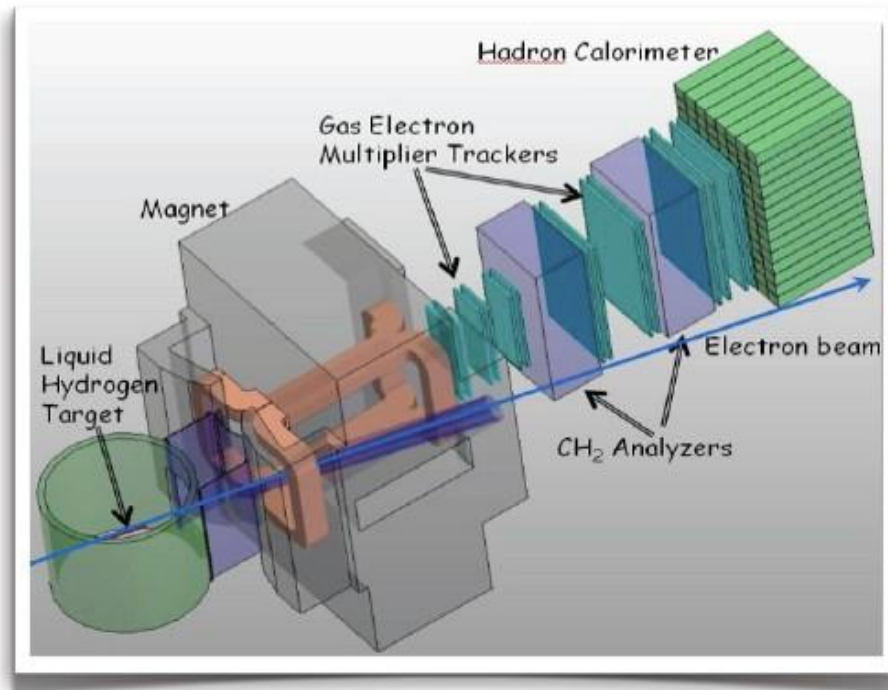


Super-BigBite-Spectrometer (SBS)

Monthly Progress Report

September 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 twelfth Monthly Progress Report for the SBS Program.

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.

Level 3 milestones for WBS 1, 2 to allow better tracking on a quarterly basis have been established. At this time a graphical representation and tabular form of those milestones is presented in the [appendix](#) of this document.

A purchase requisition was submitted to the JLab procurement department for the construction by UVa of 29 GEM modules. As of September 1st final negotiations were underway between JLab and UVa to finalize a contract between JLab and UVa.

A contract is in place for a power supply for the SBS dipole magnet.

JLab took delivery during the week of August 19th of the magnet, coils, and assorted pieces of steel from Brookhaven, achieving milestone 1.2-01M.

A purchase requisition for the new magnet coils has been submitted to procurement and is being processed.

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 8/1/2013 | Expected Date 9/1/2013 | 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 | 8/15/2013 | | 8/21/2013 |
| 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, via tele and video conference were held on August 7, 14, 21, and 28. Participants included Jefferson Lab, University of Virginia, University of Massachusetts, Carnegie-Mellon University, William and Mary, Norfolk State University, St. Mary's University, and INFN Rome.
- Project is staffed appropriately for this beginning stage, and includes a Jefferson Lab manager, scientist, and magnet engineer.
- The magnet, coils, and associated extra steel are now officially JLab property and are now at JLab, thereby achieving milestone 1.2-01M. Please see the following pictures.



Figure 1: Saddle coils from the 48D48 magnet at JLab



Figure 2: Yoke pieces for the 48D48 magnet at JLab



Figure 3: Another shot of the yoke steel.



Figure 4: Saddle coils covered to protect them from the weather.

