CM 34 wrap-up

TOWARDS CM35

(expected) Highlights of CM34

TOWARDS STEPIV:

-- LH2 test completed
-- SS1 in the hall and SS2 in training
-- AFC working and measured
-- magnetic field protection scheme advanced or solved
-- We must converge on how to run the experiment.
  -- magnets, LH2,
  -- Champions, MOMs and shifters
  -- need a minimal number of people who will be at MICE (i.e. STFC-RAL, Chilton Didtcot UK) either as long term visitors or locals.
  --champions decide which online tools they need → discuss with C. Rogers
-- progress on software, DAQ, Controls
-- progress on EMR

TOWARDS PUBLICATIONS

-- Emittance paper full draft circulated
-- PID paper results/contents final
-- step IV apparatus paper

TOWARDS STEPVI

-- scenario for STEP VI defined and loaded schedule underway
-- test of Coupling Coil 1 underway
-- progress in planning RF construction and testing – system test, MIUCOOL test
-- magnetics!

(expected) Highlights of CM34

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-- LH2 test completed

-- SS11 in the hall and SS2 in training

-- AFC working and measured

-- magnetic field protection scheme advanced or solved

-- We must converge on how to run the experiment.

  -- magnets, LH2,

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-- magnetics!

General picture

1. MICE is progressing a lot on all fronts

2. Magnet delays are really hurting us

3. with realistic schedule this leads to
   STEPIV start in Q2 2014
   Battle to keep this before the Aug.2014 shut down

4. and step V/VI in 2017/2018

need to identify where extra resources could help

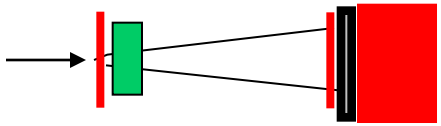
All agreed (including MPB) to go directly to step VI as this saves ~18 months on step VI.

(running step V and reconfiguration thereafter)

MICE SCHEDULE
update: June 2012

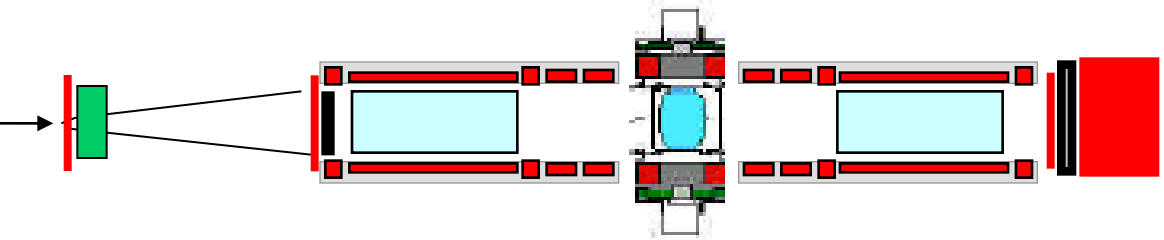
Run date:

μ



STEP I

EMR run Q1 2013

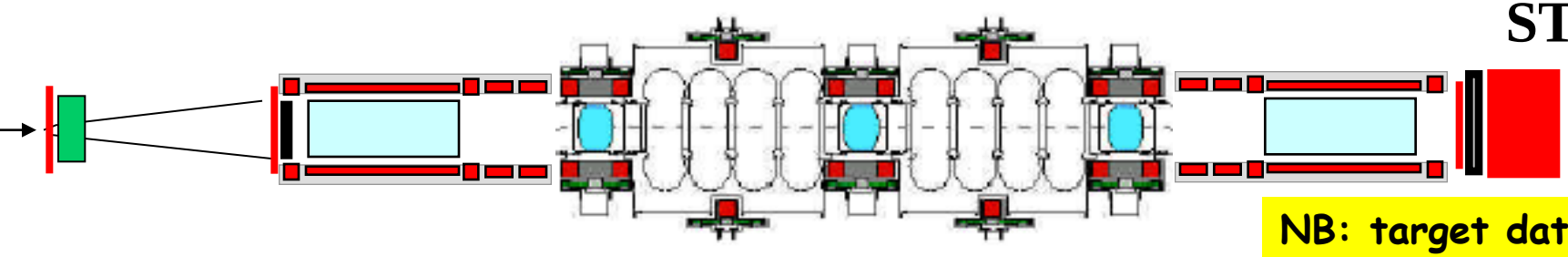


STEP IV

Q2 2013
till
Q2 2014

Under construction:

