

Spokesman's update

Spokesman's update:

DOE REVIEW OF MAP/MICE

Origins: P5's recommendations on MAP/MICE:

- Realign activities in accelerator R&D with the P5 strategic plan. Redirect muon collider R&D and consult with international partners on the early termination of the MICE muon cooling R&D facility.

Review committee's charge:










- This (and subsequent) comments:
 - Elements that relate to MICE:
 - Mark Palmer can fill detail for MAP and for MICE as part of MAP



It is requested that your review determine:

- Can Stage IV or Stage V of the MICE experiment be achieved with the quoted profile?
- Is the resource-loaded plan for achieving all deliverables to MICE at the Rutherford-Appleton Laboratory (RAL) well documented and complete?
- Are the skilled personnel needed accomplish these goals available and committed to the effort?
- Are the milestones provided by MAP and MICE partners for hardware assembly, testing, and delivery suitable for tracking progress in this plan?
- Are technical, cost, and schedule risks understood?











Open session agenda:

Tuesday, August 12, 2014

- 08:00 - 09:00 **Executive Session 1h0'** (Oasis Room (Bldg. 535))
Convener: *Dr. Bruce STRAUSS (US DEPARTMENT OF ENERGY)*
- 09:00 - 10:00 **MAP Overview, Physics Context, and Reorganization Plan (45+15) 1h0'**
Speaker: *Dr. Mark Palmer (Fermilab)*
Material: [Slides](#) 
- 10:00 - 10:30 **MAP Accomplishments (20+10) 30'**
Speaker: *Jean-Pierre Delahaye (SLAC)*
Material: [Slides](#) 
- 10:30 - 10:45 **MAP Institutional Involvement 15'**
Speaker: *Prof. Daniel Kaplan (Illinois Institute of Technology)*
Material: [Slides](#) 
- 10:45 - 11:00 **Coffee Break**
- 11:00 - 11:40 **The Neutrino Physics Landscape (30+10) 40'**
Speaker: *Prof. Patrick Huber (Virginia Tech)*
Material: [Slides](#) 
- 11:40 - 12:30 **MICE and Its Global Context (40+10) 50'**
Speaker: *Prof. Kenneth Long (Imperial College London)*
Material: [Slides](#) 
- 12:30 - 14:00 **Lunch at Berkner Hall**
- 14:00 - 14:30 **Rationale for Proposed Activities in GARD (20+10) 30'**
Speaker: *Dr. Robert Ryne (LBNL)*
Material: [Slides](#) 
- 14:30 - 14:55 **Fermilab Proton Complex and Proton Driver Interface (15+10) 25'**
Speakers: *Stephen Holmes (Fermilab), Dr. Keith Gollwitzer (Fermilab)*
Material: [Slides](#) 
- 14:55 - 15:20 **High Intensity Muon Sources (15+10) 25'**
Speaker: *Dr. Diktys Stratakis (Brookhaven National Laboratory)*
Material: [Slides](#) 
- 15:20 - 15:35 **Coffee Break**
- 15:35 - 16:00 **Bright Muon Sources (15+10) 25'**
Speaker: *Dr. Pavel Snopok (IIT/Fermilab)*
Material: [Slides](#) 
- 16:00 - 16:25 **Precision Neutrino Sources (15+10) 25'**

- Speaker: *Dr. Alex Bogacz (Jefferson Lab)*
Material: [Slides](#) 
- 16:25 - 17:00 **Advanced Sources: Resources, Schedule and Budget (25+10) 35'**
Speaker: *Peter Garbincius (Fermilab)*
Material: [Slides](#) 
- 17:00 - 18:30 **Executive Session 1h30'**
Convener: *Dr. Bruce STRAUSS (US DEPARTMENT OF ENERGY)*
- 18:30 - 18:35 **Delivery of Day 1 Questions 5'**
- 19:00 - 20:00 **Dinner**