WBS 1.1 Magnet, Power and Construction:

- Received magnet yoke, support steel and coils from Brookhaven National Lab.
- Finalizing yoke modification drawings. (90% completed)
- Detail drawings of new coils and procurement specification. (100% completed)
 - Coil procurement started
- Power supply contract awarded (100% completed)
 - Water manifold and power cabling for the power supply needs are defined (100% completed)
- Detail design of field clamps and clamp supports. (20% completed)

WBS 1.2 Magnet/Detector Platforms:

- Continuing design details on magnet counter weight support. (70% completed)
- Designing detector supports. (40% completed)

WBS 1.3 Beam Line:

- Layout and design of shielded beam pipe and vacuum snout. (20% completed)

WBS 1 Costs:

- Budget for this WBS for FY13 is \$838K.
- Costed and obligated to date (as of 9/1/2013): \$282,782 (33.75%)
 - obligated costs are small but will rise quite a bit in September, as most of the obligations will come in then.

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 | Expected date | Actual Date |
|------|-------|-----------|----------------|---------------|---------------|-------------|
| | | | | 8/1/2013 | 9/1/2013 | |

| | | | | | | |
|-----------|---|----------------------------------------------------|------------|------------|------------|------------------|
| 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, via tele and video conference were held on August 7, 14, 21, and 28. Participants included Jefferson Lab, University of Virginia, University of Massachusetts, Carnegie-Mellon University, William and Mary, Norfolk State University, St. Mary's University, and INFN Rome.
- 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):

A Pre R&D report has been submitted by UVa and accepted. UVa has reliably achieved the capability needed to construct GEM chambers for SBS. A purchase requisition was submitted to the JLab

procurement department for the construction by UVa of 29 GEM modules. As of September 1 final negotiations with UVa were underway with contract award imminent. Within the proposed contract milestone 2.2-01M is maintained and milestone 2.2-10M is split in three with completion of the first five modules on 5/30/2014, completion of the next ten modules on 9/30/2014, and completion of the final fourteen on 3/1/2015, leaving seven months of float in the schedule.

The month of August was spent in negotiations between UVa and JLab to set up and formalize the contract related to the GEM chambers for the SBS WBS-2 project. This has taken more effort than anticipated, and has slowed down activities at UVa.

WBS 2.2 GEM Electronics (UVa):

- No activity this month.

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

Frames:

- No activity this period.

WBS 2.4 Coordinate Detector:

- No activity this period.

WBS 2 Costs:

- Budget for this WBS for FY13 is \$81K.
- Costed and obligated to date (as of 9/1/2013): \$25,514 (32.74%)
 - Expecting a \$30K+overhead charge in September for the start of the GEM contract.

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.

