

LEReC Funded!

From: Gillo, Jehanne [mailto:Jehanne.Gillo@science.doe.gov]

Sent: Thursday, May 14, 2015 12:27 PM

To: Fedotov, Alexei

Cc: Shinn, Michelle; Roser, Thomas; Fischer, Wolfram; Mirabella, Kerry A; Tuozzolo, Joseph E; Gillo, Jehanne; Dukes, Cassie; Mueller, Berndt; Sowinski, James

Subject: RE: LEReC Project Execution Plan

Dear Alexei,

I would like to congratulate you and your team on all of the hard work in improving the project plans and responding to the review recommendations. With this signed PEP, the LEReC project is officially approved to start. Cassie will be contacting you to set up quarterly calls to discuss progress.

With best regards,

Jehanne

From: Fedotov, Alexei

Sent: Thursday, May 14, 2015 2:04 PM

Subject: LEReC project approved

Dear All,

FYI. The LEReC project is now formally approved by the DOE Office of Nuclear Physics.

Thank you very much for your hard work.

Even more hard work will be now needed to make LEReC a successful project.

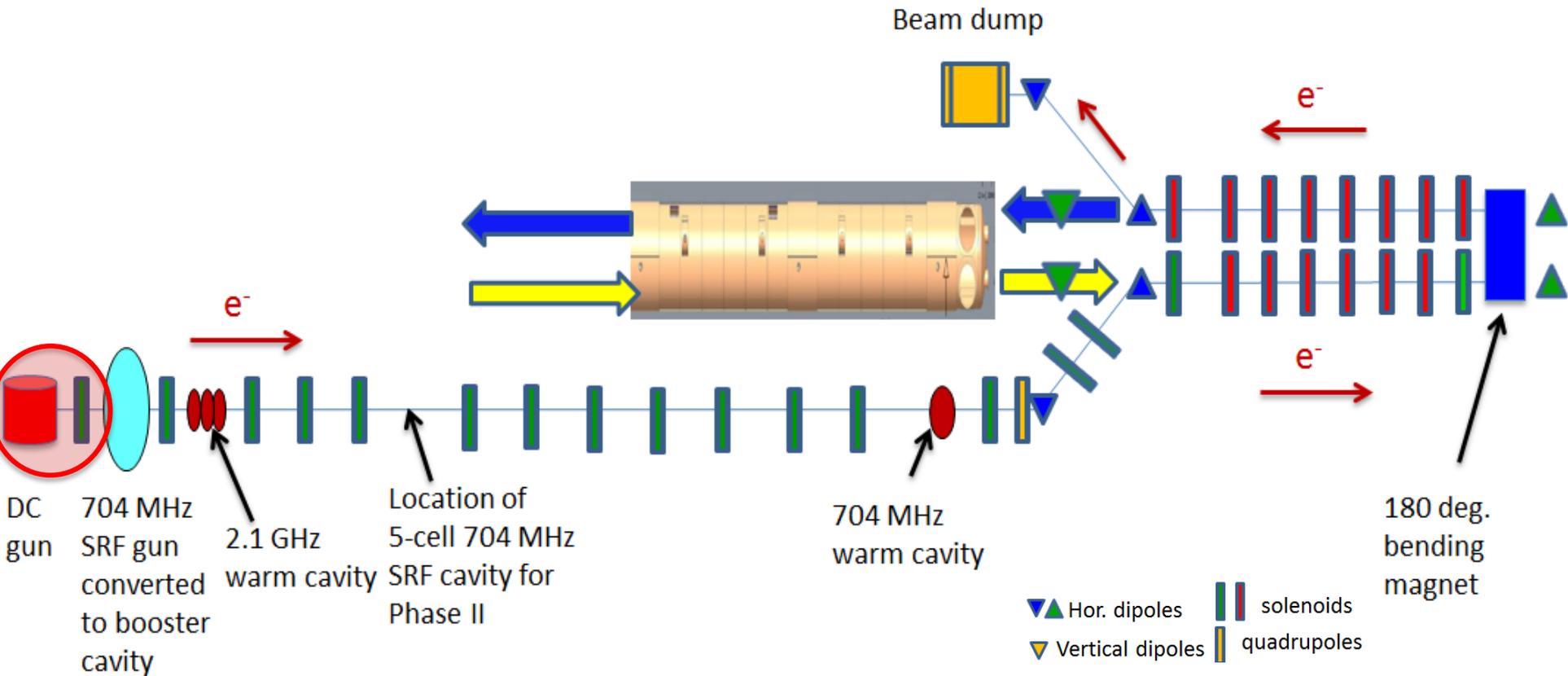
Thank you, Alexei

What's New – Phase I

Gun to Dump mode of operation 1.6 and 2 MeV electron beam

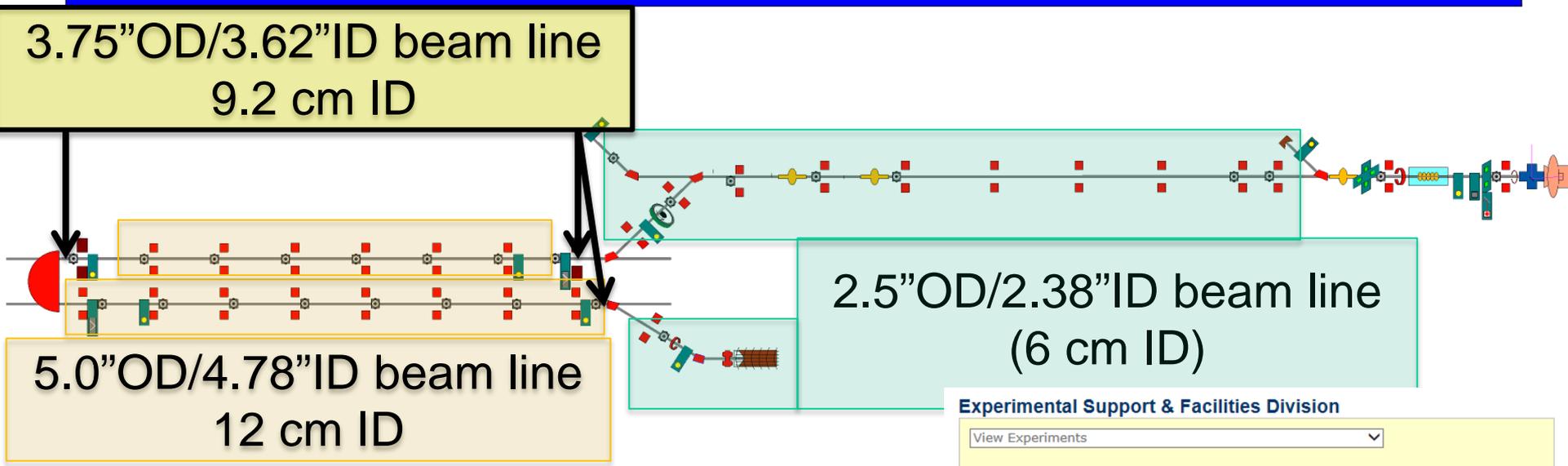
64 m

IP2



Low Energy RHIC electron Cooling

Overall Layout – Beam Line Apertures



Give all meeting presentations to Caitlin Hoffman

LEReC Webpage:

http://www.c-ad.bnl.gov/esfd/LE_RHICeCooling_Project/LEReC.htm

Experimental Support & Facilities Division

View Experiments

Contact Personnel:
Division Head: [Philip Pile](#)
Deputy Head: [Yousef Makdisi](#)
Division Secretary: [Caitlin Hoffman](#)

