



Managed by Fermi Research Alliance, LLC for the U.S. Department of Energy Office of Science

Fermilab PIP-II R&D Plan with Indian Institutions CY2015-CY2018

Shekhar Mishra

Deputy Project Manager, PIP-II

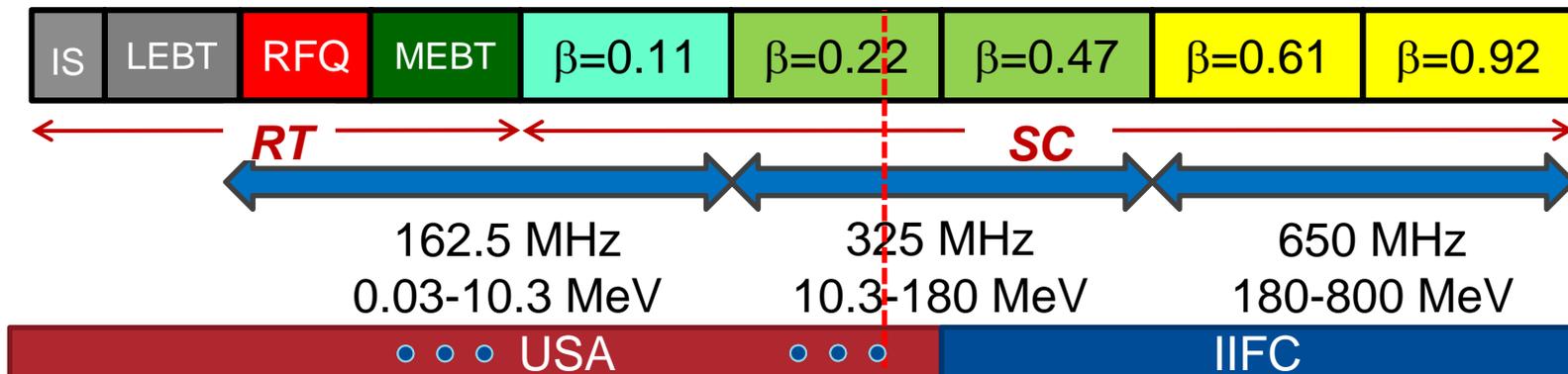
Indian Institutions and Fermilab Collaboration

Fermilab

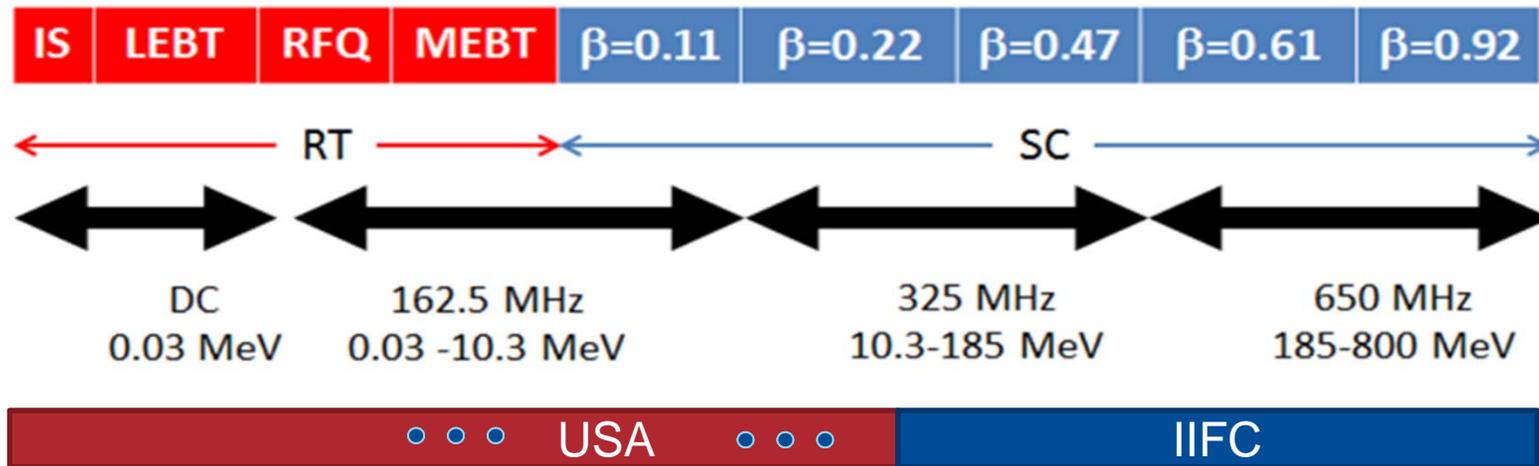
July 21, 2015

PIP-II R&D Goals:

- US Collaboration
 - Development of PXIE (~25 MeV) Test Linac
 - Source, LEBT, RFQ, MEBT, HWR CM, SSR1 CM
- Indian Institutions and Fermilab Collaboration (IIFC)
 - Development and testing of SSR1 Cryomodule
 - Testing with beam at PXIE
 - Development and testing of one HB650 MHz Cryomodule
 - Testing with the Cryomodule Test Facility at Fermilab
 - Development LB650 Dressed Cavities.
 - Testing with Horizontal Test Stand
 - Development of SSR2 Cavities.
 - Testing with Vertical Test Stand



Areas of R&D International Collaboration



High Power Tested Dressed SRF Cavity

- $\beta = 0.22$: IUAC & VECC
- $\beta = 0.47$: BARC & IUAC
- $\beta = 0.61$: VECC (**Europe**)
- $\beta = 0.92$: RRCAT
- 325 MHz RF Power: BARC
- 650 MHz RF Power: RRCAT

Non SRF components (BARC)

- Cryogenic Plant and Distribution
- RF
 - LLRF
 - Protection System
- Instrumentation: BPM, BLM
- Controls
- MEBT Magnet

LB650 Dressed Cavities

- IIFC with VECC as the lead laboratory, has worked to develop a preliminary LB650 5-cell cavity design.
- **It is planned that**
 - **LB650 Dressed Cavities will be built by VECC/DAE**
 - **Two Dressed LB650 Cavities will be produced by IIFC**
 - **High Power tests of the Dressed Cavity will be done at Fermilab**
- **A minimum of two Dressed cavities will be needed to certify the design by Q4 CY2018.**

IIFC

IIFC

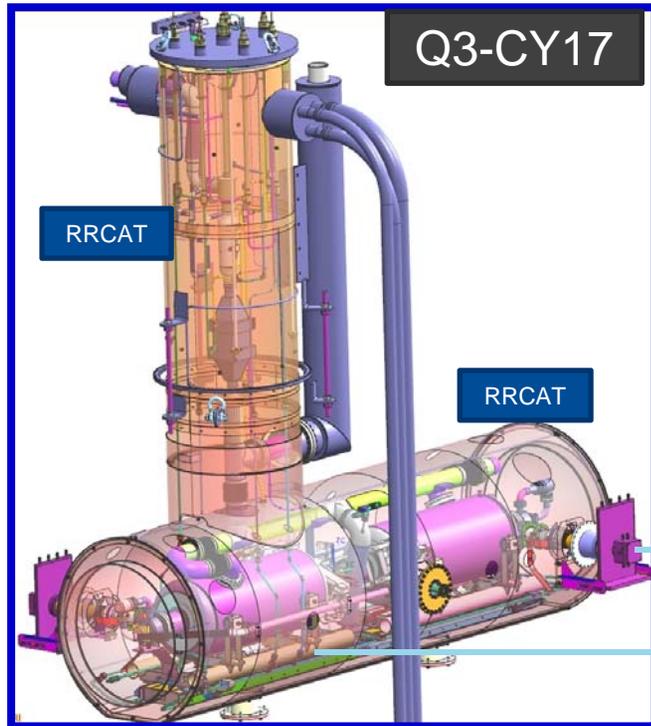
SSR2 Cavity

- **IIFC with BARC as the lead laboratory will work to develop a SSR2 cavity design.**
- **It is planned that**
 - **Fermilab will provide Nb for two SSR2 Cavities to BARC**
 - **SSR2 Cavities will be built by BARC**
 - **Processing and Low Power tests of the SSR2 Cavities will be done at Fermilab**
- **A minimum of two cavities will be needed to certify the design by Q4 CY2018.**



Horizontal Test Stand

Q3-CY2017



Two 40 kWatt Units (RRCAT)



FNAL

FNAL

FNAL:
 Cryogenic for HTS at FNAL July 16/17
DAE:
 Two 40kW RF Dec 16
 LLRF/RF Protection Oct 16
 Control System Jan 17
 Integration with cryostat at RRCAT July 17
 Integrate HTS-2 delivered at Fermilab Aug 17
FNAL:
 Install 1st Dressed Cavity at FNAL Sept 17

IIFC RF Protection (BARC/FNAL)

