



# HIE-ISOLDE Project Status Report

Y. Kadi for the HIE-ISOLDE Project Team

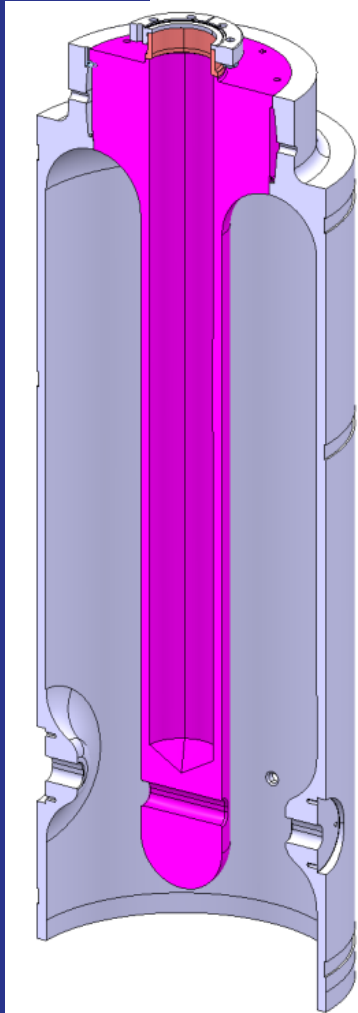
46th Meeting of the INTC  
CERN, 12-13 February 2014

- Technical Advances
- Procurement
- Installation works
- Schedule
- Conclusions



# High beta cavity procurement

Version 2



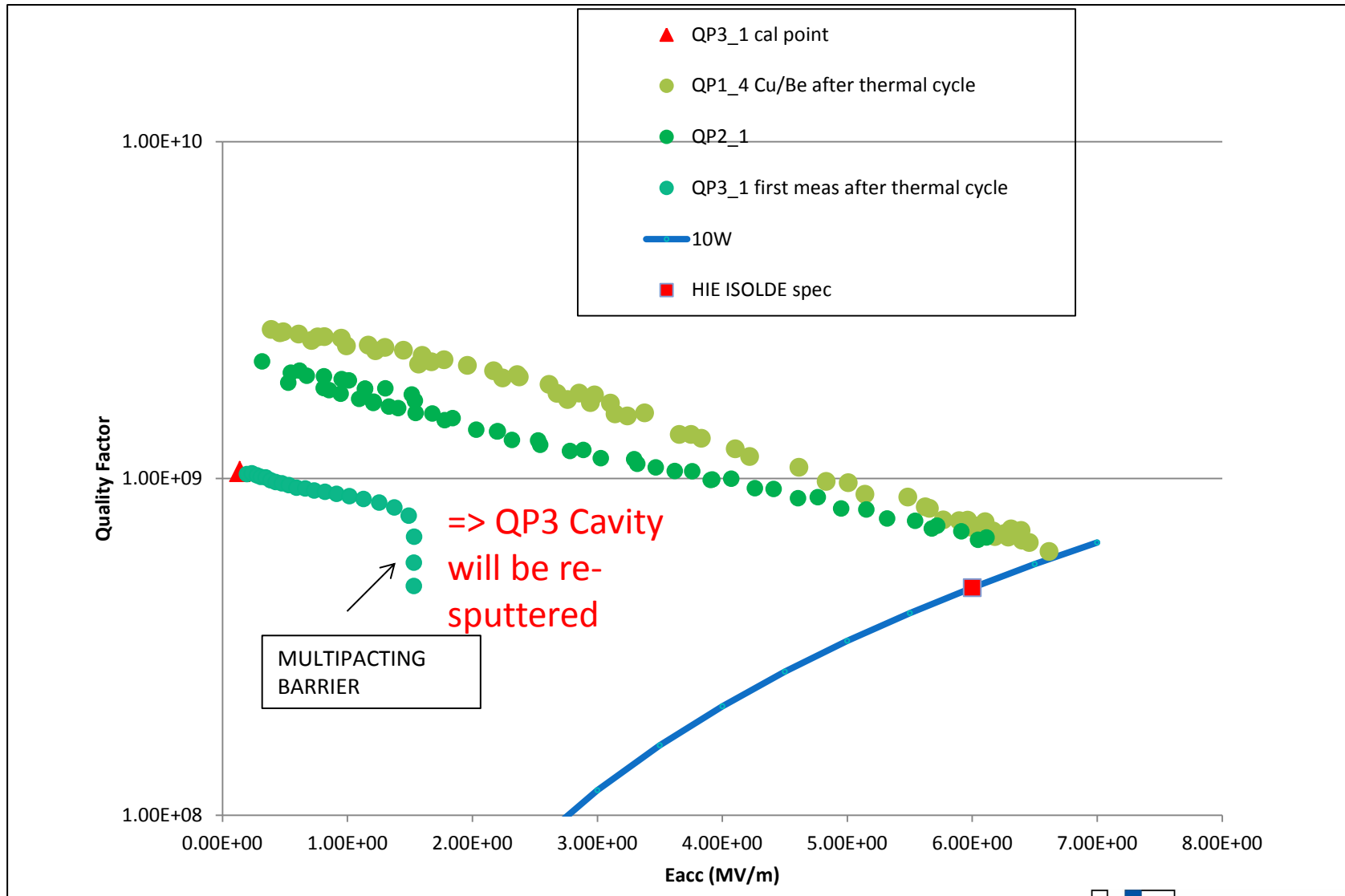
Two series cavities (QP2 and QP3) produced at CERN have been coated

