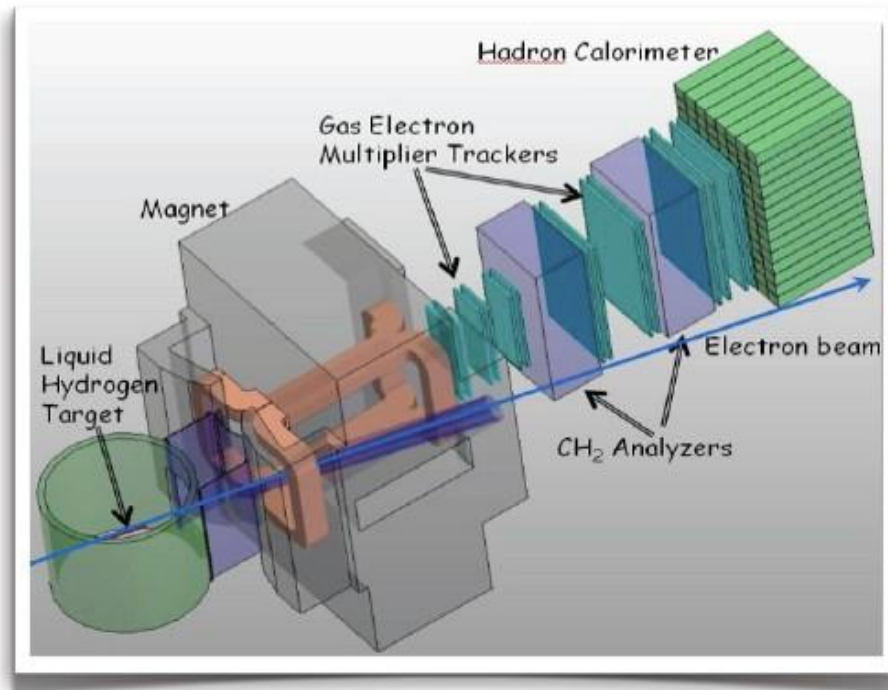


# ***Super-BigBite-Spectrometer (SBS)***

## **Monthly Progress Report**

**March 15, 2013**



## Introduction:

The SBS Program consists of three separate, but interrelated Projects.

- The first Project, **SBS Basic (WBS 1)**, involves the acquisition of an existing magnet and the associated work of preparing it for use during the SBS research program. The effort includes modifications to the magnet, including machining a slot in the yoke for beam passage, field clamps, and a solenoid to reduce the transverse magnetic field on the beam line, the design and development of the infrastructure needed to run the magnet, and the construction of the platform on which it will stand.
- The second Project, **Neutron Form Factor (WBS 2)**, involves the construction of twenty-nine GEM detector modules with associated front-end and DAQ modules to meet the requirements of the approved neutron form factor measurements.
- The third and final Project, **Proton Form Factor (WBS 3)**, involves the construction of thirty-five GEM detector modules with associated front-end and DAQ modules and the addition of pole shims for increased magnetic field integral to meet the requirements of the approved proton form factor measurements.

## Project Management Highlights:

This is the sixth Monthly Progress Report for the SBS Program. The collaboration is in place, and the Program Management Plan has been approved by Jefferson Lab management and by the DOE-NP Instrumentation Program Manager.

The first and second Projects within the SBS Program, SBS Basic (WBS 1) and Neutron Form Factor (WBS 2), started at the beginning of FY13.

The third Project, Proton Form Factor (WBS 3), isn't scheduled to start until FY14.

## WBS 1: SBS Basic

<b>WBS 1</b>	<b>SBS Basic: (Hall A Infrastructure)</b>	<b>WBS 1.01</b>	Milestones
		<b>WBS 1.02</b>	Project Oversight
		<b>WBS 1.1</b>	Magnet, power and construction
		<b>WBS 1.2</b>	Magnet/detector platforms
		<b>WBS 1.3</b>	Beam line

