

Installation Schedule

C Whyte

Cooling Demonstration

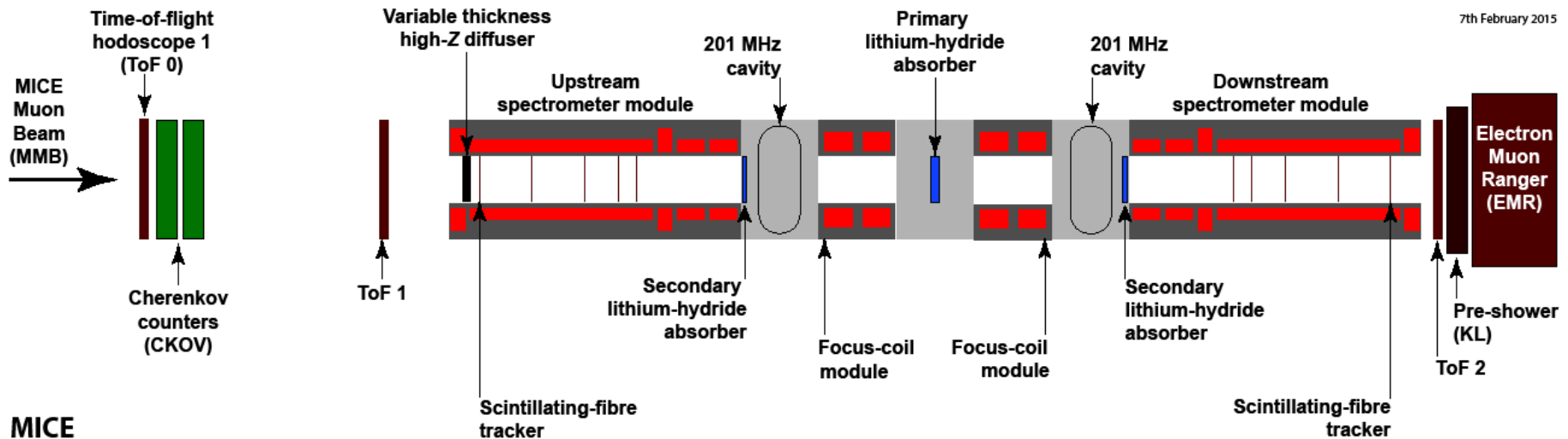
2 RF cavities, 2 secondary absorbers bracketing main absorber

New components

- 2 RF cavity modules
- 2 RF amplifier chains, power, control and monitoring systems
- Muon phase measurement system
- 2 secondary absorbers
- 2nd focus coil
- Return Yoke

Changes

- Only 2 RF cavities instead of 8
 - Higher power per cavity
- RF coupling coils deleted
 - Yoke simplified/smaller



7th February 2015

Timeline

Task Name	Start	Finish
MDIC	Wed 04/06/14	Thu 01/03/18
Shipping	Fri 31/07/15	Wed 31/08/16
Step IV De-Commissioning	Wed 01/06/16	Tue 26/07/16
Installation	Fri 31/07/15	Fri 17/02/17
RF system	Fri 31/07/15	Fri 17/02/17
MDIC Installation	Fri 22/07/16	Wed 14/12/16
MDIC Base plate installation	Fri 22/07/16	Wed 14/12/16
Return Yoke	Wed 14/12/16	Wed 01/02/17
AFC Installation	Wed 14/12/16	Thu 16/03/17
Cavity Installation	Wed 04/06/14	Fri 24/02/17
HPRF tests	Fri 24/02/17	Fri 24/03/17
Spectrometer Solenoid #2 installation	Tue 03/01/17	Thu 19/01/17
Install Spectrometer Solenoid #2 and align	Tue 10/01/17	Thu 19/01/17
Re-install TOF2, KL & EMR	Mon 06/02/17	Wed 15/02/17
Install tracker North Side wave guides	Wed 01/02/17	Mon 06/02/17
Install tracker South Side wave guides	Wed 01/02/17	Mon 06/02/17
MDIC installation complete	Fri 24/03/17	Fri 24/03/17
Commissioning	Fri 24/03/17	Tue 02/05/17
Cooling Channel magnet Commissioning	Fri 24/03/17	Tue 02/05/17
RF Testing	Tue 04/04/17	Tue 02/05/17
Tests complete	Tue 02/05/17	Tue 02/05/17