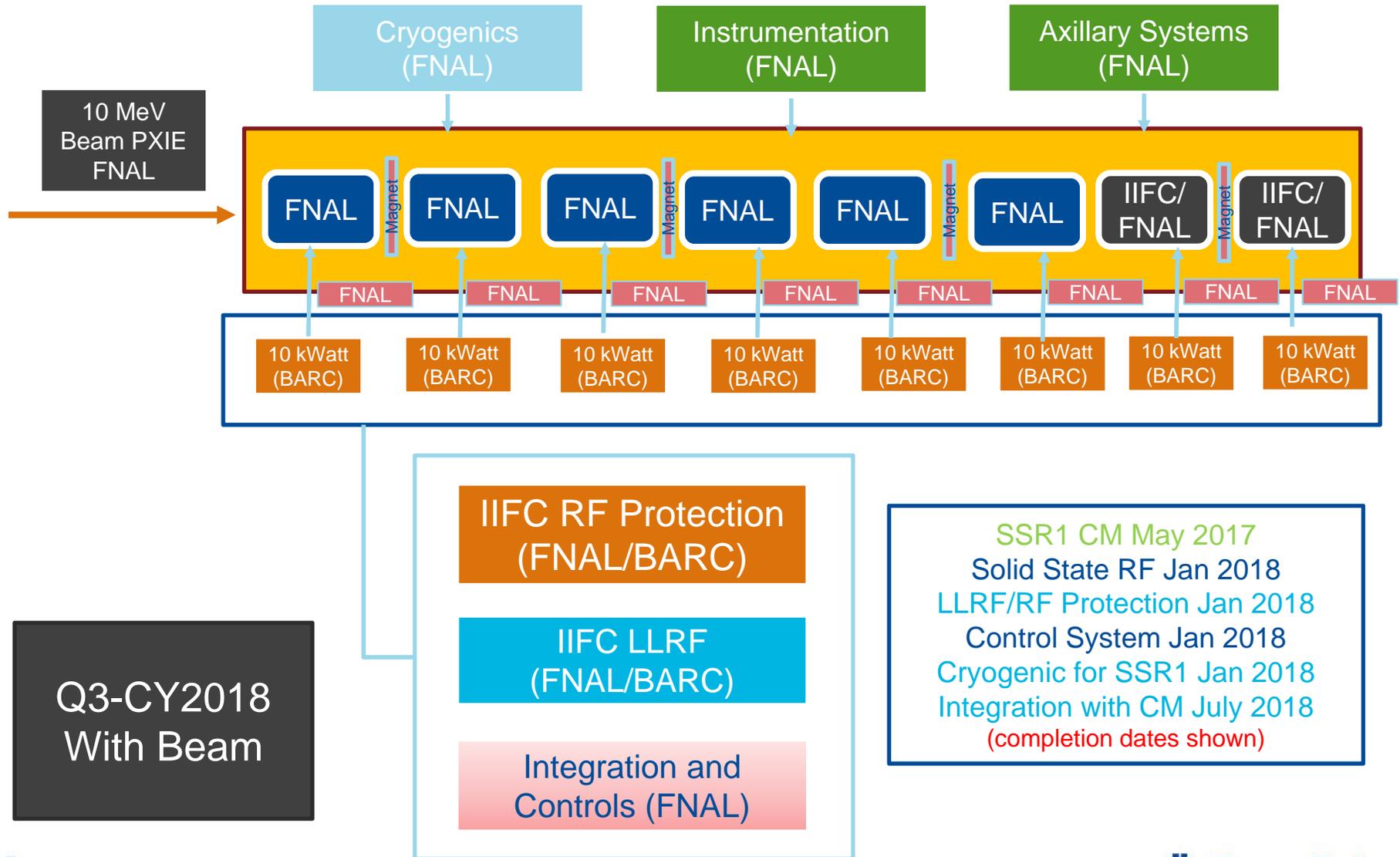
IIFC LLRF (BARC/FNAL)

IIFC Controls (BARC/FNAL)

Integration (DAE/FNAL)