Facilities & Experimental Support Head: [Al Pendzick](#)
NASA Space Radiation Laboratory: [Adam Rusek](#)
MIRP Program (BLIP/RRPL): [Suzanne Smith](#)

ES&F

- [ES&F Monday Meetings](#)
- [ESSHQ Requirements for C-A Users](#)
- [NASA Space Radiation Lab \(NSRL\)](#)
- [RHIC-AGS Machine Status](#)
- [RHIC Building and Tunnel Identification](#)
- [RHIC Machine/Detector Planning Meetings](#)

Radiation Safety (BNL login required)

- [Radiation Safety Committee \(RSC\)](#)
- [Radiation Safety Check-off List \(xls\)](#)
- [RSC Memos](#)
- [RSC Meeting Minutes](#)
- [RSC Fault List \(xls\)](#)
- [Signed Check-Off List \(pdf\)](#)
- BLIP

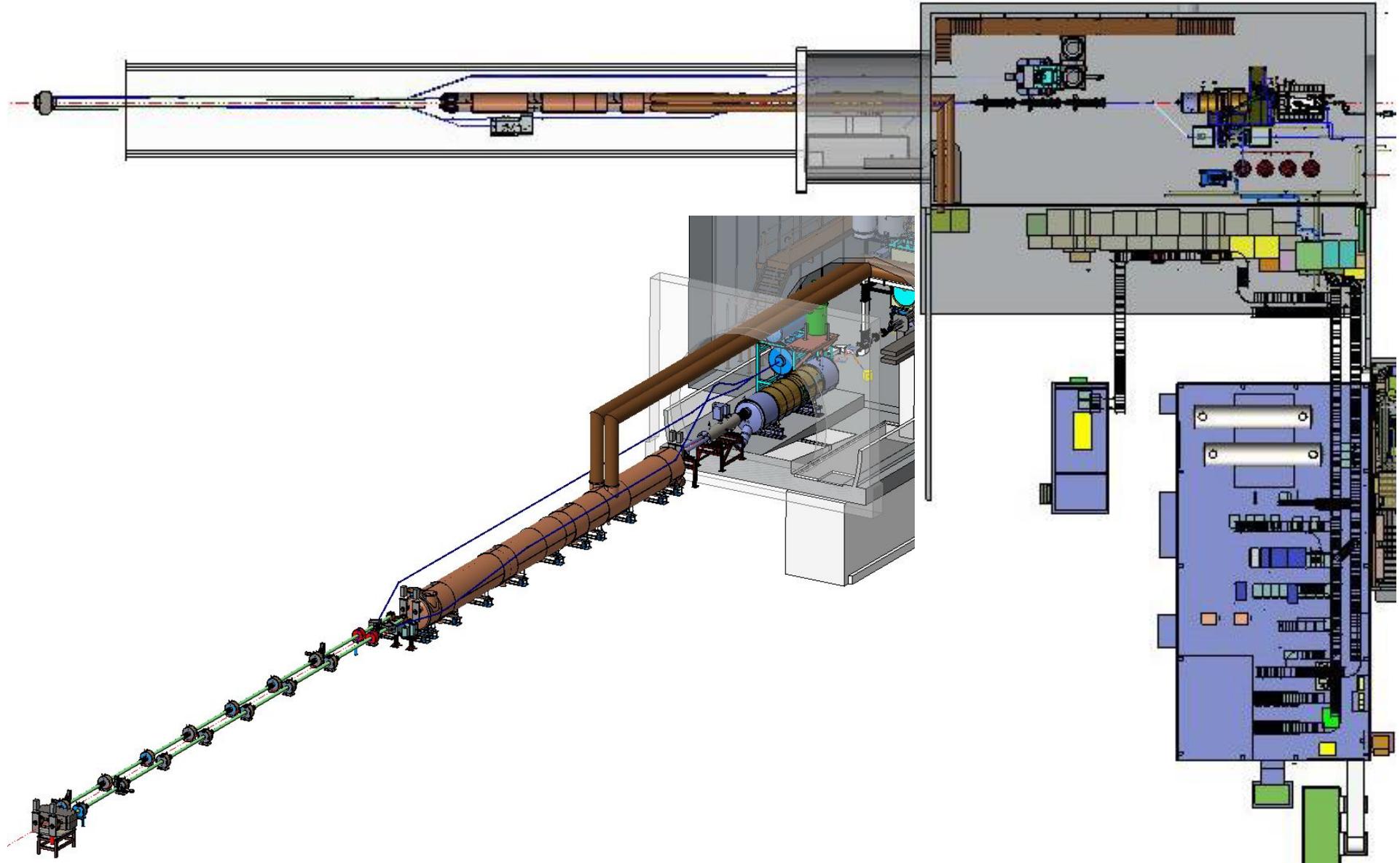
Projects

- [Low Energy RHIC electron Cooling Project \(LEReC\)](#)