Proposal for Full RF System Tests

- **Justification**
 - Tight time schedule for demonstration experiment
 - Require rapid commissioning of whole system
 - Provides opportunity for full shakedown of RF system
 - Delivers pre-prepped cavities by **end 2016**
- **Opportunity**
 - HPRF Tests, start late **August 2016**, base est. 8 weeks for first cavity
 - As soon as amplifier no. 1 is available
 - Need to build discrete control racks for each system - Change from single integrated control system
 - Feasible given sufficient EE Resource through 2015 & 16
 - Requires LLRF control
 - Requires UK/US RF experts
 - Cavity 2 commissioned partially in parallel, tested on amplifier no.1. Subsequent test of Amplifier no. 2 with cavity 2

Cavity No 1 Installation Programme



- May 2016: Module delivered assembled, from LBNL
 - VNA test of tuning to verify condition on arrival
 - Prepare vacuum system: pump, gauge etc
 - Cavity module will not use hall vacuum - independent system.
 - Prepare cavity diagnostic systems, control systems, cooling,
 - 4 weeks – assuming no vacuum intervention required.
 - Install in upstream space against shield wall
 - May require X-ray shield (est ~80 microSv/hr at 3m)
 - 2 weeks
 - Pump down, controls and interlocks to protect Be windows
 - 2 weeks
 - Install overhead RF lines, tune. Concurrent with pump down
 - Retest of cavity tune after evacuation
 - 1 week
- Ready to apply RF power around July 2016



Amplifier No 1 Programme

- **April 2015**
 - Definition of controls and automation system/interfaces/interlocks
 - Largely complete
- **Nov 2015**
 - Amplifier no 1 PSU automation system completion
 - Commission and test amplifier No. 2 with No. 1 racks
 - Test automatic/remote control systems
- **Summer 2016**
 - Re-Installation and test into loads at RAL
- **Key resources,**
 - RF Engineering effort
 - Control and monitoring/electrical engineering.
 - 6-8 months of test operation through 2015/16
 - Team drawn from
 - MICE RF engineer at RAL, DL RF engineer,
 - Imperial and Strathclyde (4 RF scientists/engineers)



Cooling Demo Schedule

Task Name	Start	Finish
Cavity Installation	Wed 04/06/14	Fri 24/02/17
Move into cooling channel	Thu 19/01/17	Fri 24/02/17
Place online and couple to magnets	Thu 19/01/17	Fri 03/02/17
Vac Pump/LLRF tests	Fri 03/02/17	Fri 17/02/17
LLRF Tests	Fri 17/02/17	Fri 24/02/17
HPRF tests	Fri 24/02/17	Fri 24/03/17
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Install Spectrometer Solenoid #2 and align	Tue 10/01/17	Thu 19/01/17
Re-install TOF2, KL & EMR	Mon 06/02/17	Wed 15/02/17
Install tracker North Side wave guides	Wed 01/02/17	Mon 06/02/17
Install tracker South Side wave guides	Wed 01/02/17	Mon 06/02/17
MDIC installation complete	Fri 24/03/17	Fri 24/03/17
Commissioning	Fri 24/03/17	Tue 02/05/17
Cooling Channel magnet Commissioning	Fri 24/03/17	Tue 02/05/17
RF Testing	Tue 04/04/17	Tue 02/05/17
Test and condition cavities, with B field, 1MW	Tue 04/04/17	Tue 02/05/17
Combined magnet and operational tests complete	Tue 02/05/17	Tue 02/05/17



