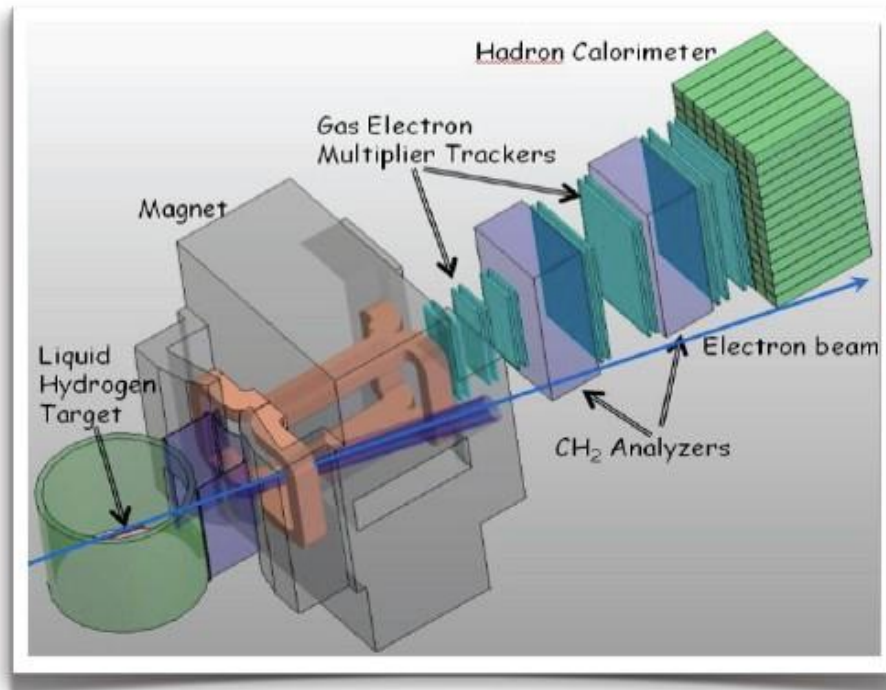


Super-BigBite-Spectrometer (SBS)

Monthly Progress Report

February 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 fifth 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 PMP was updated on January 24, 2013 as described in the January monthly report. Subsequently, it was revised again on January 31, 2013 following the quarterly phone conference. In the January 31 revision the budget tables were changed to show contingency as distributed by year rather than as a lump sum. The new tables are reproduced here.

WBS	0	FY13	FY14	FY15	FY16	Total
1	SBS Basic	\$651	\$508	\$166	\$0	\$1,326
	Contingency	\$181	\$141	\$46	\$0	\$368
	Total	\$838	\$643	\$212	\$0	\$1,694

WBS	0	FY13	FY14	FY15	FY16	Total
2	Neutron Form Factor	\$64	\$875	\$253	\$19	\$1,211
	Contingency	\$19	\$262	\$76	\$6	\$362
	Total	\$81	\$1,137	\$331	\$25	\$1,573

WBS		FY14	FY15	FY16	FY17	Total
3	Proton Form Factor	\$253	\$492	\$461	\$40	\$1,246
	Contingency	\$68	\$133	\$124	\$11	\$336
	Total	\$321	\$625	\$585	\$51	\$1,582

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

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

WBS 1.01 Milestones:

Id #	Level	Milestone	Scheduled Date	Expected Date 1/1/2013	Expected Date 2/1/2013	Actual Date
1.1-01M	1	Project start	10/1/2012	10/1/2012	10/1/2012	10/1/2012
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 shared file (EVO) and teleconference almost every Wednesday. During this Report period, meetings were held on Jan 16th, Jan 23rd and Jan 30th. Participants included Jefferson Lab, University of Virginia, St. Mary's University, William and Mary, University of Massachusetts, Carnegie-Melon University, University of Glasgow, Norfolk State University, Iowa State University, and INFN – Catania, Genova, Bari, and 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:

- Continuing the magnetostatic simulation of the magnet to define the yoke modifications and beam pipe design. (50% completed)
- Detail drawings of new coils (20% completed)

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)

WBS 1.3 Beam Line:

- Layout of shielded beam pipe and vacuum snout (5% completed)

WBS 1 Costs:

- Budget for this WBS for FY13 is \$838K.
- Costed and obligated to date (as of 2/1/2013): \$21.330K (2.5%)

WBS 2: Neutron Form Factor

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

WBS 2.01 Milestones:

ID #	Level	Milestone	Scheduled Date	Expected date 1/1/2013	Expected date 2/1/2013	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 shared file (EVO) and teleconference almost every Wednesday. During this Report period, meetings were held on Jan 16th, Jan 23rd and Jan 30th. Participants included Jefferson Lab, University of Virginia, St. Mary's University, William and Mary, University of Massachusetts, Carnegie-Melon University, University of Glasgow, Norfolk State University, Iowa State University, and INFN – Catania, Genova, Bari, and Rome.
- Project is staffed appropriately for this beginning stage, and includes Jefferson Lab (manager, scientist), UVa (two scientists), and W&M (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.

- In January SBS prototype #2 was turned on for testing.
 - This chamber has 4 sectors out of 20 sectors disabled due to damage sustained during construction¹.
 - All other sectors of this chamber work well
 - The chamber holds high voltage up to 4300 V with no difficulty and the leakage currents for each GEM foil is less than 5 nA.
 - The signals from the chamber appear as expected.
 - After initial testing, this chamber was transported to Jefferson lab for further characterization.
- The characterization of SBS prototype #1 continued with position resolution measurements.
- The new clean room at UVa was installed.
- The equipment needed to construct the newly designed SBS prototypes (50 cm x 50 cm as opposed to the 40 cm x 50 cm earlier ones) are being fabricated now.

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.

¹ The causes of these damages and the design changes to prevent these in the future are outlined in the SBS prototype report #1 submitted to Jefferson lab.

- All INFN-built APV readout hardware is now located at Jefferson lab
 - The readout system is setup at Jefferson lab
 - Noise studies and CODA (JLab Data acquisition code) integration work continue at Jefferson lab.

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

Frames:

- No activity this period.

WBS 2.4 Coordinate Detector:

- We have in hand and are reviewing a proposed draft MOU with Mahbub Khandaker at Iowa 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 2/1/2013): \$7.578K (9.4%)

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.

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