Committees

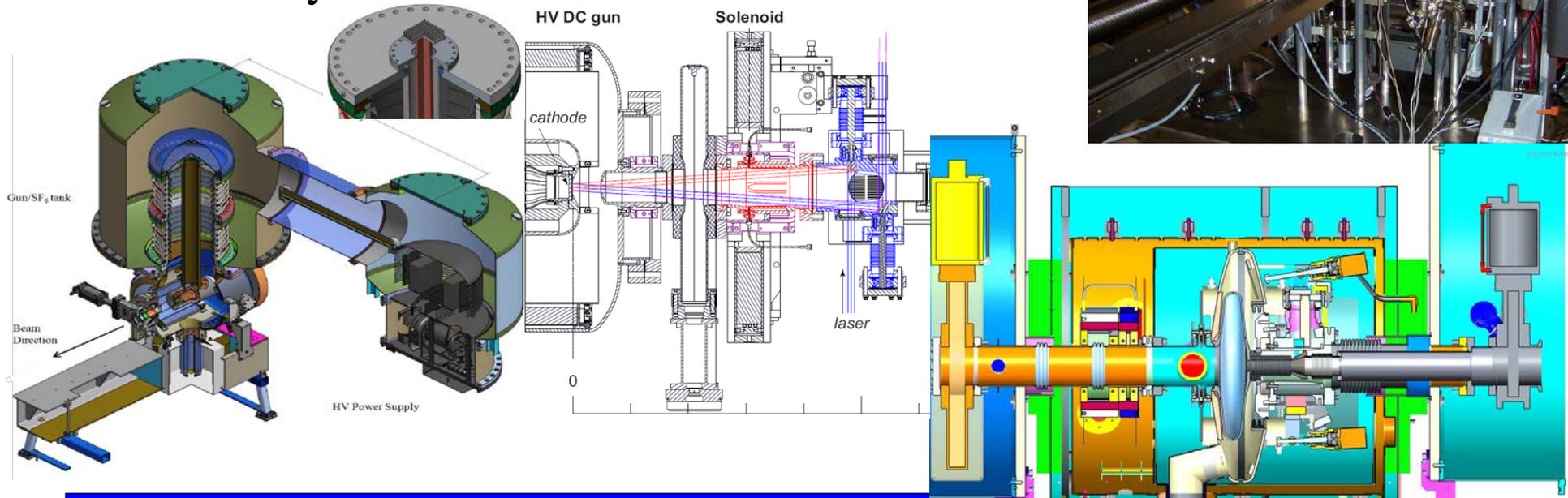
- [Experimental Safety Review Committee](#)

What's New Phase I



What's New – Phase I

- Cornell DC Gun electron source baseline
- DC Gun to “Single Cell Booster Cavity” beamline
- ERL SRF eGun to Single Cell Booster Cavity Modifications
- Production cathode deposition system
- 5 cell cavity installation moved to Phase II
- 9 MHz cavity moved to for Phase I

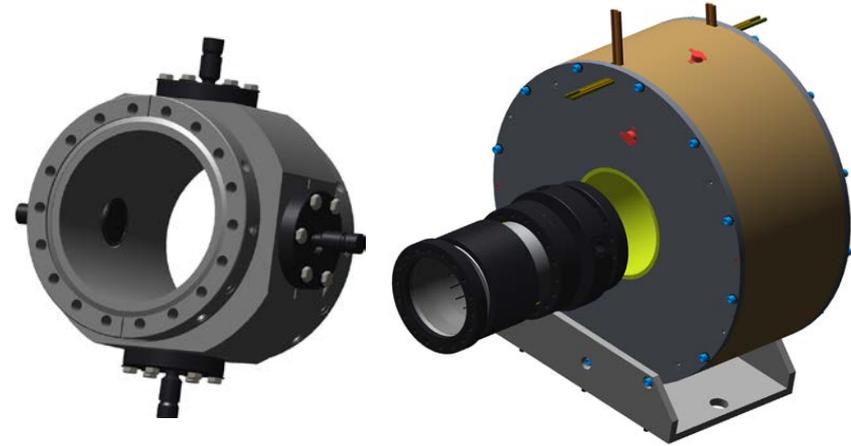


Low Energy RHIC electron Cooling

What's New – Phase I

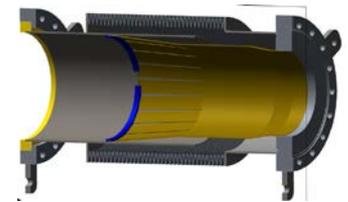
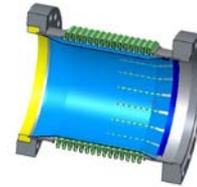
Cooling Section Purchase Orders

- HF and LF solenoid magnets
(HF vendor ordered the wrong wire – 8 week delay?)
- Shielded vacuum valves
- BPM chambers and buttons
(Need 2 smaller aperture BPM's)
- 20° magnets



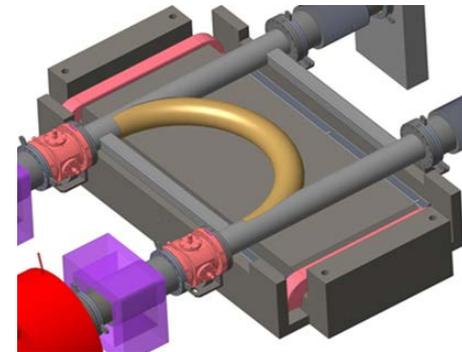
Cooling Section Requisitions and Bids

- Beamline shielded bellow and 180° magnet sliding bellows



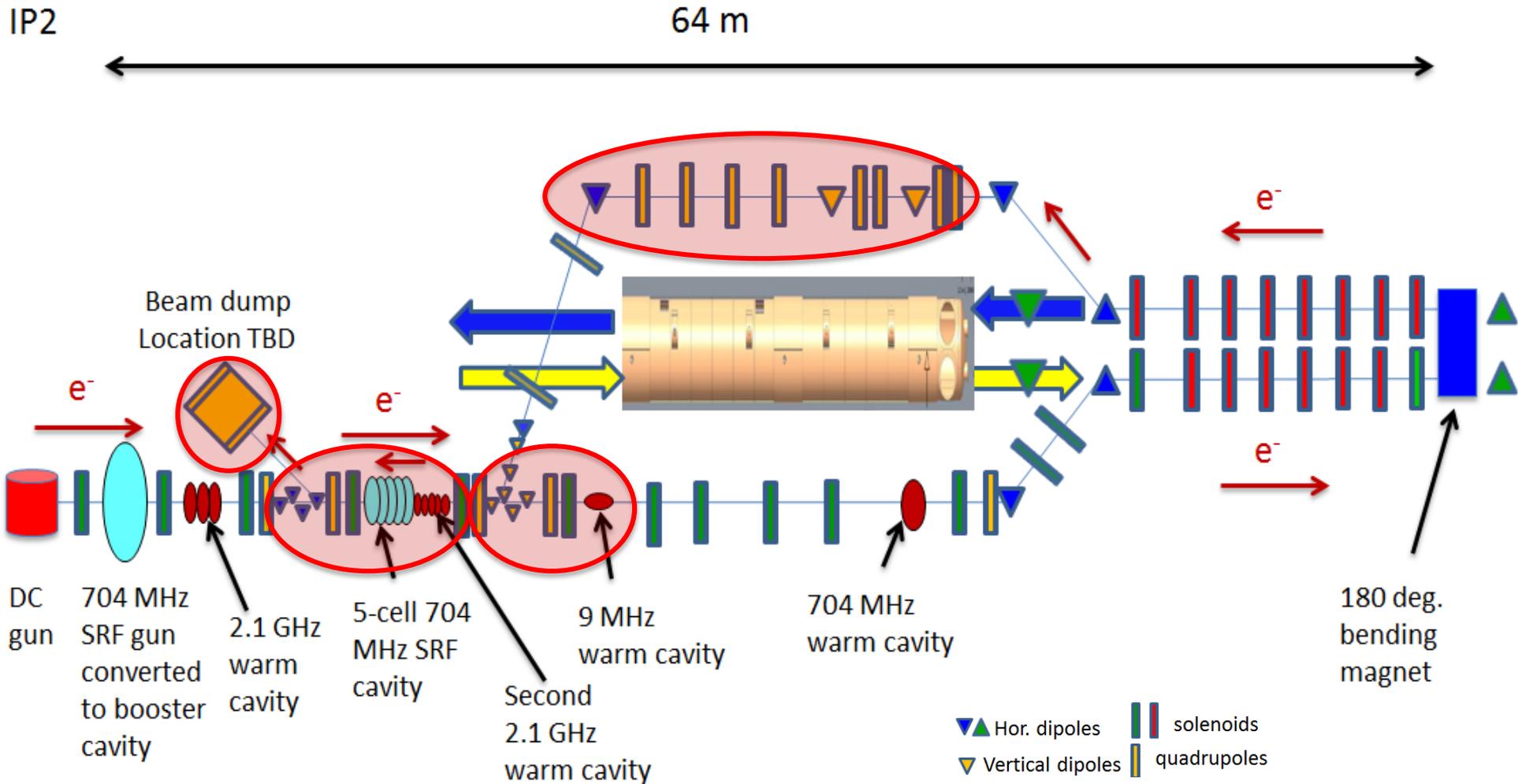
Cooling Section Critical Items (not ordered yet)