End

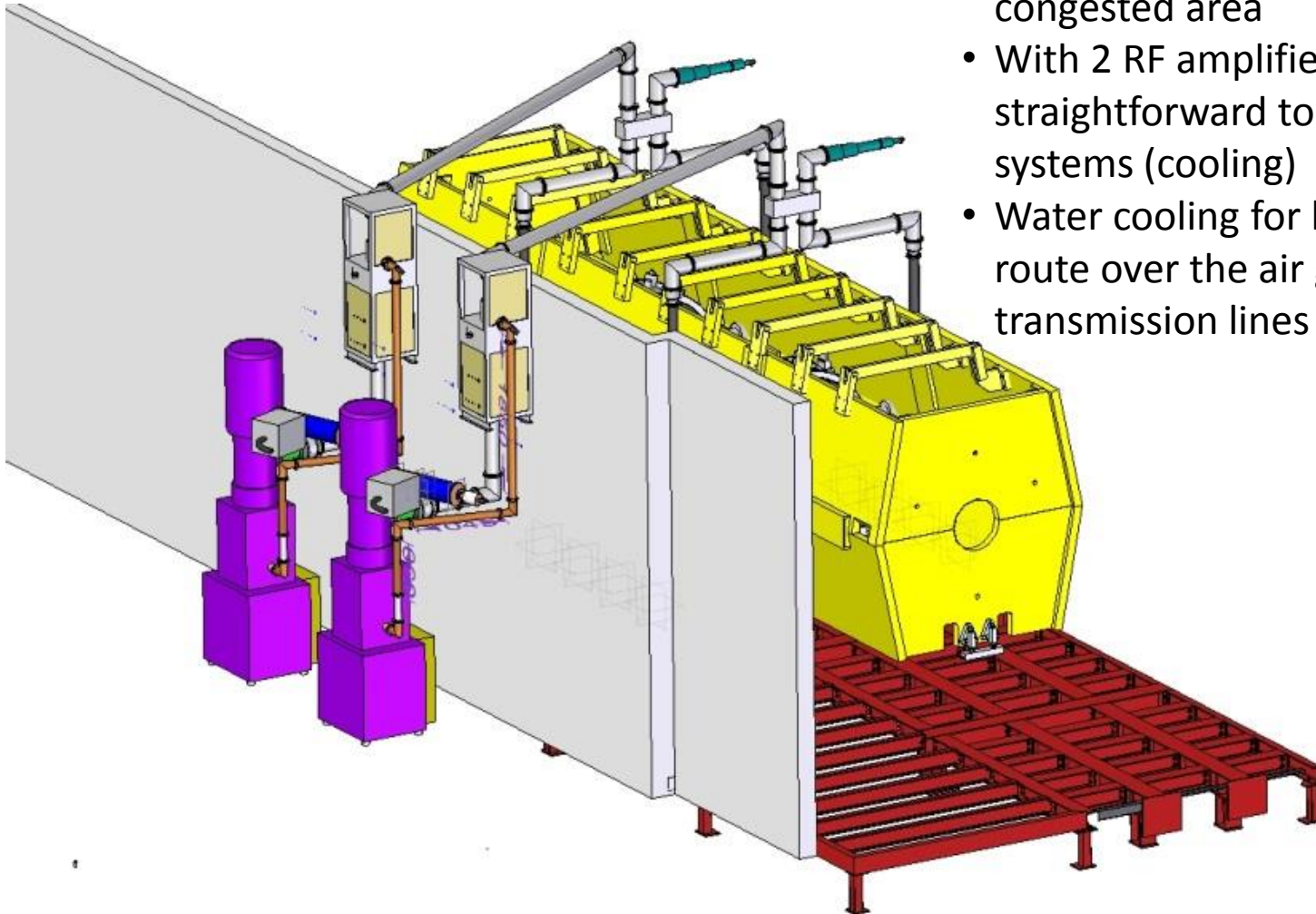


RF System Controls

- Plans drafted (in review) for the controls and monitoring interfaces required for the RF system and interfacing to other vital subsystems
 - Will allow expedited build of remote control system and data logging system as soon as effort is available
 - Needs of each cavity and RF system have been analysed
 - The system will include a range of
 - analogue monitoring inputs, (both slow and fast ~MHz rate)
 - digital inputs (binary, 3 state, 8 state)
 - analogue control inputs
 - analogue outputs
 - Large number of individual variables
 - Reviewing which need individual interfaces

RF network

- Load on each splitter to absorb unbalanced reflections
- Retracted crane hook clears coax over the wall.
- Support from present 'shield wall' and yoke
- 2nd amplifier moved to 3rd position behind wall to ease installation in congested area
- With 2 RF amplifiers now relatively straightforward to place auxiliary systems (cooling)
- Water cooling for load will need to route over the air gap on the transmission lines



Post STEP IV: RF installation

- Simplified distribution network- overhead
- Off-centre mounting of hybrid takes up phase shift
- Minimised length of 4" line- minimises losses