### WBS 1.01 Milestones:

<b>Id #</b>	<b>Level</b>	<b>Milestone</b>	<b>Scheduled Date</b>	<b>Expected Date 2/1/2013</b>	<b>Expected Date 3/1/2013</b>	<b>Actual Date</b>
1.1-01M	1	Project start	10/1/2012	10/1/2012	<b>10/1/2012</b>	<b>10/1/2012</b>
1.2-01M	2	Magnet delivered to JLab	4/30/2013	4/30/2013	4/30/2013	
1.2-10M	2	Platform parts received	6/27/2014	6/27/2014	6/27/2014	
1.2-20M	2	Magnet assembled on platform	3/19/2015	3/19/2015	3/19/2015	
1.2-30M	2	Beam-line parts received	9/24/2015	9/24/2015	9/24/2015	
1.1-10M	1	Project completion	1/29/2016	1/29/2016	1/29/2016	

### WBS 1.02 Project Oversight:

- SBS weekly meetings are being held via tele and video conference almost every Wednesday. During this Report period, meetings were held on Feb 6<sup>th</sup>, Feb 13<sup>th</sup>, Feb 20<sup>th</sup> and Feb 27<sup>th</sup>. Participants included Jefferson Lab, University of Virginia, St. Mary's University, William and Mary, University of Massachusetts, Carnegie-Mellon University, University of Glasgow, Norfolk State University, and INFN – Rome.
- Project is staffed appropriately for this beginning stage, and includes a Jefferson Lab manager, scientist, and magnet engineer.

### **WBS 1.1 Magnet, Power and Construction:**

- Completed the magnetostatic simulation of the magnet to define the yoke modifications and beam pipe design. (100% completed)
- Continue checking the physical layout for interferences. (90% completed)
- Detail drawings of new coils. Coil drawings were on hold until magnetostatic simulation was complete. Will continue work on design drawings next month.(20% completed)
- Requirements of power supply determined.
- BNL is surveying the yoke material to determine specs for transporting. Request for transfer is waiting for BNL to declare magnet yoke material as excess.

### **WBS 1.2 Magnet/Detector Platforms:**

- Continue structural analysis of counter weight support method. Continuing design work on magnet counter weight support to incorporate movement of support to relocate magnet as needed. (40% completed)
- Design work on detector supports. (15% completed)
- Designing detector supports (20% completed)

### **WBS 1.3 Beam Line:**

- Layout of shielded beam pipe and vacuum snout (10% completed)

### **WBS 1 Costs:**

- Budget for this WBS for FY13 is \$838K.
- Costed and obligated to date (as of 3/1/2013): \$25,001 (3.0%)

## WBS 2: Neutron Form Factor

<b>WBS 2</b>	<b>Neutron Form Factor</b>	<b>WBS 2.01</b>	Milestones
		<b>WBS 2.02</b>	Project oversight
		<b>WBS 2.1</b>	GEMs (UVa)
		<b>WBS 2.2</b>	GEM Electronics (UVa)
		<b>WBS 2.3</b>	Electronics Hut, Lead Shielding, Lead platform, and Detector Frames
		<b>WBS 2.4</b>	Coordinate Detector

### WBS 2.01 Milestones:

ID #	Level	Milestone	Scheduled Date	Expected date 2/1/2013	Expected date 3/1/2013	Actual Date
2.1-01M	1	Project start	10/1/2012	10/1/2012	10/1/2012	10/1/2012
2.2-01M	2	UVa receives GEM parts	2/3/2014	2/3/2014	2/3/2014	
2.2-20M	2	UVa receives electronics parts	8/20/2014	8/20/2014	8/20/2014	
2.2-10M	2	UVa GEM modules assembled and tested	10/17/2014	10/17/2014	10/17/2014	
2.2-40M	2	Coordinate Detector Assembled	11/17/2014	11/17/2014	11/17/2014	
2.2-30M	2	UVa front-end electronics assembled and tested	2/2/2015	2/22/2015	2/22/2015	
2.2-40M10	2	WBS 2.3 completed (Electronics Hut Assembled etc.)	10/5/2015	10/5/2015	10/5/2015	
2.1-10M	1	Project completion	1/29/2016	1/29/2016	1/29/2016	

## **WBS 2.02 Project Oversight:**

- SBS weekly meetings are being held via tele and video conference almost every Wednesday. During this Report period, meetings were held on Feb 6<sup>th</sup>, Feb 13<sup>th</sup>, Feb 20<sup>th</sup> and Feb 27<sup>th</sup>. Participants included Jefferson Lab, University of Virginia, St. Mary's University, William and Mary, University of Massachusetts, Carnegie-Mellon University, University of Glasgow, Norfolk State University, and INFN – Rome.
- Prof. Mahbub Khandaker of Idaho<sup>1</sup> State University has agreed to take over the coordinate detector responsibilities from Prof. Charles Perdrisat of William and Mary
- Project is staffed appropriately for this beginning stage, and includes Jefferson Lab (manager, scientist), UVa (two scientists), and Idaho State University (one scientist).