STEP VI

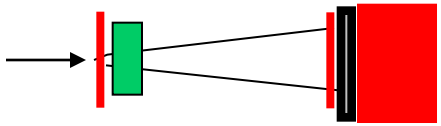


NB: target date 2016

Provisional MICE SCHEDULE
update: October 2012

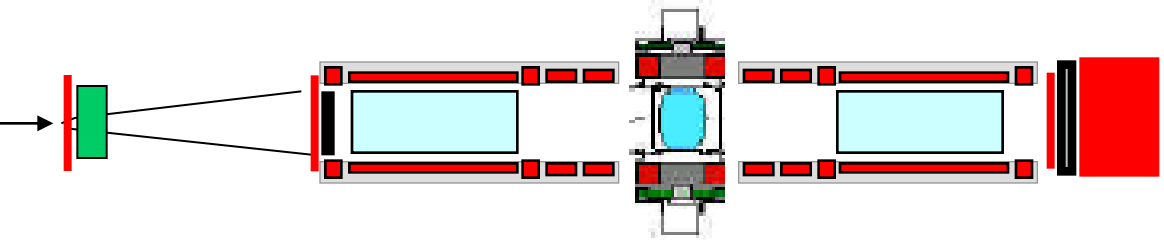
Run date:

μ



STEP I

EMR run Q1 2013



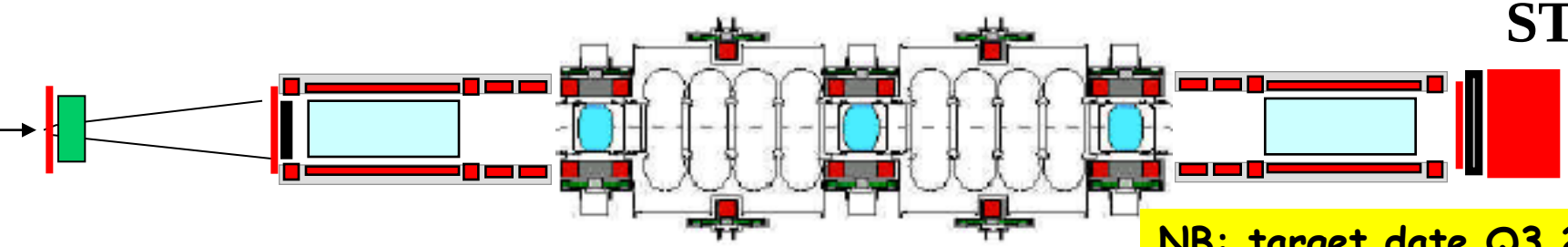
STEP IV

Q2 2014
till
Q4 2015

+ 1 year

Under construction:

STEP VI



NB: target date Q3 2018
Step V run possible Q3 2017

+ 2 years

---- Step IV starting date = June 2014;
(1.5months of running before Aug'14; restart End Feb 2015)

difference from CM33-Glasgow:
= 4 months for warmups and retrainings
+3 months for fool-proofing of controls, monitoring and alarms
+2 months for shipping
+2.5 = 2x5 weeks for training
total = 11.5 months matches ~Q2 2013 + 1 year.

some savings possible
-- dont train correction magnets E1 E2 beyond need
-- perform magnetic measurements at Wang after completion of magnet training
-- CERN guys can do that
-- save 5 weeks of retraining x 2
-- bevel shipping may save up to 1-2 months

but many (im)possible sources of delays as we all know

➔ will keep spring 2014 as step IV date for MPB
Will try to come earlier to have sufficient running of MICE step IV before Aug 2014 shut down. Not by rushing but by keeping 'eyes on the ball'
THIS WILL BE HARD.


