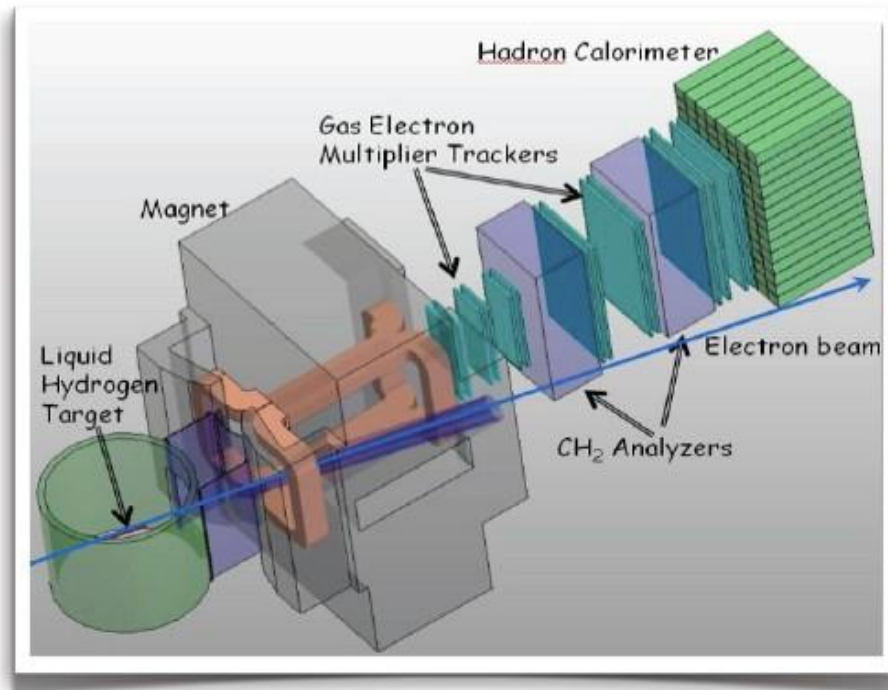


Super-BigBite-Spectrometer (SBS)

Monthly Progress Report

November 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 fourteenth 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.

Bids for the new magnet coils are being evaluated.

The third Project, Proton Form Factor (WBS 3) started on October 1, 2013.

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 10/1/2013	Expected Date 11/1/2013	Actual Date
1.1-01M	1	Project start	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 October 2, 9, and 16. Participants included Jefferson Lab, University of Virginia, University of Massachusetts, Carnegie-Mellon University, William and Mary, Norfolk State University, St. Mary's University, University of Connecticut, University of Glasgow, 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:

- Magnet Analysis:
 - TOSCA analysis for yoke cutout design, SBS and BigBite interaction and field clamp design. (100% completed)
 - Beam line shielding iterations. (30% completed)
- Magnet Yoke Modifications:
 - Completed design, drawings out for bid, bids due December 5th
- Detail drawings of new coils and procurement specification. (100% completed)
 - 4 bids received October 14th. Requested Best & Finals on November 1st. Have an alternate plan if coil bids remain above program budget (using Saddle coil from Brookhaven reduces experimental acceptance by ~10%).
- Field clamps (50% completed)

WBS 1.2 Magnet/Detector Platforms:

- Support Structure/Magnet Platform (80% completed). Reviewing engineering design, ready for procurement January 2014.
- 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 FY14 is \$643K. The incremental budget (FY13+FY14) is \$1,481K
- Costed and obligated as of 11/1/2013: \$737.7K (50%)

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 9/1/2013	Expected date 10/1/2013	Actual Date
2.1-01M	1	Project start	10/1/2012	10/1/2012		10/1/2012
2.3-1	3	Order GEM Parts			10/15/2013	10/18/2013
2.2-01M	2	UVa receives GEM parts	2/3/2014	2/3/2014	2/1/2014	
2.3-2	3	First module assembled and tested			3/3/2014	
2.2-20M	2	UVa receives electronics parts	8/20/2014	8/20/2014	8/20/2014	
2.2-10MA	3	UVa 5 GEM modules assembled and tested			6/2/2014	
2.2-10MB	3	UVa 15 GEM modules assembled and tested			9/30/2014	
2.2-10MC	2	UVa 29 GEM modules assembled and tested	10/17/2014	10/17/2014	3/9/2015	

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 October 2, 9, and 16. Participants included Jefferson Lab, University of Virginia, University of Massachusetts, Carnegie-Mellon University, William and Mary, Norfolk State University, St. Mary's University, University of Connecticut, University of Glasgow, 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):

GEM pre-R&D: In October the two 50 cm x 50 cm GEM chambers were tested in actual beam conditions at the test beam facility at Fermilab, along with detectors from Florida Tech, Stony Brook University, Yale University and Brookhaven National Lab. This three week long beam test was highly successful and allowed the testing of the SBS prototype chamber up to particle rates of 10 kHz/cm². The analysis of test beam data is currently underway.