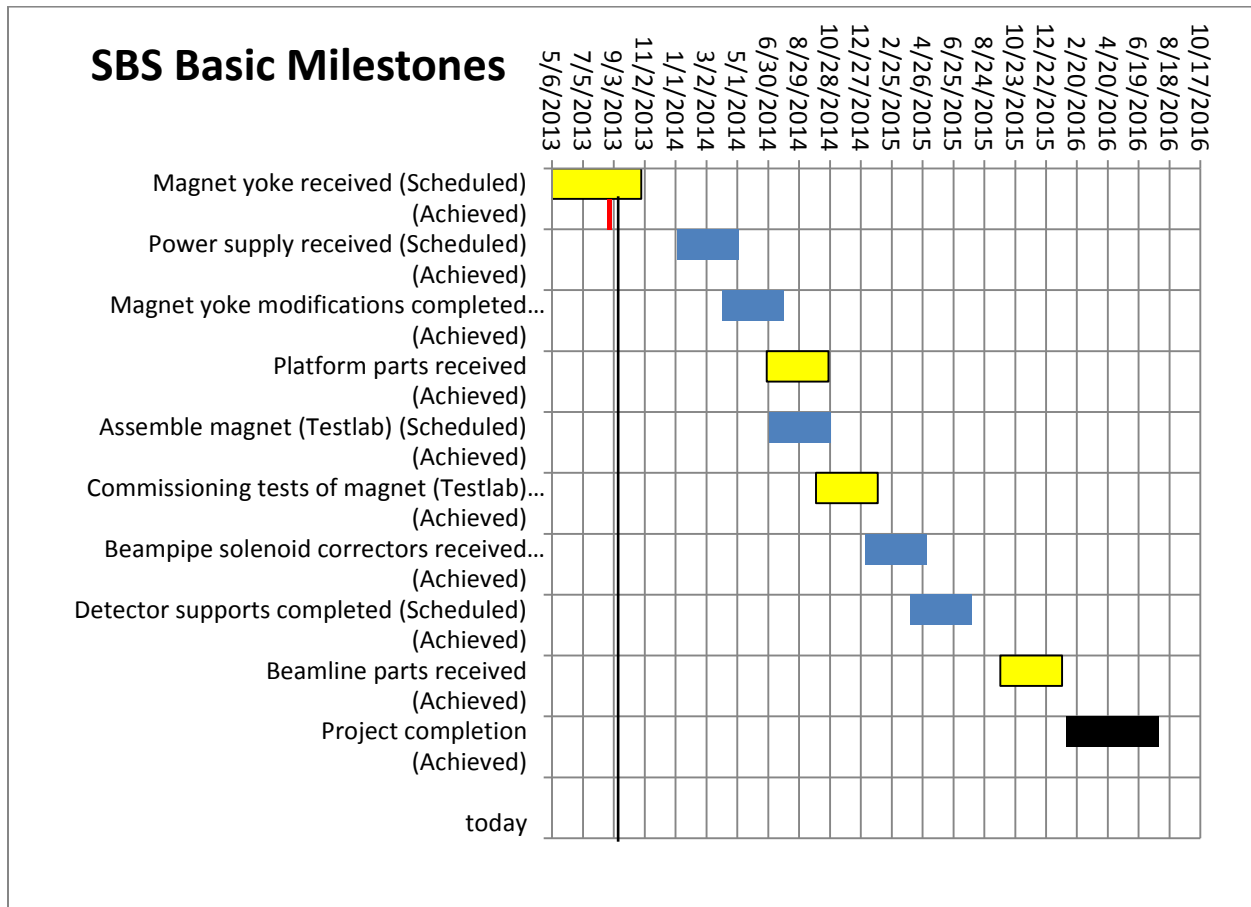
| | | | |
|--------------|---------------------------|-----------------|----------------------------------------|
| WBS 3 | Proton Form Factor | WBS 3.01 | Milestones |
| | | WBS 3.02 | Project Oversight |
| | | WBS 3.1 | Magnet Pole shims and exit field clamp |
| | | WBS 3.2 | GEM's (UVa) |
| | | WBS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