MICE keeping the eyes on the ball

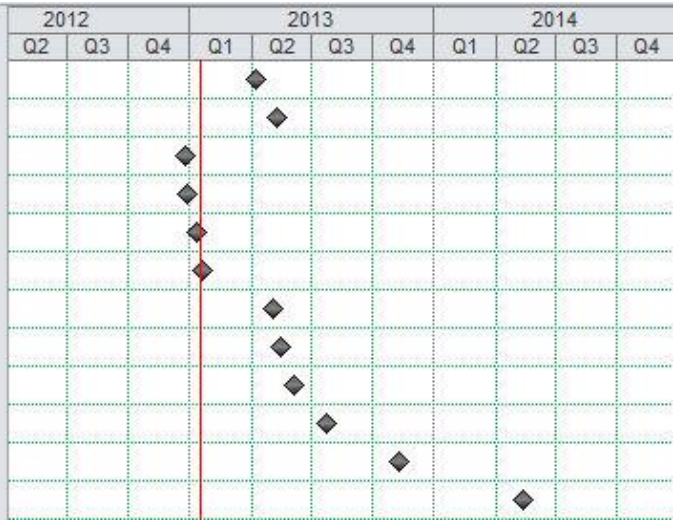
These schedule estimates result from first pass at fully loaded schedule.
Congratulations to all involved in preparing them!

Question asked is
'what date can you promise to deliver'
rather than
'how soon do we think we can achieve'

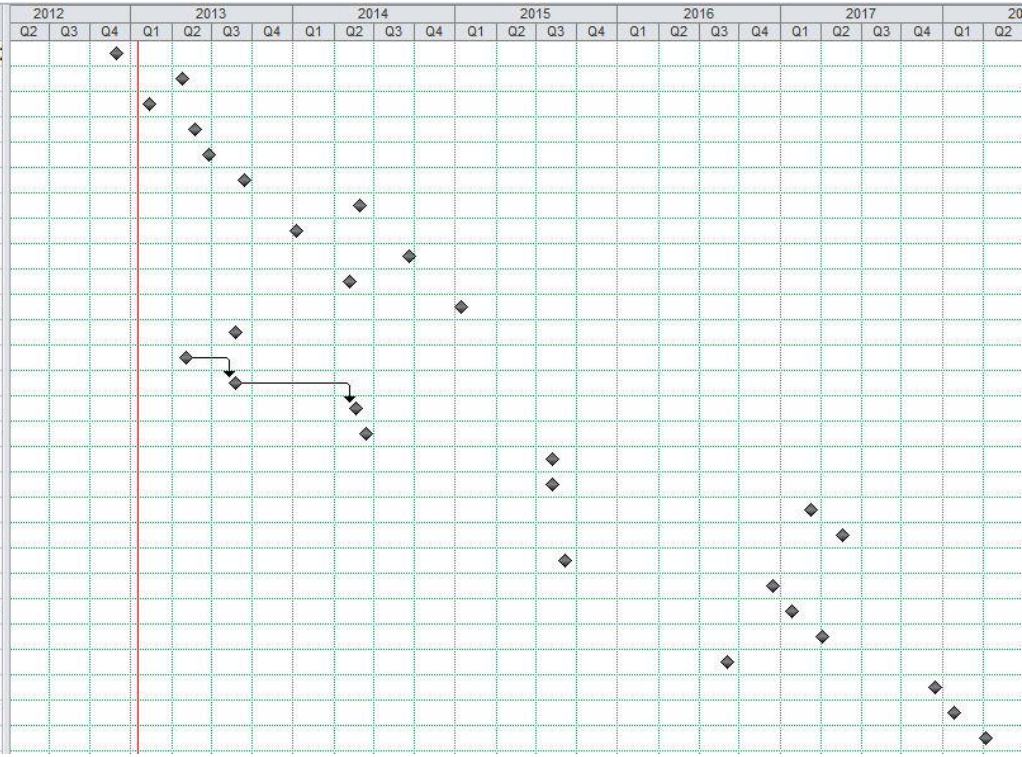
Challenge is now to beat those dates – not on paper but <u>on the floor</u>.