Delivery of first 2 pre-series units from industry (Research Instruments) ~~before the end of the year~~ now expected by mid-March  
The rest of the batch should arrive as initially foreseen

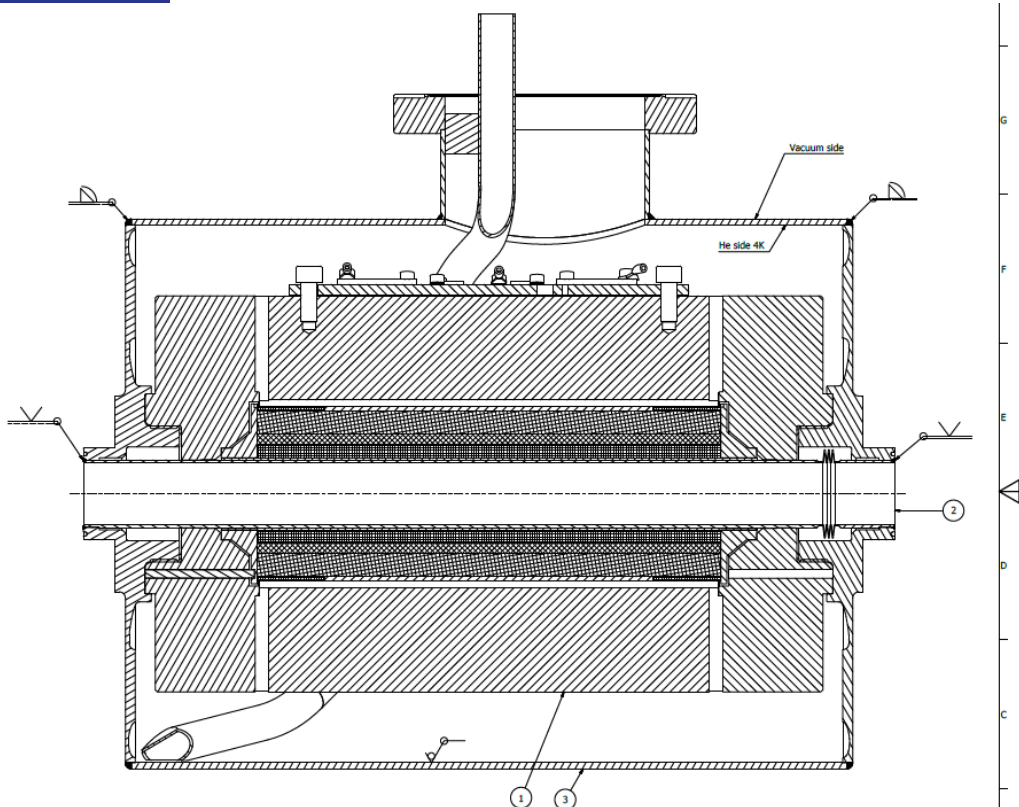
All of the series inner conductors already pre-machined => No major impact on schedule.

6 weeks until next cavities arrive to be used to understand frequency shift observed on QP2 and QP3 and to strip and re-coat QP3.