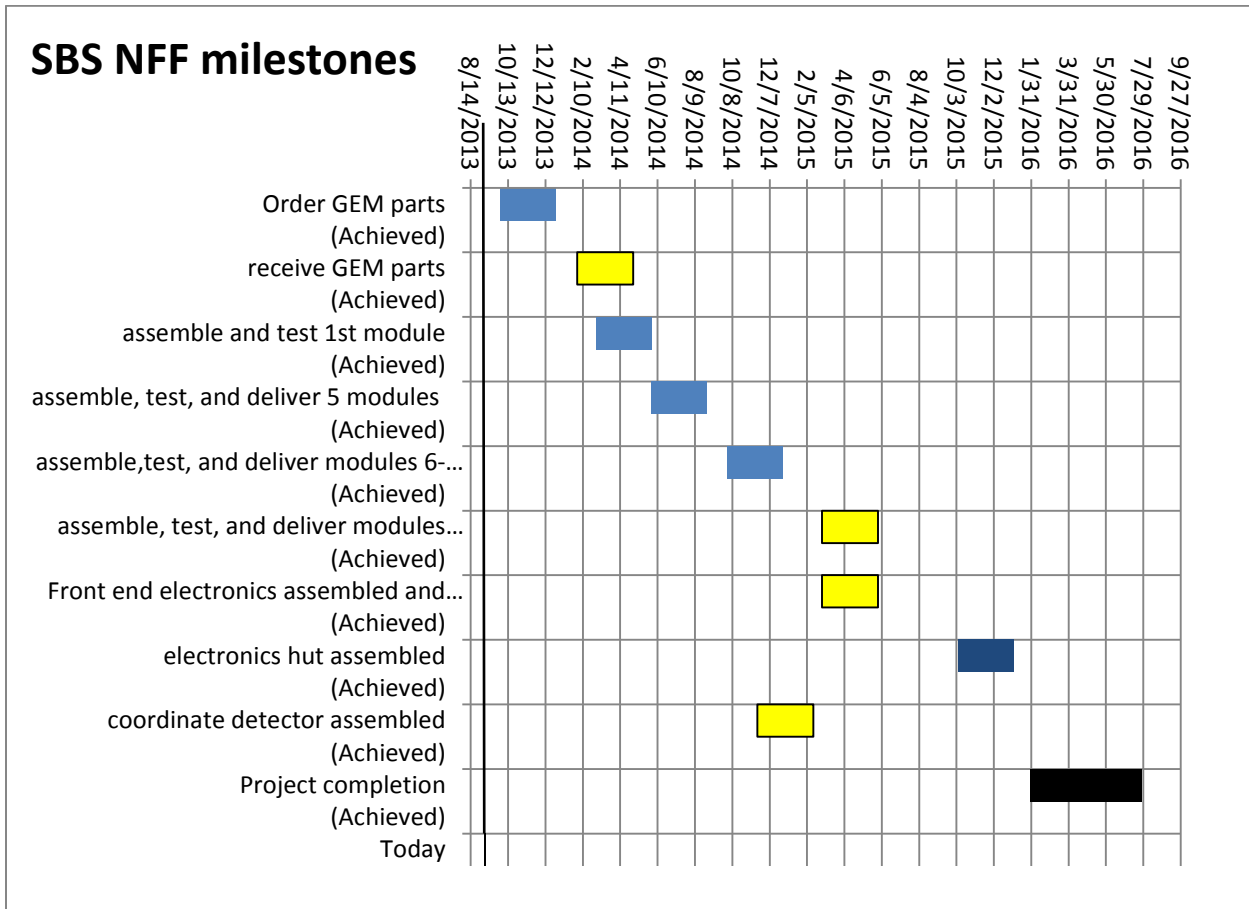
WBS 3.01 Milestones:

| ID # | Level | Milestone | Scheduled Date | Expected date 5/1/2013 | Expected date 6/1/2013 | 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 | |