➔ Milestones tracking
➔ make sure the right people are at the right place

Name	Start	Finish
SS#1 Acceptance Tests Complete	Tue 1/8/13	Tue 1/8/13
SS Controls Operational Readiness Certification	Wed 2/6/13	Wed 2/6/13
SS#2 Assembly Re-Start	Mon 9/24/12	Mon 9/24/12
SS#2 Radiation shield around cold mass	Wed 9/26/12	Wed 9/26/12
SS#2 Cold Mass and Shield inside Vacuum Vessel	Wed 10/10/12	Wed 10/10/12
SS#2 Cold mass aligned to the Vacuum Vessel	Fri 10/19/12	Fri 10/19/12
SS#2 Vacuum vessel closed	Thu 1/31/13	Thu 1/31/13
SS#2 Leak check of Vacuum vessel and cold mas	Wed 2/13/13	Wed 2/13/13
SS#2 Solenoid ready for cool down and training	Tue 3/5/13	Tue 3/5/13
SS#2 Acceptance Tests Complete	Tue 4/23/13	Tue 4/23/13
SS#1 and SS#2 at RAL	Thu 8/8/13	Thu 8/8/13
Spectrometer Solenoids Ready for Operations	Tue 2/11/14	Tue 2/11/14



Name	Start	Finish
CC Test stand ORC received	Wed 8/29/12	Wed 8/29/1
CC Test stand operational	Wed 1/23/13	Wed 1/23/13
CC Coil #1 at Fermilab	Mon 11/12/12	Mon 11/12/12
Signoff for Further Coil Winding at QiHuan	Wed 2/20/13	Wed 2/20/13
CC Coil #1 Test Complete	Mon 3/25/13	Mon 3/25/13
QiHuan completes CC Coil #2	Thu 6/13/13	Thu 6/13/13
CC Coil #2 Cold Mass Ready for Use	Wed 2/26/14	Wed 2/26/14
QiHuan completes CC Coil #3	Mon 10/7/13	Mon 10/7/13
CC Coil #3 Cold Mass Ready for Use	Thu 6/19/14	Thu 6/19/14
QiHuan completes CC Coil #4	Wed 2/5/14	Wed 2/5/14
CC Coil #4 Cold Mass Ready for Use	Mon 10/13/14	Mon 10/13/14
Release Package for Shield and Cooling Circuit Parts Fab	Thu 5/23/13	Thu 5/23/13
Release Package for MLI Blanket Order (for all cryostats)	Thu 1/31/13	Thu 1/31/13
Take Delivery of MLI Blankets	Thu 5/23/13	Thu 5/23/13
1st Cryostat Assembly Ready for Shipment to FNAL	Wed 2/19/14	Wed 2/19/14
1st. Cryostat Assembly ready for Cold Mass Integration	Wed 3/12/14	Wed 3/12/14
CCM Prototype Operational	Wed 5/6/15	Wed 5/6/15
CCM Prototype Ready to be moved to MTA	Wed 5/6/15	Wed 5/6/15
Optional: RFCC Prototype Ready to Ship to RAL	Thu 12/8/16	Thu 12/8/16
Optional: MICE RFCC Prototype arrives at RAL	Fri 2/17/17	Fri 2/17/17
2nd. Cryostat Assembly ready for Cold Mass Integration	Fri 6/5/15	Fri 6/5/15
CCM#1 Operational	Tue 9/13/16	Tue 9/13/16
RFCC#1 Ready to Ship to RAL	Tue 10/25/16	Tue 10/25/16
MICE RFCC#1 arrives at RAL	Wed 1/4/17	Wed 1/4/17
3rd. Cryostat Assembly ready for Cold Mass Integration	Fri 6/3/16	Fri 6/3/16
CCM#2 Operational	Thu 9/14/17	Thu 9/14/17
RFCC#2 Ready to Ship to RAL	Thu 10/26/17	Thu 10/26/17
MICE RFCC#2 arrives at RAL	Fri 1/5/18	Fri 1/5/18



Progress success scope for MICE

Facilities based on muon storage rings have been advocated for several physics applications of great interest with discovery potential