# Performance of Series Cavities



# Superconducting Solenoid



Production procedure:  
 General welding:  
 Full welding outside and tag welding inside.  
 TIG with a high alloy welding wire for low ferrite content.  
 Recommended wires: SANDVIK 20.25.5 L Cu.

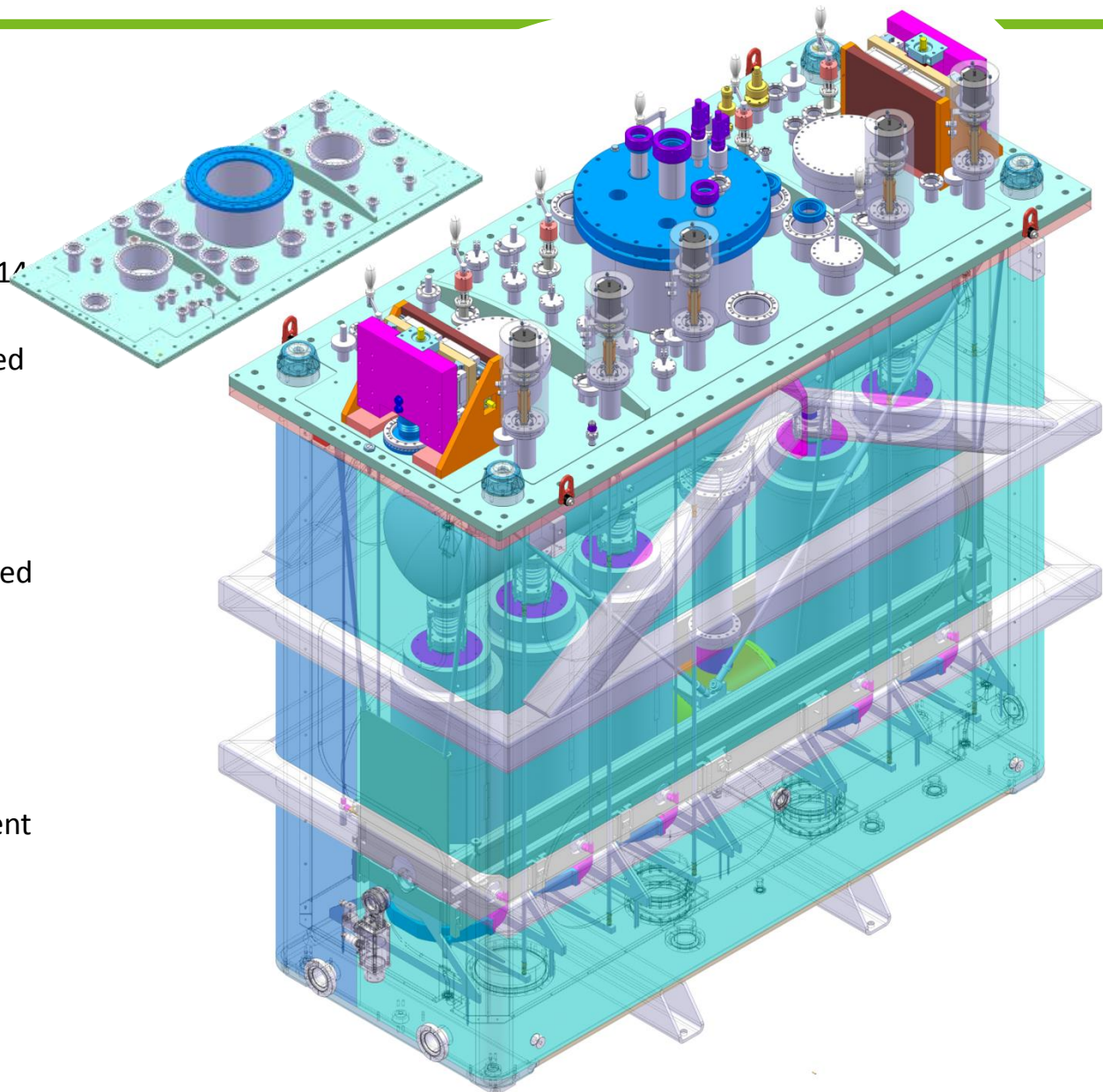
Electro Polishing  
 Ra 0,1 (Super finish/ Mirror finish)

3	1	He vessel cover	720302891	
2	1	Beam pipe	720302708	
1	1	Solenoid Magnet Assembly	720302708	