- 180° magnet
- Profile monitor and emittance slit vacuum shifters
- Special vacuum chambers: dipole magnet, PM & ES,
- Magnet, vacuum chamber, and equipment stands



What's New – Phase II

“Push/Pull” ERL mode of operation: 2.6, 3.5, 5.0 MeV electron beam.



Low Energy RHIC electron Cooling

Project Schedule

Addition of RHIC run 17 provides 9 months to a tight schedule.
Revised PEP w/Schedule delivered to DOE in April: 1618 tasks
DOE Project Review November 4-5 2015

Staged installation 2015 shutdown:

- cooling section, civil construction, (CeC installation)

Staged installation 2016 shutdown:

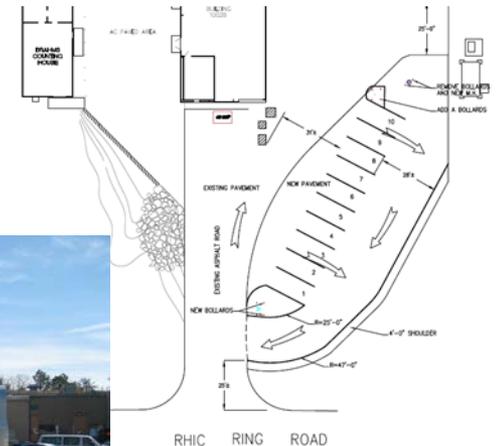
- eBeam transport, warm RF cavities, cryogenics
- civil construction, DC eGun??

Final installation 2017 shutdown: (No run 18)

- ERL: additional 9 months of testing before eGun removal
- 2/28/2017 eGun removal starts, repair/convert to Booster Cavity
- 3/30/18 6 months (min.) dedicated ebeam commissioning

Installation Staging – 2015 Run Period

- Survey beam lines - **beam line reconfigured (DX moves)**
- Test cryogenic system vacuum pumps and compressor (Compressor running for CeC + vacuum pumps being tested)
- Start install cable tray
- **Need to update equipment requirements – planning new penetrations**
- Renovate building 1002D (Brahms)
- New parking lot approved



Installation Staging – 2015 Shutdown



- Move 01:00 sector equipment
- Install RHIC cooling section beamline
 - Magnets, vacuum, beam diagnostics, being designed and ordered.
- ~~Prep beam dump area & floor~~ Moved beam dump location
- Install tunnel cable penetrations
 - Need to update requirements (meeting 5/6/2015)
- Cryogenic piping installation to “shared” equipment with CeC
 - Booster cavity piping installed in 2016 shutdown



Installation Staging – 2016 RHIC Run Period

- Start cooling section cable pulls and terminations
- Power and test RHIC beamline beam diagnostics
- Install RF power amplifiers 1002B
- Install racks and power in 1002D

Installation Staging – 2016 Shutdown

Install SCRF booster cavity to cooling section transfer beam line

- Install beam line magnets, vacuum, beam diagnostics, magnet PS, etc.
- Cable pulls and terminations.
- Install 2.1GHz RF cavity and 704 MHz RF cavity, coax/waveguide to PA, complete PA and system (controls, MPS, etc.) installation.

Install DC gun, cathode, and Laser system ?? In tunnel? At Cornell? In 912?



Installation Staging – 2017 RHIC Run Period

- Commission 2.1GHz RF cavity and 704 MHz RF cavity systems.
- Commission DC Gun with beam.
- Power and test beam line magnets and beam line beam diagnostics.
- 2/28/2017 SCRF eGun removal starts, repair/convert to Booster Cavity.

Final Installation – 2017 Shutdown

Install SCRF booster cavity, RF, vacuum, cryogenics, etc.

Install *DC gun, laser*, and GtB transfer beam line.

- Install beam line magnets, vacuum, beam diagnostics, magnet PS, etc.
- Cable pulls and terminations.
- Install ERL beam dump and beam dump beam line
- Installation complete 12/31/2017