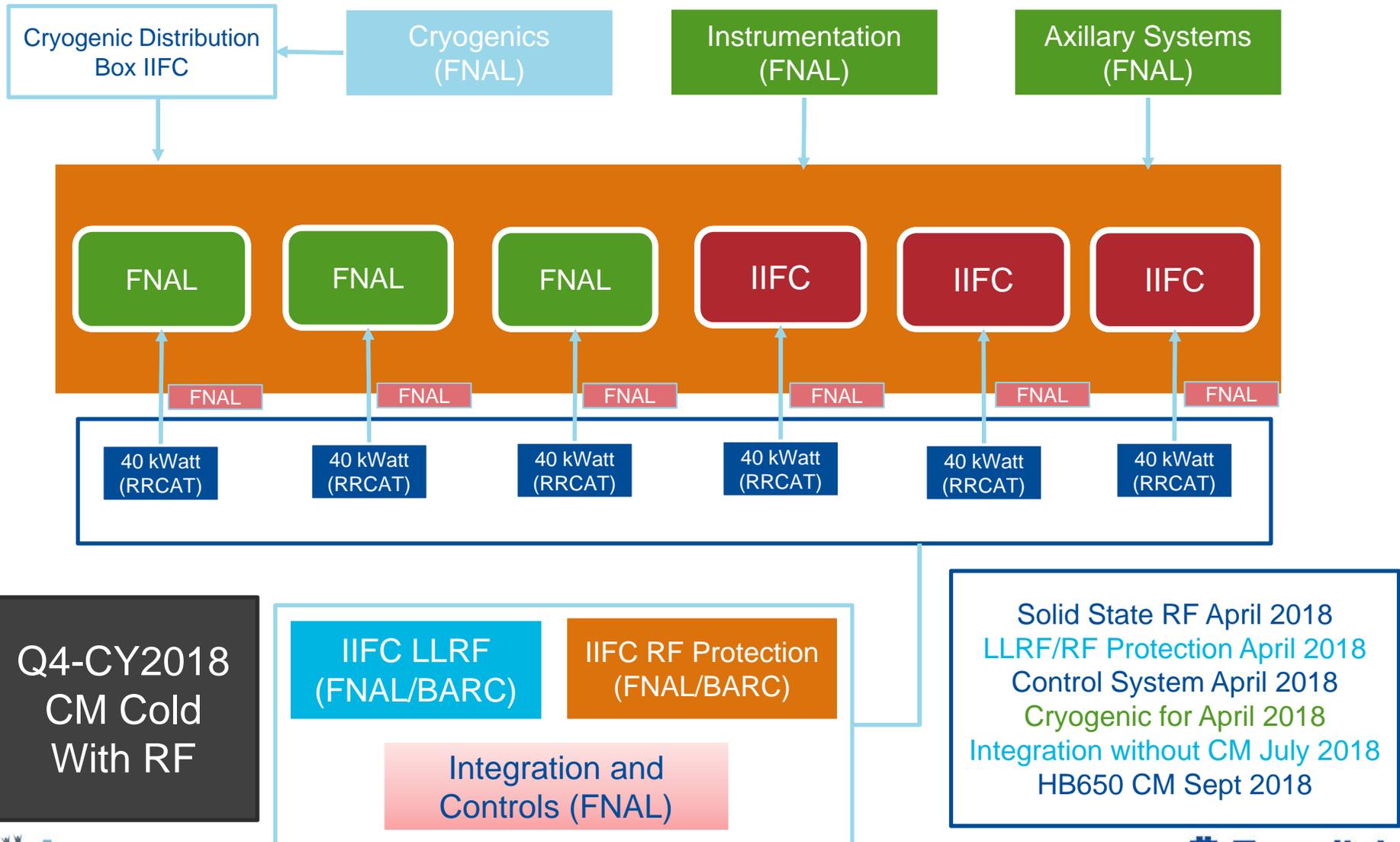
System Test of SSR1 CM and RF Power with Beam



Q3-CY2018
With Beam



Integrated Test of HB650 Cryomodule and RF Power



High Level Scheduling Documents: *Shekhar, Steve, Hasan, Nigel, IIFC*

Fermilab PIP-II R&D Plan: CY2015-CY2018

Edited by Shekhar Mishra

(On behalf of the PIP-II Management and Fermilab PIP-II Sub-Project Managers)

PIP-II, Fermilab

Teamcenter #ED0003026

This document has been
Development RD&D goal
technologies that we are
The PIP-II RD&D is being
United States and India.
and Fermilab Collaborati

Joint Project Document For the Research and Development Phase of the Indian Institutions and Fermilab Collaboration

Teamcenter #ED0003024

PIP-II R&D Goals:

1. Prologue

This document has been prepared
scientific, technical and financial
described in detail and agreed
VECC and IUAC) addendum M
MOU. These documents were
were brought under the "Imp
United States of America and
Cooperation in the Area Acc
Discovery Science" which was
Institutional MOU on Jan 16,

*Structure Manager x

* ED0001224--;1-PIP-II EPDM (eBOM) - Working; Any Status - Date - "Now"

BOM Line	
ED0001224--;1-PIP-II EPDM (eBOM)	
ED0001225--;1-PIP-II LINAC EPDM (eBOM)	
ED0001677--;1-PIP-II HTS-2, EPDM (eBOM)	
ED0002103-B;1-PIP-II PRE CD0, ROLLUP, PROJECT GOALS AND TIMELINES (eBOM)	
ED0002530--;1-IIFC DELIVERABLES (eBOM)	
ED0002531--;1-PIP-II and IIFC Deliverable	
ED0003024--;1-JOINT PROJECT DOCUMENT FOR THE R&D PHASE OF THE IIFC	
ED0003026--;1-PIP-II R&D PLAN - CY2015 - CY2018	
ED0002858--;1-CRYOGENICS, PIP-II, EPDM	
ED0002857--;1-CONVENTIONAL FACILITIES, PIP-II, EPDM	
ED0002859--;1-BEAM DELIVERY, PIP-II, EPDM	
ED0002855--;1-CONTROL SYSTEMS, PIP-II, EPDM (eBOM)	
ED0002818--;1-PIP-II REFERENCE DESIGN REPORT	