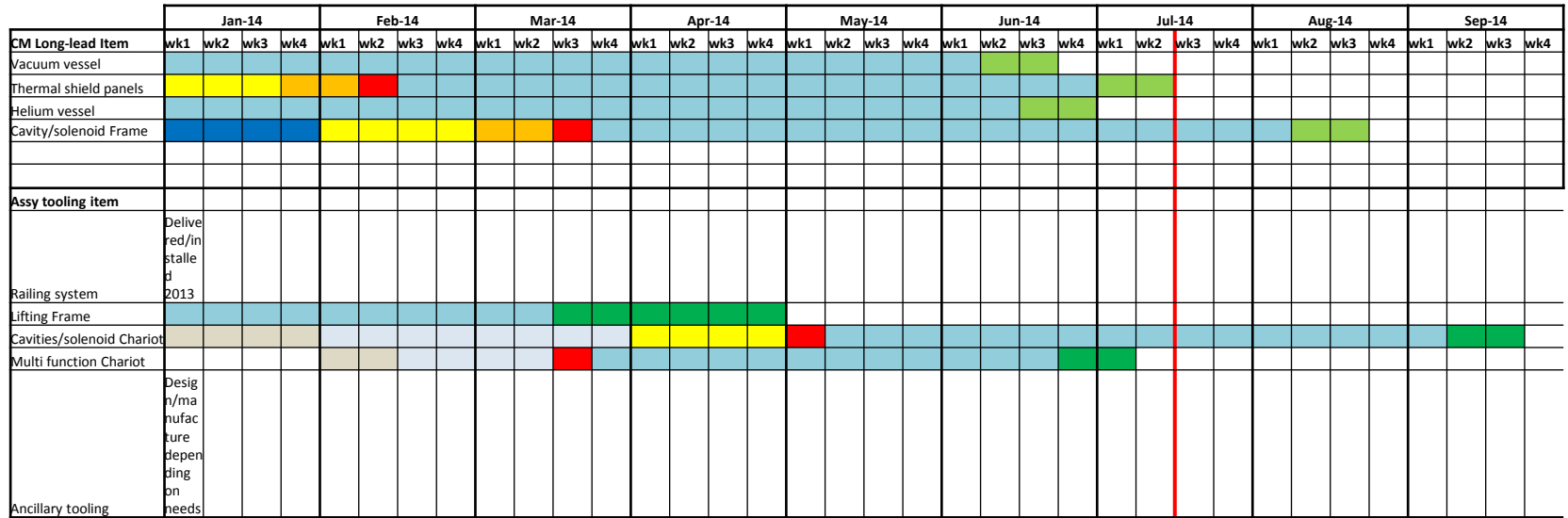
- Design was revised in June to cope with differential thermal contractions during cool down transients
- Final Design Report approved
- Test bench ready
- First 2 units assembled and ready for training and tests
- First solenoid delivery foreseen end February beginning of March 2014
- Second end March 2014

# Cryomodule assembly

- Procurement of leading items completed (Vacuum vessel, He vessel, Thermal shield and cavity/solenoid support frame): delivery expected by mid-July 2014
- Thermal shield: lack of response from industry => will be in-sourced at CERN.
- New sets of 4 Support adjusters ordered through CATE.
- Rest of CM sub-assemblies and small components will be produced via CERN Central Workshop (EN/MME).
- **Procurement of CM assembly tooling now on critical path.**
- CM design team has been reinforced to accelerate procurement (2 additional designers + 1 Safety engineer)



# CM Assembly Planning



Start of assembly in clean-room



# Technical Advances

## ● SC Linac

- Cavity series production started
- RF coupler and **tuner** systems are being validated
- LLRF prototype successfully tested => series production underway
- SC solenoid design approved=> fabrication starting
- Cryomodule design finalized => procurement underway for long-lead items

## ● High-Energy Beam Transfer lines

- Layout frozen => tracing on the floor
- Dipole and quadrupole Magnets + supports ordered
- H/V corrector magnets by end of November
- vacuum chambers design to be finalized soon
- Diagnostic boxes under procurement

## ● Design Study for the Intensity Upgrade well underway

- Target + Front-end (FE8 and 9)
- **Offline separator test bench**
- HVAC + Cooling => nuclearization
- **Charge Breeder => assembly of electron gun, test at BNL (US)**
- **HIE-ISOLDE Workshop: The Technical Aspects** <https://indico.cern.ch/event/255042/>