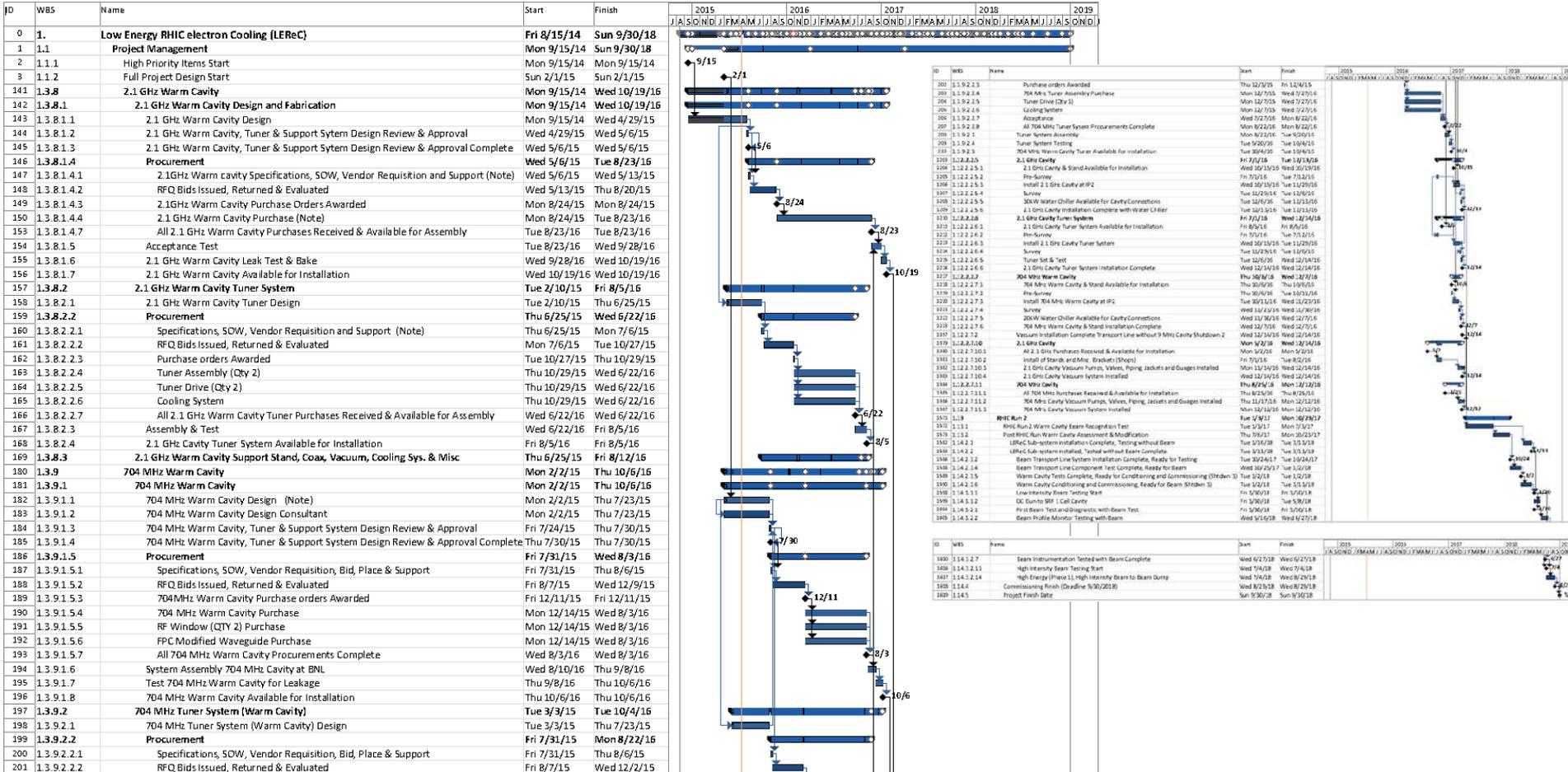
Installation Complete 1/1/18

- January to March: system testing and commissioning
- March 1: cryogenic system start for Booster Cavity Conditioning
- **3/30/2018** e Beam commissioning start

Critical Paths

Cooling section installation

PEP: Warm RF Cavities – 704 MHz and 2.1 GHz



Low Energy RHIC electron Cooling

Reportable Milestones



55 DOE Reportable Milestones

- Physics specifications
- Design reviews
- Contract Awards
- Deliveries
- Installations
- Safety approvals
- System tests complete
- Commissioning w/beam

1st Milestones 4QFY2015

Last Milestone 1QFY2019

(ebeam) Commissioning Finished

9/30/2018

	Level	Reportable Milestones	Date
1.3.9.1.4	1	704 MHz Warm Cavity, Tuner & Support System Design Review & Approval Complete	4QFY15
1.2.2.2.6	1	Accelerator Section Physics Design Review	4QFY15
1.2.3.2.3	1	Extraction Line Lattice, Beam Instru., Beam Dump Physics Design Review	2QFY16
1.2.2.4	1	ERL Testing Complete, Equipment Extraction May Begin	2QFY17
1.3.3.9	1	DC Gun Available for Installation	3QFY17
1.13.3.1.3	1	SRF 1 Cell Cavity Commissioned w/Beam	4QFY18
1.13.5	1	Project Finish Date	3QFY19
1.2.2.2.2	2	Beam Dynamics Optimized for DC Gun	2QFY15 (A)
1.3.7.3	2	Laser Design Review Completed	2QFY15 (A)
1.5.2.3.3	2	Compensating Solenoids Contract Awarded	2QFY15 (A)
1.5.4.3.1	2	Matching Solenoids Specifications, SOW, Vendor Requisition and Support	2QFY15 (A)
1.5.4.3.3	2	Matching Solenoids Contract Awarded	2QFY15 (A)
1.7.2.1.2	2	Design Review for Beam Profile Monitor & Emittance & Energy Spread Slits System for RHIC Cooling Section, Shutdown 1	2QFY15 (A)
1.3.8.1.3	2	2.1 GHz Warm Cavity, Tuner & Support System Design Review & Approval Complete	3QFY15
1.5.1.3.4	2	Magnet, 180° Dipole Contract Awarded	3QFY15
1.3.7.4.5	2	Laser Master Oscillators, Amplifier & Other Contract Award	4QFY15
1.3.8.1.4.3	2	2.1GHz Warm Cavity Purchase Orders Awarded	4QFY15
1.4.1.2.4	2	Power Amplifiers 704 MHz SCRF Booster Cavity (2 req'd) Contract Awarded	4QFY15
1.5.3.3.4	2	Magnet, 20° Dipole Contract Awarded	4QFY15
1.7.2.2.3	2	BPrM for RHIC Cooling, Purchase orders Awarded, Shutdown 1	4QFY15
1.2.2.2.5	2	Beamline Alignment/RF Phase/Stability Studies Complete	1QFY16
1.3.9.1.5.3	2	704MHz Warm Cavity Purchase orders Awarded	1QFY16
1.5.2.3.6	2	Compensating Solenoids Characterized & Available for Installation	1QFY16
1.2.3.2.1	2	Transport Lattice Physics Design Review	1QFY16
1.1.9	2	RHIC Shutdown 1 Deadline for LEReC Cooling Section Installation Complete	2QFY16
1.5.1.3.11	2	180° Dipole Magnet Characterized & Available for Installation	2QFY16
1.5.3.3.7	2	20° Dipole Magnet Characterized & Available for Installation	2QFY16
1.2.3.2.2	2	LEReC Safety Assessment Document Submitted	3QFY16
1.7.2.1.6	2	Beam Dump Diagnostic Design Review, Shutdown 3	3QFY16
1.4.1.2.10	2	Power Amplifier (1 req'd) Rec'd & Available for Installation	4QFY16
1.4.1.2.11	2	Coax Line/ Waveguide Rec'd & Available for Installation	4QFY16
1.4.1.2.12	2	Circulators and DL Rec'd & Avail for Installation	4QFY16
1.3.8.1.7	2	2.1 GHz Warm Cavity Available for Installation	1QFY17
1.3.9.1.8	2	704 MHz Warm Cavity Available for Installation	1QFY17
1.5.5.3.6	2	Transport Solenoids Characterized & Available for Installation	1QFY17
1.12.2.2.7.6	2	704 MHz Warm Cavity & Stand Installation Complete	1QFY17
1.12.2.2.8.6	2	704 MHz Warm Cavity Tuner Installation Complete	1QFY17
1.3.1.1	2	SRF Gun (704MHz Booster Cavity) Removal Start	2QFY17
1.3.7.6.4	2	ERL Testing Complete Laser is Available for LEReC Installation	2QFY17
1.6.1.5	2	Power Supplies for the Matching Solenoids Received & Available for Installation	2QFY17
1.12.2.4.7.3	2	2.1 GHz 3rd Harmonic System Install Complete	2QFY17
1.2.4.2.1	2	SRF Gun Characterization Complete	2QFY17
1.12.2.8.6.4	2	Instrumentation Controls Installation Complete	3QFY17
1.3.1.3	2	SRF Gun (704MHz Booster Cavity) Available for Installation	4QFY17
1.5.6.3.8	2	Metal Shielding Received and Available for Installation	4QFY17
1.8.2.7	2	Extraction Line Components Avail for Installation	4QFY17
1.12.2.3.1.8	2	Beam Dump Installation Complete	1QFY18
1.12.2.5.9.4	2	MU Metal Shielding Installation Complete	1QFY18
1.12.2.1.4.2	2	Install Valvebox Mod for SRF Cryostats, Gun and 5-cell Installation Complete	2QFY18
1.13.1.1	2	LEReC Commissioning Plan Submitted	2QFY18
1.13.1.3	2	ARR Final Report	3QFY18
1.13.2.3.13	2	SCRF Accelerator Cavities Conditioned and Ready for Beam	3QFY18
1.13.3.2.1	2	First Beam Test and Diagnostic with Beam Test	3QFY18
1.13.2.2	2	LEReC Sub-system installed, Tested without Beam Complete	4QFY18
1.13.3.2.7	2	Beam Instrumentation Tested with Beam Complete	4QFY18
1.13.4	2	Commissioning Finish (Deadline 9/30/2018)	1QFY19