A. nuSTORM: 10^{11} μ/s storage ring: (<1%) ν_e ν_μ $\bar{\nu}_e$ $\bar{\nu}_\mu$ x-sections and $\nu_{sterile}$ search

B. neutrino factory: 10^{14} μ/s storage ring precision study of CPviolation, unitarity

C. Precision muon collider Higgs factory studies of X(125.5), H/A system (if there) ultra-precise measurements of any new particles in 50-1000 GeV range

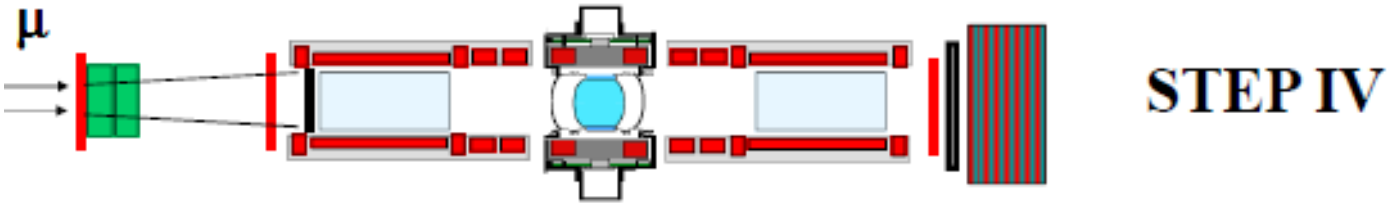
D. High energy muon collider: the most powerful envisaged machine to search the high energy frontier

For B C D the high intensity muons beams are generated and prepared in a powerful magnetic bottle, from the target solenoid all the way to the last stages of cooling. This magnetic bottle consists of continuous magnetic field lines generated by a string of axial coils and solenoids.

This is the key to high intensity muon beams

MICE is such a magnetic bottle, from the diffuser to the end of the experiment. Cooling is the aim of the experiment but the lessons learned extend beyond that.

MICE was designed to test the concept in stages with important results at each step



Step IV

-- Liquid hydrogen absorber realisation and routine safe operation

-- complete particle detector system; calibrations of emittance measurement to $\pm 10^{-3}$

-- understanding of propogation of (imperfect) beam through the magnetic bottle

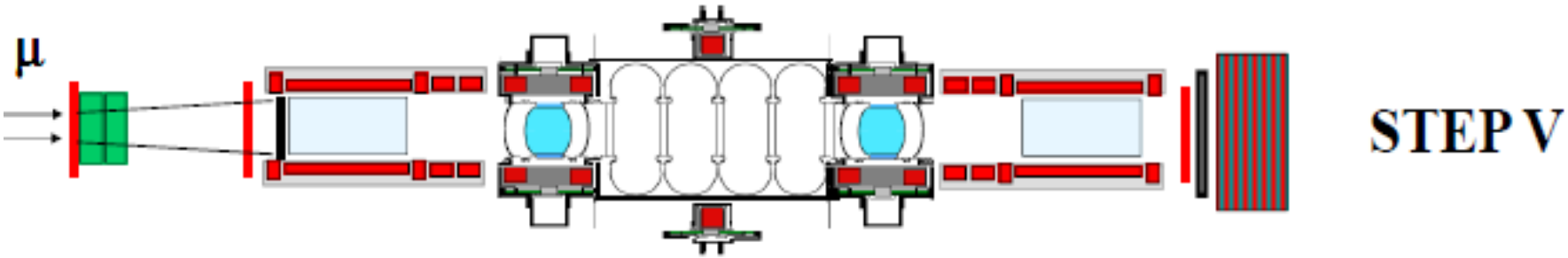
-- correlated precision measurements of multiple scattering and energy loss straggling (this will constitute an important contribution to experimental particle physics!)