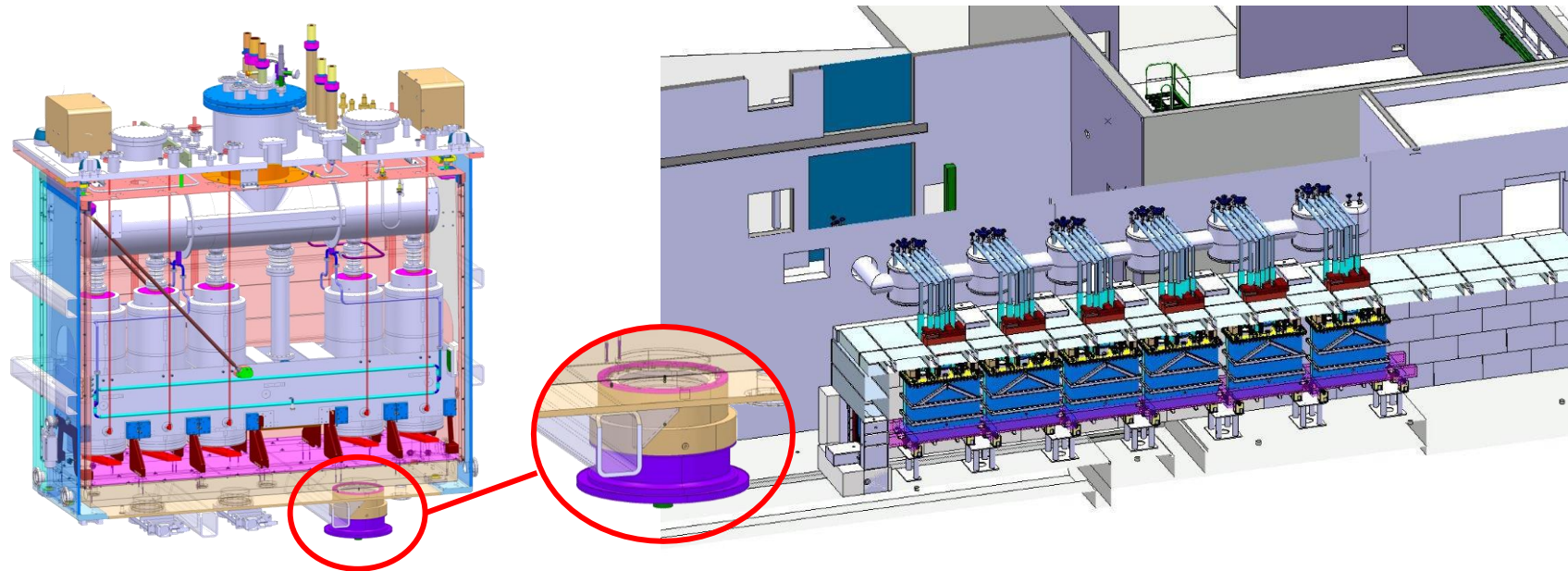
# Safety Issues

- Recommendation from IAP from 11<sup>th</sup> of April 2013:
  - *“A review on the safety aspects of ODH (Oxygen Deficiency Hazard) is planned and the committee also recommends it”*
- The Safety Review took place the 5<sup>th</sup> of November 2013
- Covers ODH as well all the other Safety Aspects of the project
- Internal Reviewers: CERN Safety expert, TE-CRG Cryogenic Operation for Accelerators, Chairman BE-OP-PS Operation
  - External Reviewers: INFN Legnaro, TRIUMF Canada



# Cryogenic Hazard

Safety devices of the Insulation Vacuum Vessel placed at the bottom of the cryomodule due to space constraint on cryomodule top plate → **Safety issue for the access during steady state**



*Acknowledgment : Y.Leclercq*

All Safety devices (for LHe tank and Insulation Vacuum Vessel) → now routed outside the tunnel → **No safety issue**

**Space between CM and tunnel roof to impact on pipe routing and possibly roof girder position**

# HIE ISOLDE installation works



# Status Bldg 198 & 199

## ● Building 198, Compressor building:

- EL power cable trays and cabling done, power connections ongoing
- CV Electrical cabinets installed, connecting of power and instrumentation ongoing
- Air ducts and diffusers installation done
- Pumps all installed and connection instrumentation ongoing
- Tubing inside B198 largely done
- Ventilator openings in roof to be done
- Installation and piping of refurbished compressors as of end February followed by electrical cabling in March