Reportable Milestones



Level	Reportable Milestones	Date
1	704 MHz Warm Cavity, Tuner & Support System Design Review & Approval Complete	4QFY15
1	Accelerator Section Physics Design Review	4QFY15
1	Extraction Line Lattice, Beam Instru., Beam Dump Physics Design Review	2QFY16
1	ERL Testing Complete, Equipment Extraction May Begin	2QFY17
1	DC Gun Available for Installation	3QFY17
1	SRF 1 Cell Cavity Commissioned w/Beam	4QFY18
1	Project Finish Date	3QFY19
2	Beam Dynamics Optimized for DC Gun	2QFY15 (A)
2	Laser Design Review Completed	2QFY15 (A)
2	Compensating Solenoids Contract Awarded	2QFY15 (A)
2	Matching Solenoids Specifications, SOW, Vendor Requisition and Support	2QFY15 (A)
2	Matching Solenoids Contract Awarded	2QFY15 (A)
2	Design Review for Beam Profile Monitor & Emittance & Energy Spread Slits System for RHIC Cooling Section, Shutdown 1	2QFY15 (A)

Seven (7) Level 1 milestones

Two (2) Level 1 milestones must be completed before DOE review.

Same 2 Level 1 milestones must be completed before 9/30/2015.

Six (6) completed Level 2 milestones

- Level 1 milestones are the Critical Decisions
- Level 2 are the Reportable milestones that help ensure you achieve the Level 1s

November DOE Reportable Milestones

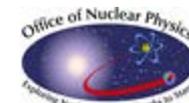


Two (2) Level 1 milestones must be completed before DOE review.
 17 Level 2 milestones: Physics, **Cooling section**, **RF cavities**, **Laser**.

	Level	Reportable Milestones	Date
1.2.2.2.2	2	Beam Dynamics Optimized for DC Gun	2QFY15 (A)
1.3.7.3	2	Laser Design Review Completed	2QFY15 (A)
1.5.2.3.3	2	Compensating Solenoids Contract Awarded	2QFY15 (A)
1.5.4.3.1	2	Matching Solenoids Specifications, SOW, Vendor Requisition and Support	2QFY15 (A)
1.5.4.3.3	2	Matching Solenoids Contract Awarded	2QFY15 (A)
1.7.2.1.2	2	Design Review for Beam Profile Monitor & Emittance & Energy Spread Slits System for RHIC Cooling Cooling Section, Shutdown 1 work complete	2QFY15 (A)
1.3.8.1.3	2	2.1 GHz Warm Cavity, Tuner & Support Sytem Design Review & Approval Complete	3QFY15
1.5.1.3.4	2	Magnet, 180° Dipole Contract Awarded	3QFY15
1.3.9.1.4	1	704 MHz Warm Cavity, Tuner & Support System Design Review & Approval Complete	4QFY15
1.2.2.2.6	1	Accelerator Section Physics Design Review	4QFY15
1.3.7.4.5	2	Laser Master Oscillators, Amplifier & Other Contract Award	4QFY15
1.3.8.1.4.3	2	2.1GHz Warm Cavity Purchase Orders Awarded	4QFY15
1.4.1.2.4	2	Power Amplifiers 704 MHz SCRF Booster Cavity (2 req'd) Contract Awarded	4QFY15
1.5.3.3.4	2	Magnet, 20° Dipole Contract Awarded	4QFY15
1.7.2.2.3	2	BPrM for RHIC Cooling, Purchase orders Awarded, Shutdown 1	4QFY15
1.2.2.2.5	2	Beamline Alignment/RF Phase/Stability Studies Complete	1QFY16
1.3.9.1.5.3	2	704MHz Warm Cavity Purchase orders Awarded	1QFY16
1.5.2.3.6	2	Compensating Solenoids Characterized & Available for Installation	1QFY16
1.2.3.2.1	2	Transport Lattice Physics Design Review	1QFY16