-- engineering test of beamline made of several magnetically connected components

-- measurement of 6D emittance change (observation of normalized emittance cooling)

-- validation of simulation code

-- limited possibility to test the longitudinal cooling with wedge



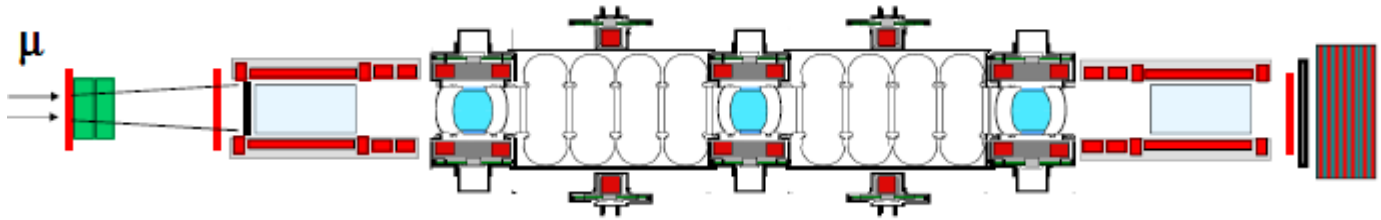
Step V

-- More difficult magnetic situation with one large 'coupling' coil

-- RF cavity operation in magnetic field

-- verification of understanding of energy loss and RF acceleration for particles up to large amplitudes and over all phases

-- First measurement of usable ionization cooling



STEP VI

-- operation of channel with all magnetic couplings in place.

-- full cooling cell allowing all optics configurations: flip, non-flip etc…

-- exact replenishment of energy possible

-- significant and measurable longitudinal heating

-- precise measurement of equilibrium emittance of various configurations

-- detailed and precise verification of simulation codes

The relative risks (and associated expenses) of step VI wrt Step V have been considered minor wrt to the extra time needed (18 months delay to step VI) and we have agreed (with MPB support) that the baseline option is to skip step V

MICE legacy

MICE will have achieved the first demonstration of ioniztion cooling and tested essential concepts for production of intense muon beams

It will have generated experience and know-how, bridging sometimes painfully a significant gap between the neutrino factory and muon collider dreams … and reality.
This will set future developments on firmer ground.

Once step VI is complete a powerful Cooling Test Facility is in place with

-- a quality muon beam
-- 8MW of 200 MHz RF power
-- 23MV of acceleration
-- infrastructure for 70 litres of liquid Hydrogen absorbers
-- instrumentation for precision 6D emittance measurements
-- a number of available magnets and associated infrastructure
-- and… a number of people who have made (most of) the mistakes already

a formidable asset that could be used for e.g. a 6D cooling experiment

(expected) Highlights of CM35 RAL 12-16 February

TOWARDS STEPIV:

-- SS1 ~fully trained at LBNL
-- AFC working and measured in R9
-- magnetic field protection scheme well advanced
    -- use of plant room clarified
    -- questions regarding tracker shielding solved
    -- engineering solution for Flux return solution
-- EMR complete, running on cosmics at UNIGE and preparing for shipping
-- reconstruction, analysis and online software
-- elog!

TOWARDS PUBLICATIONS

-- Emittance paper final
-- PID paper final (requires KL reconstructioon included in MAUS)
-- step IV apparatus paper started

TOWARDS STEPVI

-- test of Coupling Coil 1 underway and almost complete
-- RF group progress (2MW?)

A couple requests

-- please advertise progress in the MICE news!
(If you cant make text, send pictures!)

-- answer rapidly to calls for MOMs and shifters

-- continue proposing yourselves to give talks at workshops and conferences and make publicity for MICE and muon machines

➔Announcement from Vittorio

News from
the MICE Speakers Bureau
V. Palladino, Univ. & INFN Napoli

MICE
Talks and Posters

Sezione di Napoli

Up-to-date list always at
http://micewww.pp.rl.ac.uk/projects/mice/wiki/List_of_MICE_Presentations

Next major deadline: Dec 5, 2012

Abstracts for IPAC 2013 Posters (Shangai 12-17 May 2013)

http://www.ipac13.org/

Draft abstracts to Speakers Bureau **>1 week earlier,please**

Traditionally a major event for MICE, several posters every year.
Student Grant Request & Poster Session applications soon open (Oct 23).

Thanks to Linda, Debbie, Rose for organisation of meeting and agenda

THANKS to all MICE for large participation to CM34,
excellent and realistic presentations