## ● Building 199, Cold Box building:

- All openings in walls between the different buildings for EL , CV and Cryo done
- Ventilator openings in roof to be done
- Ventilation units all in place and adjusted with regard to unequal floor surface. Connections water and air ducts done
- Air ducts inside B199 largely done
- EL power cable trays installed, cabling ongoing
- RF room closed (sandwich panels in place)
- New power transformer installed outside B199, connections ongoing



# Status Bldg 170

## ● Hall 170:

- Tunnel walls done and last level of concrete blocks installed. Few missing blocks at end shielding to be installed week 27 Jan and removal of spare blocks
- Special size blocks for shielding door to arrive week 27 Jan
- Chariot shielding door installed end Dec., wall adjusted for free running of the door
- Installation of air ducts and diffusers along the walls done. Missing small connecting part to B199
- Installation EL power cable trays ongoing: Inter connecting power room B197 and new B199 along Saleve wall and under ventilation room(B170) ongoing – to finish start next week
- Retracing and verification of the linac and HEBT elements done this week
- Rack platform ready for cable tray installation – to be in place end March
- Metal carrying structures for roof ventilators in place. Opening roof foreseen next week (VIC 27 Jan)
- Metal covers for lateral trench to be cut to correct size
- Drawing and drilling HEBT supports holes (with templates) in Feb (1 day) in coordination with other floor work
- Installation of HEBT supports March/beginning April in coordination with other floor work
- Priorities metal structures:
  - Metal structure holding HEBT cable trays from platform into hall (design ready to be validated) – installation mid Feb – mid March with trays
  - Metal structure in tunnel (design to validate) – installation beginning March + 2 wks
  - Metal structure jumper boxes between tunnel and B199 (design to finish & validate) – installation beginning March + 2 wks
  - Metal structure / beams under RF racks (AYPA) to be in place end Feb