## **WBS 2.1 GEMs (UVA):**

Pre R&D work on the production of GEM modules for WBS 2.1, aimed at starting production work, has continued. Below is a report on how that pre R&D work is progressing.

- The characterization of SBS prototype #1 continued with its position resolution measurements
  - Preliminary results reveal a resolution of 75 microns or better.
- The installation and cleaning of the new level-1000 clean room was completed.
  - The newly constructed GEM chamber fabrication equipment were installed in the clean room and tested.
  - The cost of the new clean-room and it's accessories was approximately \$ 10,000 (paid for by the University of Virginia)
- All components for the first two 50 cm x 50 cm prototype chambers arrived
  - Visual inspection of these components did not indicate any major defects. However, one GEM foil has three small puncture marks and a second foil had a scratch mark about 6" long. The CERN GEM shop has assured us that the foils are OK despite these minor issues. After consulting with Dr. Bogdan Wojtsekhowski, it has been decided to accept these foils only if they pass the high voltage tests; if they fail, they will be sent back to CERN for replacements.

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<sup>1</sup> Incorrectly reported as Iowa State University in the February 15 report

## **WBS 2.2 GEM Electronics (UVa):**

As with WBS 2.1, pre R&D continues on the GEM electronics. Below is a report on that work.

- All INFN built APV readout hardware is now located at Jefferson lab
- The readout system is setup at Jefferson lab, noise studies and CODA integration work continue at Jefferson lab.
- The new design for the improved version of the INFN readout system has been finalized and sent to the manufacturer.
  - Orders have been placed for a full set of electronics of this version.

## **WBS 2.3 Electronics Hut, Lead Shielding, Lead platform, and Detector**

### **Frames:**

- No activity this period.

## **WBS 2.4 Coordinate Detector:**

- We continue reviewing a proposed draft MOU with Mahbub Khandaker at Idaho State University for work on the coordinate detector as part of this WBS

## **WBS 2 Costs:**

- Budget for this WBS for FY13 is \$81K.
- Costed and obligated to date (as of 3/1/2013): \$9,809 (12.1%)

## WBS 3: Proton Form Factor

This Project is not scheduled to start until FY14: October 1, 2013. The WBS structure and milestone table are included below for completeness.

<b>WBS 3</b>	<b>Proton Form Factor</b>	<b>WBS 3.01</b>	Milestones
		<b>WBS 3.02</b>	Project Oversight
		<b>WBS 3.1</b>	Magnet Pole shims and exit field clamp
		<b>WBS 3.2</b>	GEM's (UVa)
		<b>WBS 3.3</b>	GEM electronics (UVa)
		<b>WBS 3.4</b>	Trigger (RU)



### WBS 3.01 Milestones:

ID #	Level	Milestone	Scheduled Date	Expected date 1/1/2013	Expected date 2/1/2013	Actual Date
3.1-01M	1	Project start	10/1/2013	10/1/2013	10/1/2013	
3.2-01M	2	UVa receives parts for GEM modules	8/20/2014	8/20/2014	8/20/2014	
3.2-10M	2	UVa begins assembly of electronics	1/5/2015	1/5/2015	1/5/2015	
3.2-50M	2	RU begins trigger design	1/6/2016	1/6/2016	1/6/2016	
3.2-20M	2	UVa electronics assembly and tests completed	7/20/2016	7/20/2016	7/20/2016	
3.2-30M	2	JLab receives pole shims	8/22/2016	8/22/2016	8/22/2016	
3.2-40M	2	JLab receives exit field clamp	8/22/2016	8/22/2016	8/22/2016	
3.2-70M	2	RU completes trigger	12/1/2016	12/1/2016	12/1/2016	
3.2-60M	2	UVa GEM modules assembled (and tested)	2/2/2017	2/2/2017	2/2/2017	
3.1-10M	1	Project completion	7/31/2017	7/31/2017	7/31/2017	