Low Energy RHIC electron Cooling

Critical Procurements



Purchases>\$25K<\$2M			Unburdened Cost		1.18
I.D.	Contact	WBS	3,547,842	Name	Start
286	Mahler	1.5.1.3.5	60,000	Procure 180° Dipole Magnet	5/27/2015
120	Sheehy	1.3.7.4.6	320,000	Laser Master Oscillators & Amplifier Order <i>(partially ordered)</i>	6/25/2015
670	Mapes	1.9.7.2.7	25,000	Heating Jackets	6/29/2015
420	Gassner	1.7.2.2.4	220,414	Procure Beam Profile Monitor & Emittance and Energy Slits System Hardware for RHIC (See Note) Shutdown 1	6/30/2015
229	Zaltsman	1.4.1.2.5	350,000	Power Amplifiers 704 MHz SCRF Booster Cavity (2 req'd)	7/22/2015
232	Zaltsman	1.4.1.2.8	75,000	Coax Line /Waveguide purchase	7/22/2015
233	Zaltsman	1.4.1.2.9	143,555	Circulators and Dummy Load (Note)	7/22/2015
521	Gassner	1.7.7.2.2.4	140,000	Procure BPoM Electronic Components for Cooling Section	8/21/2015
264	Zaltsman	1.4.5.2.4	400,000	2.1 GHz 3rd Harmonic System Power Amplifier	8/15/2015
150	Brutus	1.3.8.1.4.4	135,000	2.1 GHz Warm Cavity Purchase (Note)	8/24/2015
190	Brutus	1.3.9.1.5.4	150,000	704 MHz Warm Cavity Purchase	12/14/2015
191	Brutus	1.3.9.1.5.5	110,000	RF Window (QTY 2) Purchase	12/14/2015

Cooling Section Components
 Warm RF Cavities and PA's
 Laser System for testing at ERL

Contact	WBS	unburdened cost	Purchases<\$25K	Start
Mahler	1.5.2.4	6,000	Fabricate & Assemble Stands	Wed 4/1/15
Belomestnykh	1.3.7.4.12	10,000	Power Amplifier Components	Wed 4/29/15
Mahler	1.5.3.3.11	1,200	Procure Stand, chamber and other Components	Fri 5/15/15
Mapes	1.9.8.2.4	3,000	Cables & Connectors	Mon 6/8/15
Sheehy	1.3.7.4.7	20,000	Frequency Doubling Module	Thu 6/25/15
Sheehy	1.3.7.4.8	6,000	Diagnostics: Cameras & Lenses	Thu 6/25/15
Sheehy	1.3.7.4.9	5,000	Diagnostics: Power Meters	Thu 6/25/15
Sheehy	1.3.7.4.10	4,000	Diagnostics: Photo Detectors	Thu 6/25/15
Sheehy	1.3.7.4.11	20,000	Materials for Pulse Generators	Thu 6/25/15
Mapes	1.9.7.2.4	10,000	180° Dipole Chamber Turn Around, 1 ea	Mon 6/29/15
Mapes	1.9.7.2.6	10,000	20° Dipole Wye Chamber, 2ea in/out	Mon 6/29/15
Mapes	1.9.7.2.8	14,000	NEG Pipe Mods	Mon 6/29/15
Mapes	1.9.7.2.10	1,000	Beampipe Supports	Mon 6/29/15
Sheehy	1.3.7.5.4	10,000	Transport Fibers	Mon 7/6/15
Sheehy	1.3.7.5.5	10,000	Fiber Launch System with Stabilization Feedback	Mon 7/6/15
Sheehy	1.3.7.5.6	6,000	Transport & Control Optics	Mon 7/6/15
Sheehy	1.3.7.5.7	3,500	Transport & Control Optomechanics	Mon 7/6/15
Mahler	1.5.1.3.9	1,200	Procure Stand, Vacuum Chmbr & Hardware for	Mon 7/6/15
Mahler	1.5.4.3.10	2,000	Procure Stands	Tue 7/7/15
Zaltsman	1.4.1.2.9	143,555	Circulators and Dummy Load (Note)	Wed 7/22/15
Mahler	1.5.3.4	1,200	Fabricate & Assemble Stands	Wed 8/12/15
Mahler	1.5.1.4	400	Fabricate & Assemble Stands & Vacuum Chmbr,	Tue 9/15/15
Liaw	1.3.4.2.3	4,000	Purchase orders Awarded	Thu 9/17/15
Liaw	1.3.4.3.1	4,000	Procure Miscellaneous hardware to fabricate DC	Mon 9/21/15
Brutus	1.3.8.2.2.4	20,000	Tuner Assembly (Qty 2)	Thu 10/29/15
Brutus	1.3.8.2.2.5	3,500	Tuner Drive (Qty 2)	Thu 10/29/15
Brutus	1.3.8.2.2.6	5,000	Cooling System	Thu 10/29/15
Brutus	1.3.8.1.4.5	20,000	Fundamental Power Coupler (FPC) Window	Wed 11/25/15
Brutus	1.3.8.1.4.6	5,000	FPC Modified Waveguide	Wed 11/25/15
Brutus	1.3.9.2.2.4	10,000	704 MHz Tuner Assembly Purchase	Mon 12/7/15
Brutus	1.3.9.2.2.5	1,750	Tuner Drive (Qty 1)	Mon 12/7/15
Brutus	1.3.9.2.2.6	5,000	Cooling System	Mon 12/7/15
Brutus	1.3.9.1.5.6	5,000	FPC Modified Waveguide Purchase	Mon 12/14/15