The frames for the last two SBS prototype modules arrived at UVa. These 50 x 60 cm frames have the number of spacers reduced by a factor of 3 compared to the previous prototypes built. The success of these prototypes would allow the SBS production modules to be built with the reduced spacer arrangement, which would increase the overall chamber efficiency by approximately 1.5 %.

GEMs: Placed the order with CERN for the GEM parts needed to start construction on 29 modules on October 18, 2013, achieving milestone 2.3-1.

WBS 2.2 GEM Electronics (UVa):

Readout Electronics pre-R&D:

The new 8,000 channel APV25 based SRS electronic system procured from CERN was fully used and tested during the Fermilab beam test. This was the first demonstration of successful use of a large APV-25 SRS system in actual beam conditions.

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 FY14 is \$1,137K. The incremental budget (FY13+FY14) is \$1,218K
- Costed and obligated as of 11/1/2013: \$618.1K (51%)

WBS 3: Proton Form Factor

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 10/1/2013	Expected date 11/1/2013	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	

WBS 3.02 Project Oversight:

- SBS weekly meetings, via tele and video conference were held on October 2, 9, and 16. Participants included Jefferson Lab, University of Virginia, University of Massachusetts, Carnegie-Mellon University, William and Mary, Norfolk State University, St. Mary's University, University of Connecticut, University of Glasgow, and INFN Rome.
- Project is staffed appropriately for this beginning stage, and includes Jefferson Lab (manager, scientist), UVa (two scientists).
- An account, entitled SBSPPF, was opened at JLab on November 1, 2013

WBS 3.1 Magnet Pole shims and exit field clamp

No activity this month

WBS 3.2 GEM's

No activity this month

WBS 3.3 GEM electronics

No activity this month

WBS 3.4 Trigger

No activity this month

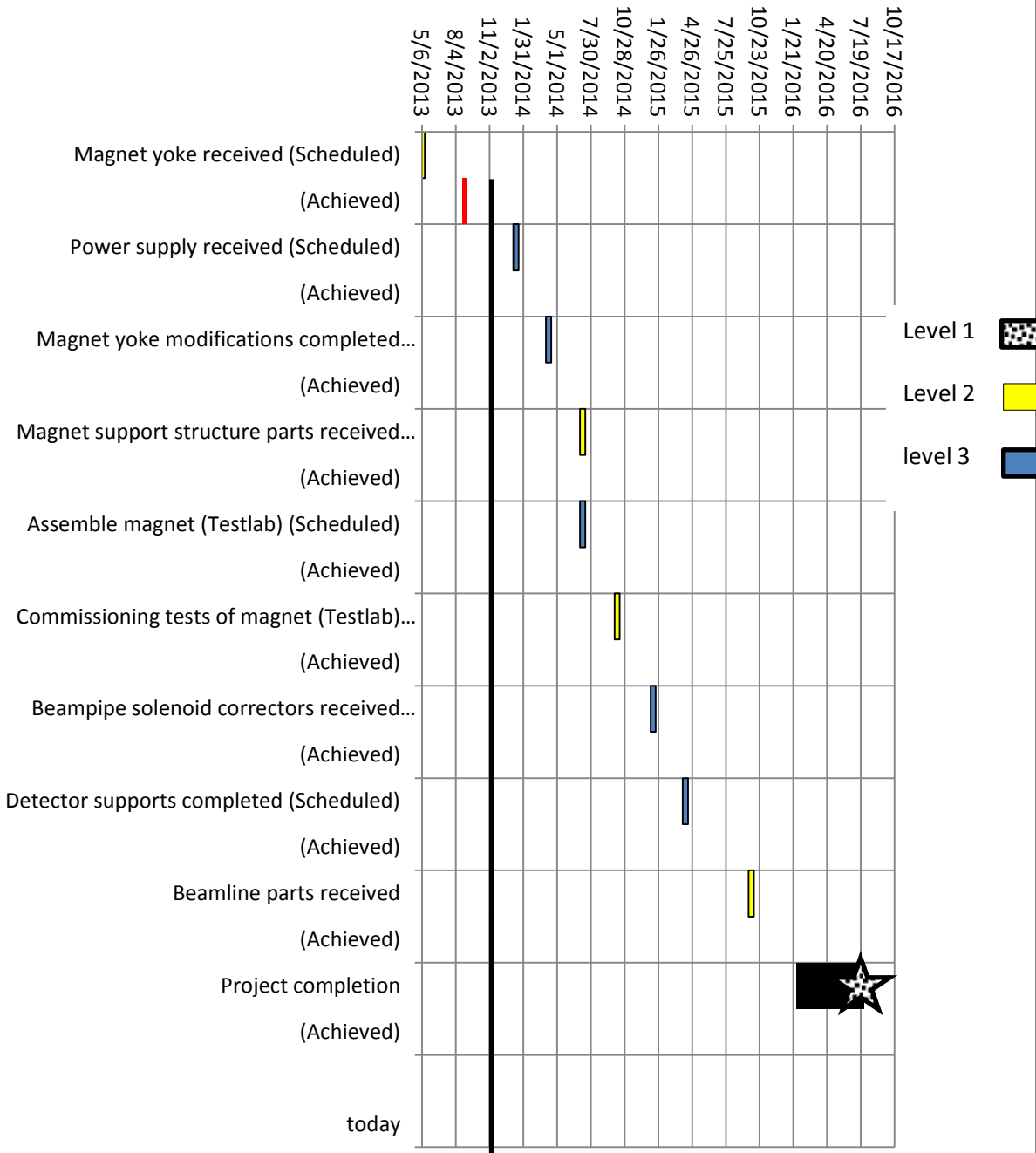
WBS 3 Costs:

- Budget for this WBS for FY14 is \$321K.
- Costed and obligated as of 11/1/2013: \$0K

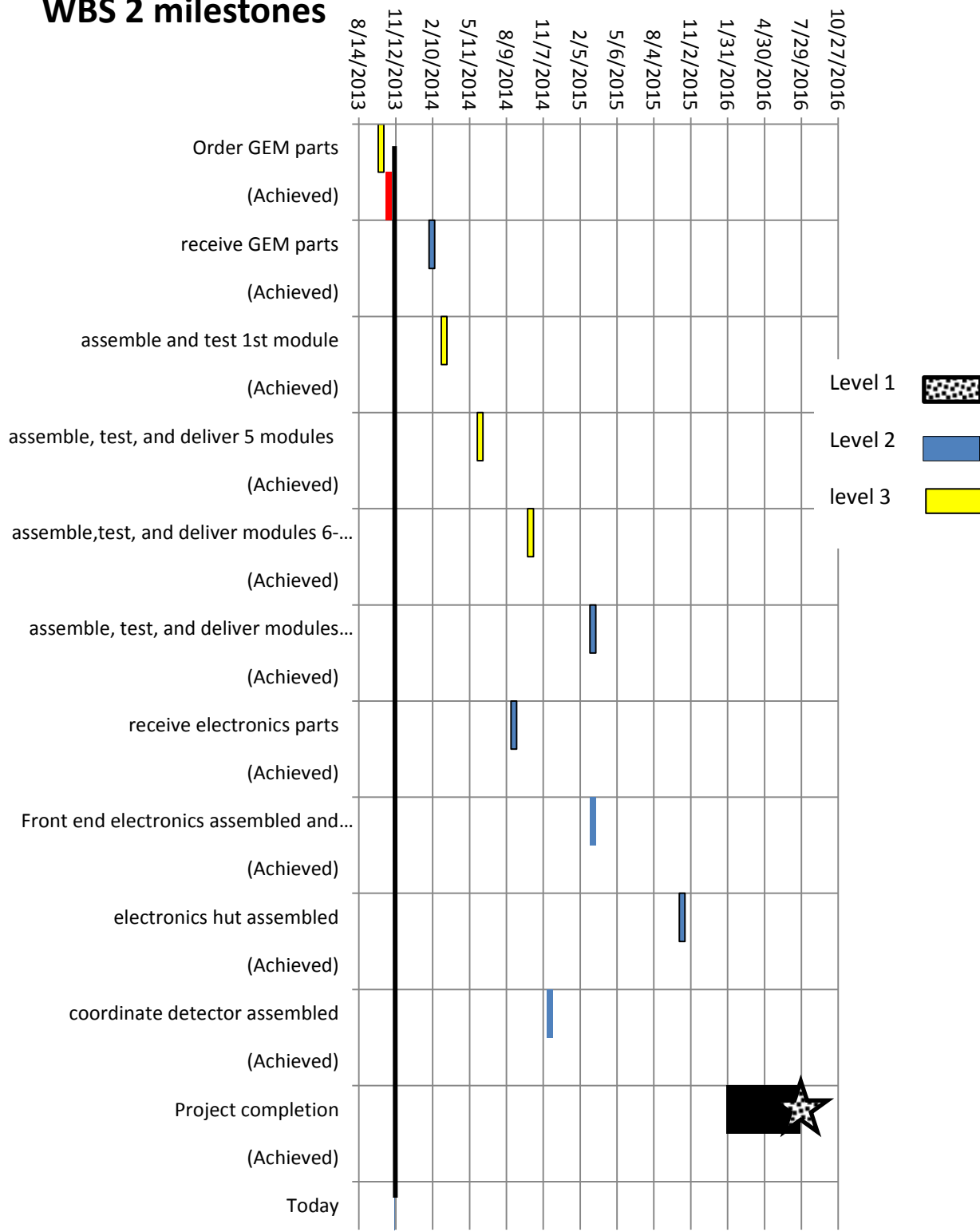
Appendix

The following are graphical representations of the milestones for SBS Basic (WBS 1), Neutron Form Factor (WBS 2,) and Proton Form Factor (WBS 2), updated on November 1, 2013. 