# Hall 170



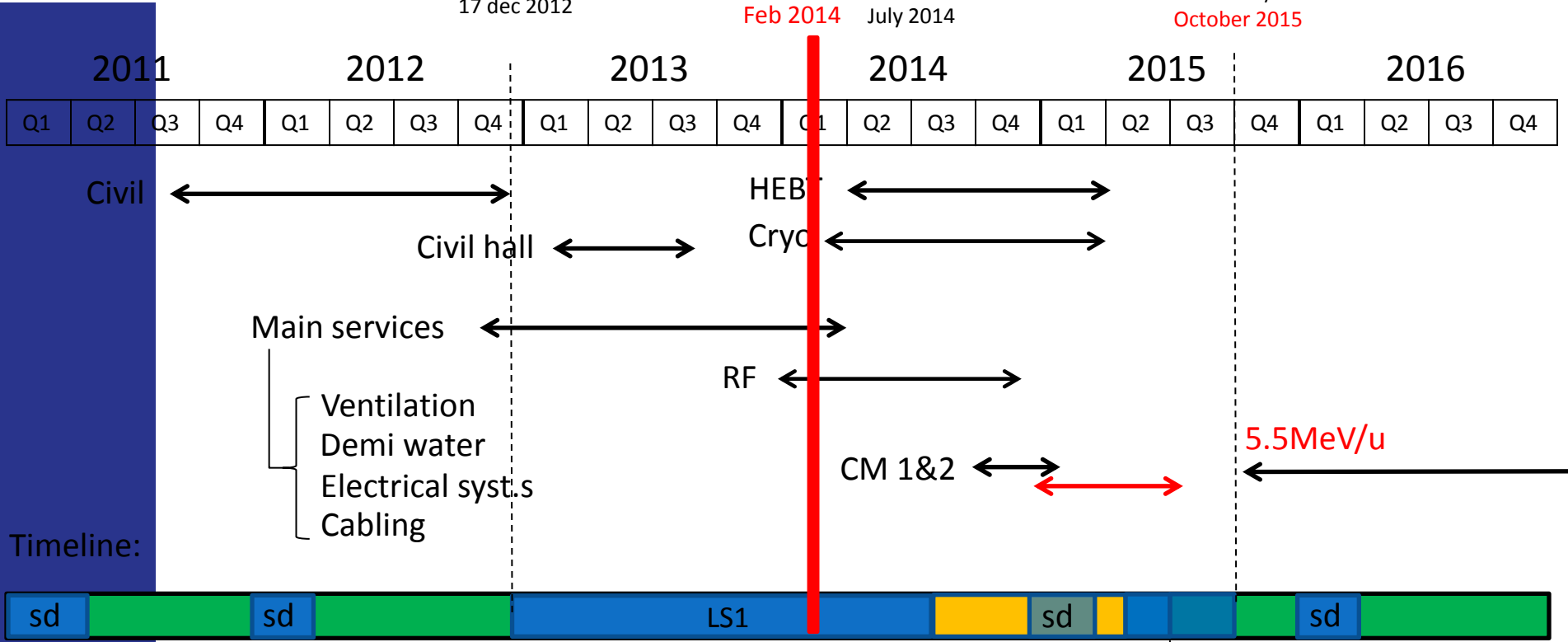
# Status Bldg 197

## ● Building 197:

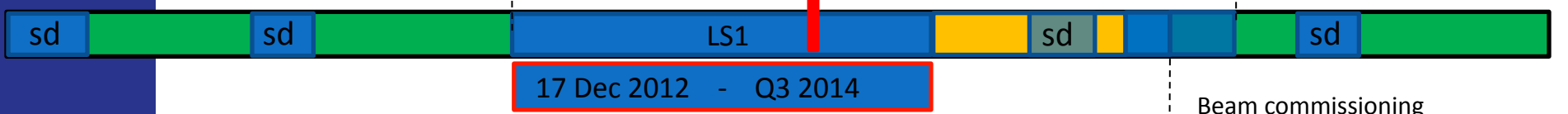
- All new pumps in place, electrical connections ongoing
- Target cooling water station to be connected
- Tubing between the different water stations largely done (inside B197, outside B170 and into B198)
- Aiming for deadline 15 March to have station ready for the ISOLDE facility low energy part cold-check and run
- Key dates water:
- 31<sup>st</sup> March for the ISOLDE hall (including separator magnets)
- 7<sup>th</sup> April for the target cooling water (the small separate station)
- 26<sup>th</sup> to 30<sup>th</sup> May for the BTY line
- 
- B197 1<sup>st</sup> floor: HT power room: Reservation for the HT cable to connect B197 to the new HIE Isolde power installation in B199 done
- EL HT cabling along B170 roof to newly installed HIE ISOLDE transformer at B199 ongoing

# HIE Simplified Planning

Start Isolde shutdown 17 dec 2012  
 End LS1: Start Low E physics  
 We are here: Feb 2014 July 2014  
 HIE physics at 5.5MeV/u  
 October 2015



Timeline:



