the [March 2010 SBS meeting](#), response to the TR was the main topic of the discussion. A [summary](#) of these discussions has been written and people have agreed to lead groups to address and respond to specific questions in the TR's report. By the middle of July 2010, each group will contribute a report that will be a part of the response to the TR. A [wiki](#) has been setup for the SBS experiments. Right now it is barebones, but please use it.

Upcoming Conferences:

- [Exclusive Reactions at High Momentum Transfers IV](#), May 18-21, 2010, Newport News, VA, US . Early registration deadline April 15th.
- [12th International Conference on Meson-Nucleon Physics and the Structure of the Nucleon \(MENU2010\)](#), May 31-June 4, 2010, Williamsburg, VA, US. Deadline Mar 5th
- [International Nuclear Physics Conference 2010 \(INPC2010\)](#), Vancouver, Canada 7/4/10- 7/9/10. Abstract deadline March 15.
- [Gordon Conference on Photonuclear Reactions](#), August 1-6, 2010, Tilton, NH, US .

Table of Contents

1. Update of GEMs. (pg 2)
2. Update on the SBS magnet. (pg 2)
3. Update on BigCal (pg 2)
4. Update on DAQ and simulations (pg 3)

Update on GEM (E. Cisbani)

1. GEM foils: CERN expects to deliver the foils for the first 40x50 cm² module at the end of April .
2. electronics: the VME controller/ADC prototype has arrived (see Fig. 1) and our collaborators in Genova are testing it. Initial visual inspection found a few minor hardware bugs that have been fixed. Presently testing the power consumption on isolated sectors of the VME module.

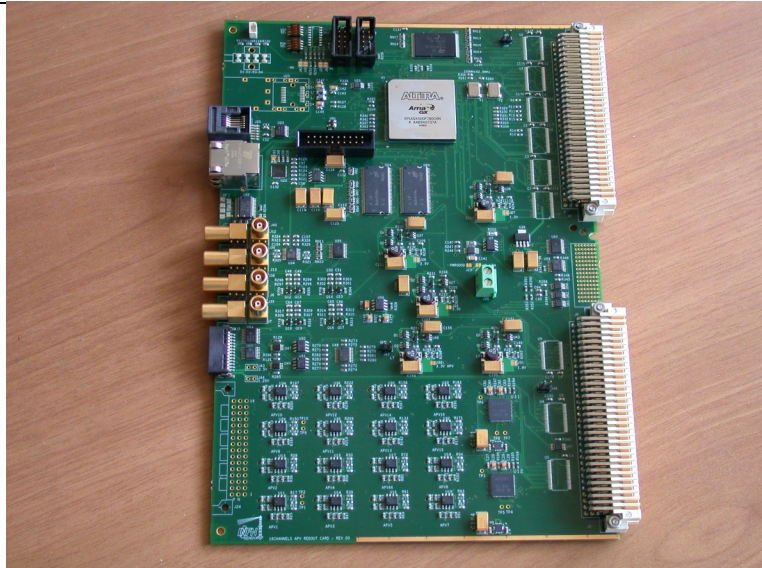


Fig. 1: The GEM VME controller/ADC prototype.

Update on SBS magnet (J. LeRose)

We have made contact with the engineer at BNL who will be our main contact in the property exchange. He says that we should probably plan on visiting BNL in the late summer, given that we won't be able to move anything till the fall anyway. The magnets are easy. Re power supplies, they have several, but they are old, refurbished in the 80's. We will need to interface them with our controls. He recommends we bring a magnet power supply engineer when we visit. The magnets will be disassembled into 18 ton pieces, 5-6 trucks per magnet. He estimates 100m-h per magnet to ship = \$10k. He also says the equipment is not going anywhere so we don't need to hurry. He also promised to tell us if there's any other interest. Here at JLab, Robin Wines has been assigned the task of doing the TOSCA modeling for the SBS magnet. It should be the middle of May before we see the first results.

Update on BigCal (M. Jones)

In response to TR recommendation section 4.2, we are planning to do a test of UV curing of the blocks. Two options are being considered. One would be to use the UV lamp that were used to cure the lead glass after the Hall A RCS experiment. Another would be to use a similar setup to the one used to cure the glass during Hall C Gep3 experiment. Frank Wesselmann has agreed to help setup a test space this summer. Work is also being done to setup the GEANT MC for studying the position and energy resolution with a 20cm Aluminum absorber in front of Big-Cal.

Updates on SBS activities for DAQ and Simulations (O. Hansen)

30 April 2010

TR Recommendation 3.2 (3-sample method & DAQ rate):

As was suggested by the Technical Review Committee, the 3-sample readout method will be used for all APV25. In this scheme, 3 adjacent samples of 25~ns integration time are read from the APV25 analog pipeline and digitized for each hit. This allows us to do a rough fit of the signal peak to obtain improved time and amplitude resolution, and to reject background from data in the 200~ns tail of earlier hits. This improvement comes at the cost of increased data rates. Assuming 4 bytes/channel (7 bits address, 3x8 bits data) instead of 2 bytes/channel, 100k tracker channels, and an average occupancy of 15%, the event size becomes 60 kB. At the design trigger rate of 1 kHz, the data rate becomes 60 MB/s from the trackers. This is still within the 100 MB/s specification. Even with a twice higher trigger rate of 2 kHz, the resulting tracker data rate of 120 MB/s will be comfortably within the CODA3 and JLab 12 GeV capabilities. To allow a safety margin, we increase our data rate design limit to 200 MB/s.

TR Recommendation 5 (Simulations):

Efforts are actively underway at INFN and JLab to implement a full track simulation and reconstruction chain. INFN has designed a GEANT4 simulation of the particle propagation in the GEM front trackers. Physics track data from L. Pentchev's earlier simulations are used as input to this simulation. At present under development is the digitization of the GEANT4 output and conversion of the digitized data to ROOT file format. In parallel to the efforts at INFN, the JLab group has been working on modifying the existing BigBite track reconstruction software for the SBS GEM systems. The BigBite software is based on the TreeSearch recursive template matching algorithm. At this point, the code modifications are about 50% complete. Still missing are the interface and decoder for the simulation file format, the analysis algorithm for the 3 samples per hit from the APV25, and the matching of track projections via amplitude correlations in each GEM readout plane.

The simulations group has set the following milestones:

- June 1: - Fully digitized test data from the simulation available, including Monte Carlo truth information.
 - Successful tracking of clean test data
- July 1: - Tracking algorithms debugged and tuned;
 - Production Monte Carlo data for various detector configurations and background conditions available
- July 15: - Analysis of production data complete
- Aug 1: - Write-up of simulation and tracking work complete