Risk list – project wide



	WBS	Risk Description	Risk Metrics						Mitigation Plan
			Type of Risk	Consequence	Likeli-hood	Schedule Consequence	Cost Impact (burdened \$k)	Risk Expiration	
High Risk	1.0	Electron gun must demonstrate 50 mA CW operation with beam parameters (bunch charge and emittance) needed for cooling	Technical	Level 1	U		0	4QFY18	Cornell University will construct DC gun (funded off-project) similar to the gun which already demonstrated needed parameters. SRF gun in R&D ERL is under commissioning.
	1.0	Production delivery date delays by vendors on multiple components for magnets, power supplies, RF equipment, cryogenics, instrumentation, etc.	Schedule	Level 2	VL	12 weeks	0	2QFY18	BNL purchasing division has assigned a single point of contact for all LEReC procurement who will work with engineering staff on procurement and oversee vendor performance to schedule. The schedule consequence does not impact Project completion.
Medium Risk	1.0	Cryogenic systems, magnet systems, and RF systems will require design and engineering support from 3QFY14 through 2QFY18 for detailed modeling, design, and installation drawings needed for equipment specific to this project.	Schedule	Level 2	L	4 weeks	---	2QFY18	Use of overtime in the design room, limiting additional new projects during LEReC design, realigning project priorities, and hiring staff if needed. The schedule consequence does not impact Project completion.
	1.5	Magnets require correctors as a result of beam dynamics tolerances studies and magnet field measurements	Cost, Schedule, Technical	Level 2	L	16 weeks	100	4QFY17	Tolerance studies will be done with detailed simulations. All magnets will be measured and correctors added as needed. The schedule consequence does not impact Project completion.
Low Risk	1.7	Absolute energy measurement of electron beam requires building dedicated spectrometer beam line	Cost	Level 3	L		200	2QFY16	Various methods are being evaluated.
	1.3	SRF Gun Cathode lifetime, as determined by ERL testing, is lower than design specification.	Technical	Level 2	U		---	1QFY17	Redesign of the cathode insertion system has been added to the ERL R&D program to allow the loading and remote changing of multiple cathodes for efficient egun operations. The cathode production system is also being upgraded to increase production rate.
	1.0	RHIC operating schedule/priorities cause installation delay	Schedule	Level 2	U	4 weeks	---	3QFY17	Careful installation planning, install early, work 2 shifts, coordinate with C-AD Ops. The schedule consequence does not impact Project completion.
	1.0	The LEReC return beam lines adjacent to the triplet in the 01:00 section of RHIC will make access to the LEReC equipment difficult.	Technical	Level 3	L		---	3QFY17	The cable tray, water lines, air lines, magnet, instrumentation, and vacuum stands need to be carefully designed to provide access to the equipment and to meet safety rules for egress.
	1.0	Incoming inspection and testing delays for new components for magnets, power supplies, RF equipment, cryogenic, instrumentation, etc.	Schedule	Level 2	U	8 weeks	---	2QFY18	Maintain staffing levels and funding to support operations, testing of new equipment, and installation. Use of overtime where necessary. The schedule consequence does not impact Project completion.
	1.6	Power supply tolerances (stability) out of specifications	Technical	Level 3	U		---	3QFY17	Frequent communication with manufacturer, testing and verification upon delivery
1.5	Failure of upstream magnet(s) designed for over-focusing/spreading of the beam will impact the dump and could possibly burn a hole in the dump itself	Technical	Level 2	U		0	4QFY18	Testing of existing ERL will provide experience in beam control and insight into energy dissipation into the beam dump. Interlocks should be in place to monitor x-ray production/distribution from dump, over-focusing magnet current and temperature, dump level vacuum.	

LEReC Cooling Section Design Room



Design 180° dipole chamber for impedance review (KH)

LF & HF solenoid and 20° dipole fabrication drawings (KH)

BPM chamber and buttons (VDM)

Beam Line 5" bellows with shields fabrication drawings (GW)

20° dipole vacuum chamber for impedance review (KH)

180° dipole fabrication drawings (KH)

Beam Diagnostics ES W slit & chamber fabrication drawings (VDM)

Beam Diagnostics PM YAG, mirror, mount, & chamber fabrication drawings (GW)

180° vacuum chamber + large sliding bellows fabrication drawing (KH)

Beam Instrumentation PM ferrite insert (GW)

20° dipole vacuum chamber (KH)

20° and 180° stand drawings (KH) ↘

Beam line solenoid stand LF Solenoid, BPM, and long pipe are to be independently positioned and surveyed on common stand.

Magnetic Shielding drawing and solenoid magnetic measurement test station

Cable tray and penetration drawings

Phase 2: 5 cell cavity positioning (RM)

RHIC 1:00 move real estate drawings (V.DM.)

DC Gun Vacuum Chamber Fabrication Drawings (JH)

DC Gun SF6 Pressure chamber specification control drawings (JH)

DC Gun cathode cooling design (JH)

DC Gun to Booster SRF booster cavity beam line (JH)

DC Gun stands (JH)

Phase 2: 5 cell cavity positioning (RM) – Revised Position

Phase 1 and 2 cryogenic system layout (RM)

2.1 GHz warm cavity fabrication drawings (MG)

704 MHz warm cavity fabrication drawings

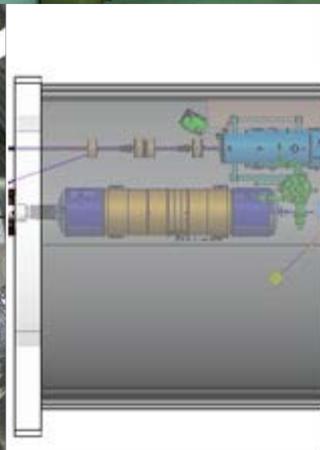
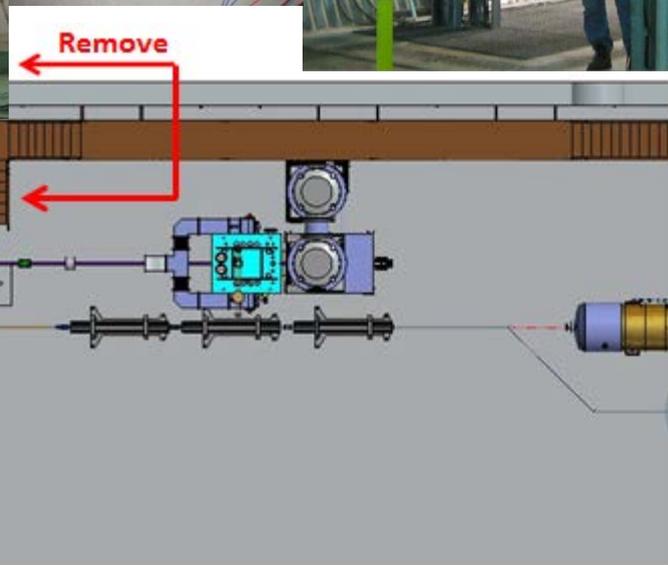
DC Gun cathode insertion drive

DC Gun cathode coating system upgrade – coating system vacuum chamber

Transport line layout drawing (RM/VDM)

Sector 2 Modifications

- Move cable tray, relocate cables 01:00: Triplet and DX Magnets
- Remove stairway and part of cross-over platform
- Move Access Controls Gate



Low Energy RHIC electron Cooling

Meetings



Invite who you need to be there and Cc everyone on the project (C. Hoffman)

Give all meeting presentations to Caitlin Hoffman

Weekly (regular)

- Cooling section design
- Beam diagnostics

Weekly (irregular)

- Warm RF Cavity systems

Other

- Physics
- Conventional facilities: rack space, cable trays, cable penetrations
- Engineering as needed

Weekly (soon)

- Transport line design

DOE Review Summary 1/15/2015, 11/4/2015



The LEReC system will be built using as much existing equipment as possible to reduce facility cost and shorten schedule.

*New SRF equipment for the B912 ERL is built and will be tested over the next two years to confirm performance. **ERL operation underway.***

The RHIC 02:00 has much of the support equipment needed to support the LEReC system.

Equipment to be procured is within the state of the art and is available from commercial vendors. **First procurements on schedule.**

The project schedule works well with the completion of other upgrade projects at RHIC. Experienced personnel are available.

Cooling section modifications and installation on schedule.

Civil construction 02:00 on schedule.

Critical path items ordered/on schedule (2.1 GHz and 704 MHz systems)

Pictures instead of models