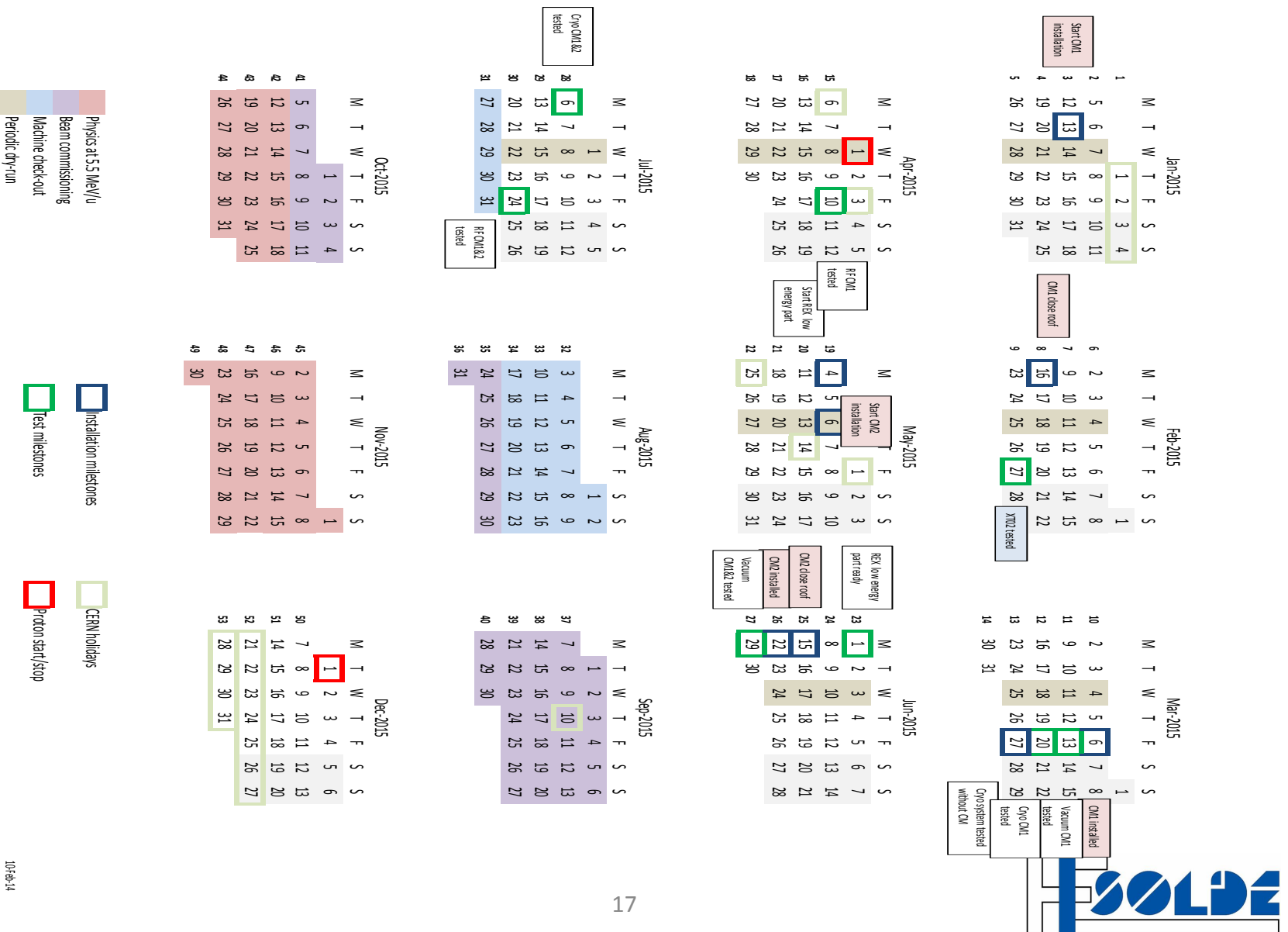
Beam commissioning 3 months

- shutdown
- Isolde Ops
- HIE installations and tests (Isolde normal operations)
- Machine Check-Out (Isolde normal operations)
- Beam Commissioning (Isolde normal operations)





# HIE-ISOLDE Operation 2015



# Conclusions (1/2)

- Technical Activities: progress is tangible on most of the machine parts => however one has to carefully monitor the following items:
  - ✓ Procurement of CM parts and instrumentation
  - ✓ Tooling for clean room assembly
  - ✓ Cryogenics for SM18 test
- Installation Works: High activity in the hall and service buildings; Despite delays we are still in line with the overall schedule which aims for low energy physics during 2014 and HIE physics as of Oct 2015. Critical paths for some activities are being addressed (cryogenics & cryomodule installation)
- Next meetings:
  - ✓ ATSMB on March 24th
  - ✓ Physics Coordination board + HIE-SC on April 1<sup>st</sup>
  - ✓ HIE International Advisory Panel April 8-9

# Conclusions (2/2)

## Budget and Resources:

- ✓ Financial situation analysed in-depth:
  - ✧ 5.8 MCHF shortfall for the completion of Phase 1 (5.5 MeV/u)
  - ✧ 8.6 MCHF shortfall in total up to Phase 2 (10 MeV/u)
  - ✧ 13.8 MCHF shortfall including Phase 3 (10 MeV/u + Low-Beta)
- ✓ Decision to allocate extra budget by CERN-DG to be endorsed in MTP2014 (June)
- ✓ Additional resources have been allocated:
  - ✓ V. Mertens (TE) project monitoring and F. Formentti (TE) technical coordination
  - ✓ P. Santos Silva (DG-HSE) risk management plan
  - ✓ B. Leida (EN/MEF) planning and installation coordination
  - ✓ 2 additional draughtsmen + 1 safety engineer (TE/MSC)

## Planning:

- Baseline Planning should be ready by end of February and presented at AT sector meeting on March 24<sup>th</sup>