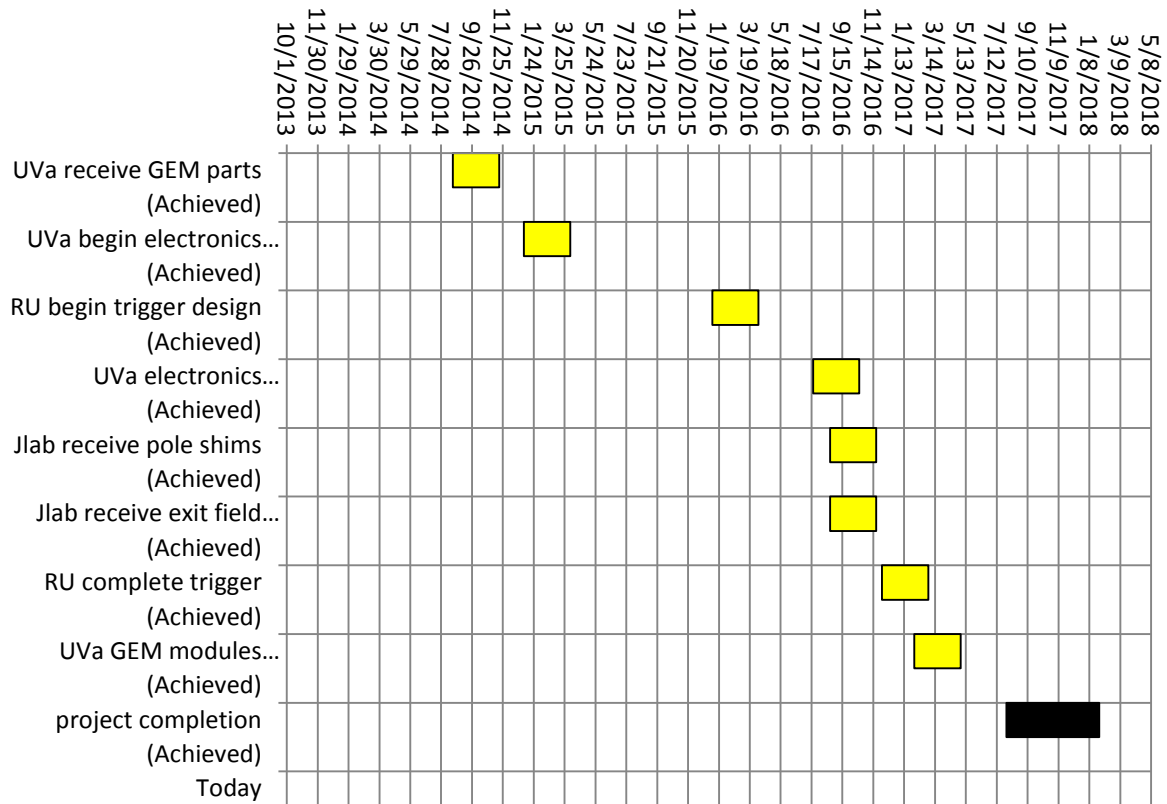
Appendix

The following are graphical representations of the milestones for SBS Basic (WBS 1), Neutron Form Factor (WBS 2,) and Proton Form Factor (WBS 2). Black represents level 1 milestones as specified in the PMP. Yellow represents level 2 milestones from the PMP. Blue represents the new level 3 milestones to allow better quarterly tracking. The black vertical line indicates the day the chart was made. The red bar indicates when the milestone was achieved (e.g. Magnet yoke received). The milestones are presented in tabular form after the graphic representations.





SBS PFF milestones



| WBS 1 Milestone | date |
|---------------------------------------------------------------|-------------|
| Magnet yoke received (Scheduled) | 4/29/2013 |
| (Achieved) | 8/21/2013 |
| Power supply received (Scheduled) | 1/4/2014 |
| (Achieved) | |
| Magnet yoke modifications completed (Scheduled) | 4/1/2014 |
| (Achieved) | |
| Platform parts received | 6/27/2014 |
| (Achieved) | |
| Assemble magnet (Testlab) (Scheduled) | 7/1/2014 |
| (Achieved) | |
| Commissioning tests of magnet (Testlab) completed (Scheduled) | 10/1/2014 |
| (Achieved) | |
| Beampipe solenoid correctors received (Scheduled) | 1/5/2015 |
| (Achieved) | |
| Detector supports completed (Scheduled) | 4/1/2015 |
| (Achieved) | |
| Beamline parts received | 9/24/2015 |
| (Achieved) | |
| Project completion | 1/29/2016 |
| (Achieved) | |

| WBS 2 Milestone | date |
|--------------------------------------------|-------------|
| Order GEM parts | 9/30/2013 |
| (Achieved) | |
| receive GEM parts | 2/1/2014 |
| (Achieved) | |
| assemble and test 1st module | 3/3/2014 |
| (Achieved) | |
| assemble, test, and deliver 5 modules | 5/30/2014 |
| (Achieved) | |
| assemble, test, and deliver modules 6-16 | 9/30/2014 |
| (Achieved) | |
| assemble, test, and deliver modules 17-29 | 3/1/2015 |
| (Achieved) | |
| Front end electronics assembled and tested | 3/1/2015 |
| (Achieved) | |
| electronics hut assembled | 10/5/2015 |
| (Achieved) | |
| coordinate detector assembled | 11/17/2014 |
| (Achieved) | |
| Project completion | 1/29/2016 |
| (Achieved) | |

| WBS 3 Milestone | date |
|----------------------------------------------------|-------------|
| UVa receive GEM parts (Achieved) | 8/20/2014 |
| UVa begin electronics assembly (Achieved) | 1/5/2015 |
| RU begin trigger design (Achieved) | 1/6/2016 |
| UVa electronics assembled and tested (Achieved) | 7/20/2016 |
| Jlab receive pole shims (Achieved) | 8/22/2016 |
| Jlab receive exit field clamp (Achieved) | 8/22/2016 |
| RU complete trigger (Achieved) | 12/1/2016 |
| UVa GEM modules assembled and tested (Achieved) | 2/2/2017 |
| project completion (Achieved) | 7/31/2017 |