56 MHz SRF Cavity in RHIC

Estimated Budget & Schedule

G. McIntyre

56 MHz SRF Cavity

- Estimates of Cost and Schedule
  - Based on previous experience with design and fabrication of other SRF cavities
  - Costing estimates from industrial partners on relevant systems.
  - System experts provided estimate guidance on their systems.
  - This cavity is unlike others in C-AD complex
    - Shape & size
    - Multiple “through helium” penetrations

56 MHz SRF Cavity Cost Estimate

- RHIC's 56 MHz SRF Cavity Installation is proposed as two AIPs:
  - RHIC Blue Ring $3.978M
  - RHIC Yellow Ring $1.844M

  - Total Proposed Cost $5.823M*

*- Total reflects savings due to "Large Procurement" overhead reductions in Cryomodule purchase.

56 MHz SRF Cavity
Blue Ring AIP

56 MHz Cavity Cost Estimate: RHIC Blue Ring							
G. McIntyre			Material	Shops	Shops		$ 3,978,352.71
		Materials	Burdened	Hours	Burdened	Total	
Travel Costs							$ 39,780.00
Consultants - (5 persons)							
Meeting #1 (5 consultants @ $2K each)		$ 10,000.00	$ 11,700.00			$ 11,700.00	
Meeting #2 (5 consultants @ $2K each)		$ 10,000.00	$ 11,700.00			$ 11,700.00	
Inspections/meetings (BNL personnel)							
5 trips @ $2K each		$ 10,000.00	$ 11,700.00			$ 11,700.00	
Analysis trip to SLAC (2 people @ $2K ea)		$ 4,000.00	$ 4,680.00			$ 4,680.00	
Cavity Process Tooling							$ 323,027.78
Tuner	1						$ 101,638.00
Prototypes							$ 212,278.67
First Prototype Copper in air		$ 20,000.00	$ 23,400.00	417	$ 62,266.67	$ 85,666.67	
2nd Prototype Copper evacuated		$ 22,000.00	$ 25,740.00	675	$ 100,872.00	$ 126,612.00	
Cryomodules	AES	$ 1,286,000.00	$ 1,337,000.00			$ 1,337,000.00	$ 1,337,000.00
includes processing & FPC & PU probes							
C yomodule assembly		$ 1,500.00	$ 1,755.00	80	$ 11,955.20	$ 13,710.20	$ 13,710.20
Cryogenics system (VTA & RHIC Modifications)						$ 1,378,778.00	$ 1,378,778.00
RF System							$ 199,719.00
RF Amplifiers	1	$ 70,000.00	$ 81,900.00			$ 81,900.00	
Co-ax Cables		$ 3,700.00	$ 4,329.00			$ 4,329.00	
Low Level RF - Control		$ 97,000.00	$ 113,490.00			$ 113,490.00	
Couplers							$ 219,481.00
Fundam ntal Damper	1	$ 26,500.00	$ 31,005.00	400	$ 59,776.00	$ 90,781.00	
HOM wit filter	2	$ 110,000.00	$ 128,700.00			$ 128,700.00	
Vacuum		$ 130,718.00	$ 152,940.06			$ 152,940.06	$ 152,940.06

56 MHz SRF Cavity
Yellow Ring AIP

56 MHz Cavity Cost estimate - RHIC Yellow Ring G. McIntyre		Materials	Material Burdened	Shops Hours	Shops Burdened	Total	$ 1,844,086.26
Tuner	1						$ 101,638.00
Cryomodules	AES	$ 1,286,000.00	$ 1,286,000.00			$ 1,286,000.00	$ 1,286,000.00
includes processing & FPC & PU probes							
Cryomodule assembly		$ 3,000.00	$ 3,510.00	80	$ 11,955.20	$ 15,465.20	$ 15,465.20
RF System							
RF Amplifiers	1	$ 70,000.00	$ 81,900.00			$ 81,900.00	
Co-ax Cables		$ 3,700.00	$ 4,329.00			$ 4,329.00	
Low Level RF - Control		$ 10,000.00	$ 11,700.00			$ 11,700.00	$ 97,929.00
Couplers							
Fundamental Damper	1	$ 26,500.00	$ 31,005.00	400	$ 59,776.00	$ 90,781.00	
HOM with filter	2	$ 110,000.00	$ 128,700.00			$ 128,700.00	$ 219,481.00
Vacuum		$ 105,618.00	$ 123,573.06			$ 123,573.06	$ 123,573.06