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.

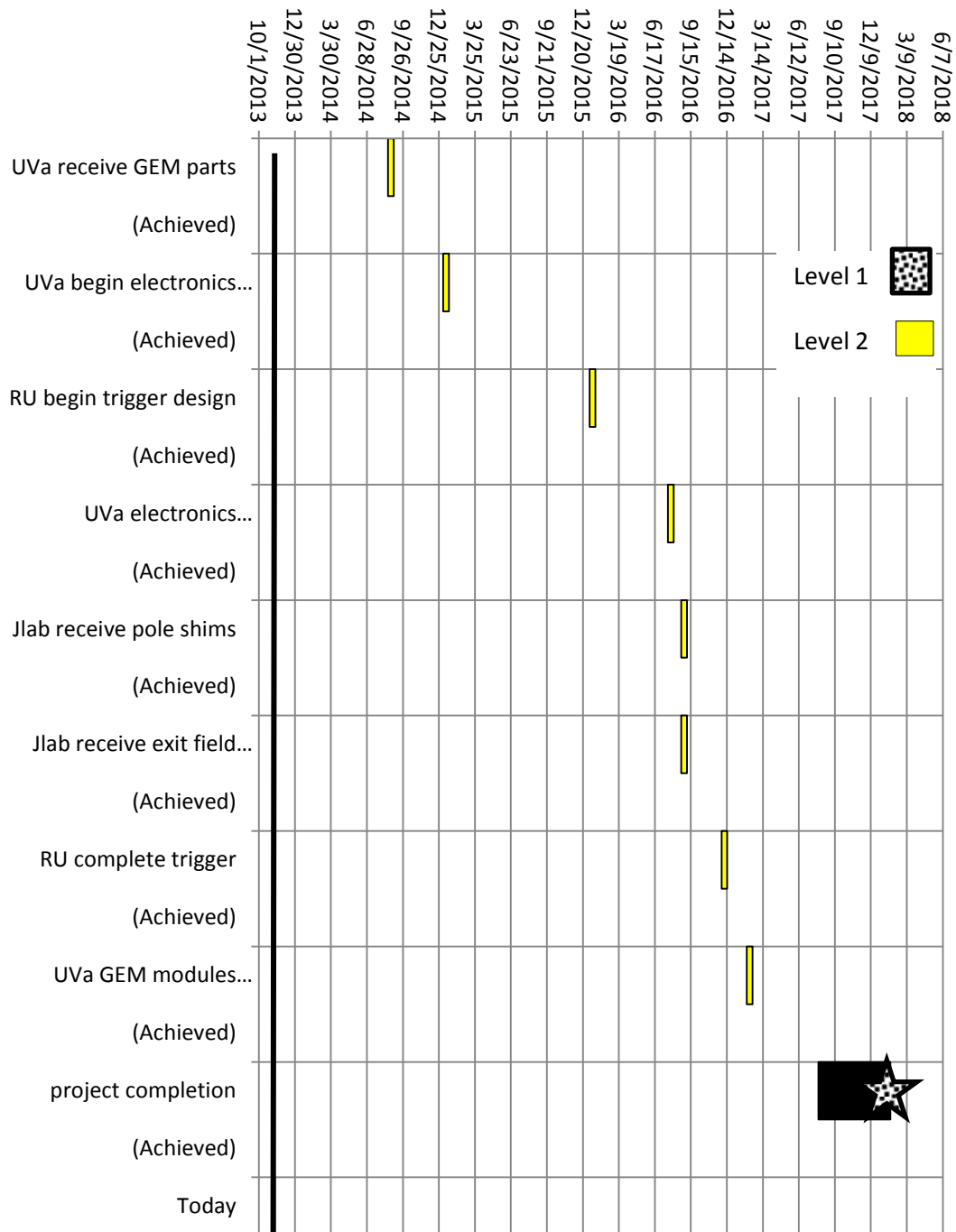
WBS 1 Milestones



WBS 2 milestones



WBS 3 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)	10/18/2013
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