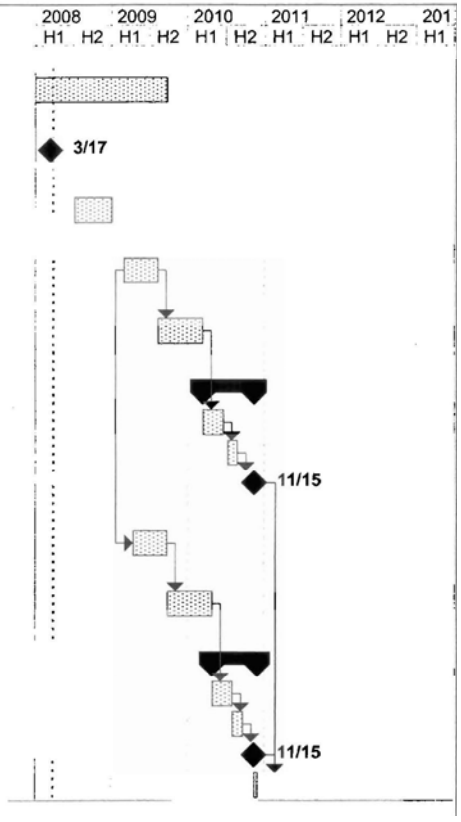
- Blue Ring AIP includes costs non-recurring in Yellow Ring:
- Prototypes - Process Tooling
- Cryogenic System - Large purchase overhead (~$100K)

56 MHz SRF Cavity Schedule Details

- Schedule reflects a start of 01/02/08.
- Cavity design complete by 10/01/08.
- Procurement of Yellow Ring Cavity follows Blue Ring Cavity purchase by 5 weeks.
  - Cavity processing follows same B/Y lag
- Both Cavity system installations show complete by cool down of FY 11(Run 11).

56 MHz SRF Cavity Preliminary Schedule

ID	Task Name	Duration	Start	Finish	Predecessors
1	56MHz Cavity AIP Schedule	1 day?	Wed 1/2/08	Wed 1/2/08	
2	Cavity & Tooling Design Development	453 days	Thu 1/3/08	Mon 9/28/09	
3					
4	First Prototype delivered to BLG 905	0 days	Mon 3/17/08	Mon 3/17/08	
5					
6	2nd (Copper) Prototype fabrication & test	129 days	Wed 7/9/08	Mon 1/5/09	
7					
8	1st Cavity fabrication	116 days	Thu 3/5/09	Thu 8/13/09	
9					
10	1st Cavity Processing	153 days	Fri 8/14/09	Tue 3/16/10	8
11					
12	**1st Cavity Mechanical Installation**	**173 days**	**Wed 3/17/10**	**Mon 11/15/10**	
13	Cryomodule Assembly	69 days	Wed 3/17/10	Mon 6/21/10	10
14	Assemble SRf Cavity & Associated Components	35 days	Mon 7/12/10	Fri 8/27/10	13
15	56 MHz Cavity System cooldown	0 days	Mon 11/15/10	Mon 11/15/10	14
16					
17	2nd Cavity fabrication	117 days	Thu 4/16/09	Fri 9/25/09	8SS+30 days
18					
19	2nd Cavity Processing	153 days	Mon 9/28/09	Wed 4/28/10	17
20					
21	**2nd Cavity Mechanical Installation**	**153 days**	**Thu 4/29/10**	**Mon 11/29/10**	
22	Cryomodule Assembly	69 days	Thu 4/29/10	Tue 8/3/10	19
23	Assemble SRf Cavity & Associated Components	35 days	Wed 8/4/10	Tue 9/21/10	22
24	56 MHz Cavity System cooldown	0 days	Mon 11/15/10	Mon 11/15/10	23
25	Cavity SystemsTesting & Cold Emissions Testing	10 days	Tue 11/16/10	Mon 11/29/10	24,15



- Greater schedule detail available . See G. McIntyre for further information.