Wednesday, August 13, 2014

- 08:00 - 09:30 **Executive Session 1h30'**
Convener: *Dr. Bruce STRAUSS (US DEPARTMENT OF ENERGY)*
Speaker: *Dr. Mark Palmer (Fermilab)*
Material: [Slides](#) 
- 09:30 - 09:45 **Coffee Break**
- 09:45 - 10:30 **MICE-UK Plan (30+15) 45'**
Speaker: *Mr. Roy Preece (STFC-RAL)*
Material: [Slides](#) 
- 10:30 - 11:30 **MICE-US Construction Effort (45+15) 1h0'**
Speaker: *Prof. Alan Bross (Fermilab)*
Material: [Slides](#) 
- 11:30 - 12:00 **RF in Magnetic Field R&D (MTA) (20+10) 30'**
Speaker: *Dr. Derun Li (LBNL)*
Material: [Slides](#) 
- 12:00 - 12:25 **MTA Facility (including MICE Support) (15+10) 25'**
Speaker: *Prof. Yagmur Torun (Illinois Institute of Technology)*
Material: [Slides](#) 
- 12:25 - 13:10 **MICE-US: Resource Loaded Schedule and Budget Profile (30+15) 45'**
Speaker: *Peter Garbincius (Fermilab)*
Material: [Slides](#) 
- 12:25 - 14:15 **Lunch**
- 13:10 - 15:00 **Executive Session w/Working Lunch 1h50'**
MICE Breakout
Convener: *Dr. Bruce STRAUSS (US DEPARTMENT OF ENERGY)*
- 15:00 - 15:30 **MICE-US Experimental Contributions (25+10) 30'**
Speaker: *Prof. Daniel Kaplan (Illinois Institute of Technology)*
Material: [Slides](#) 
- 15:30 - 15:45 **Coffee Break**
- 15:45 - 16:10 **Vacuum RF R&D (15+10) 25'**
Speaker: *Daniel Bowring (Fermilab)*
Material: [Slides](#) 
- 16:10 - 16:35 **High Pressure RF R&D (15+10) 25'**
Speaker: *Katsuya Yonehara (Fermilab)*
Material: [Slides](#) 
- 16:35 - 17:05 **MTA: Resources, Schedule and Budget (20+10) 30'**
Speaker: *Peter Garbincius (Fermilab)*
Material: [Slides](#) 

MICE preparation and presentations:

DOE Reviews

DOE review of MAP and MICE, Brookhaven National Laboratory, 12th to 14th August 2014

Presentations:

1. K. Long: MICE and its global context; 01-2014-08-12-LONG.pptx
2. R. Preece: MICE-UK plan; 02-MICE-UK_Plan_120814.ppt
3. A. Brass: MICE-US construction effort; 03-DOE_Review_MICE_construction_v11.pptx
4. P. Garbincius: MICE-US resource-loaded schedule and budget profile; 04-PHG_MICE.pptx
5. D. Kaplan: MICE-US experimental contributions; 05-Kaplan-MICE_MAP-DOE-Review-Aug2014-R11.pptx

Documents:

1. Delivering the MICE project; options for success

o Figures:

1. Top: Drawing of a single lattice cell of the Feasibility II cooling channel: Figure-1a-StudyII.pdf. Bottom: Rendered engineering drawing of MICE in the Step VI configuration: Figure-1b-StepVI.pdf
2. Steps in the staged implementation of MICE: Figure-2-MICE-steps.pdf
3. Step IV Dashboard: Figure-3-MICE_Dashboard.pdf
4. Step IV baseline schedule milestones: Figure-4-Step_IV_milestones_Waterfall.pdf
5. Step V critical path relating to Plan A: Figure-5-StepV_Critical_Path_Advanced.pdf
6. Step V critical path relating to Plan B: Figure-6-StepV_Critical_Path_Flat_Funding.pdf
7. Spend profile required to carry complete Step V according to Plan A: Figure-7-Advanced-UK-US_Finance.pdf
8. Spend profile required to carry complete Step V according to Plan B: Figure-8-Flat_UK-Flat_US-UK-US_Finance.pdf
9. Comparison of the UK spend profiles required to deliver Step V according to Plans A and B compared with the profile required to deliver Step IV: Figure-9-MICE-UK_Funding_Profiles.pdf
10. Comparison of the US spend profiles required to deliver the components of Step V for which the US is responsible: Figure-10-MICE-US_Funding_Profiles.pdf

o Tables:

1. Headlines of the minimal physics programme by Step in the staged implementation of the MICE programme: Table-1-PhysicsHeadlines.pdf
2. Interface points identified in the MICE baseline-schedule analysis: Table-2-Delivered_Required_Dates.pdf
3. Step IV baseline critical path: Table-3-Step_IV_Critical-Imminent-Near.pdf
4. The tasks which lie on the Step~V baseline critical path for Plan A: Table-4-StepV_Critical_Near_Advanced.pdf
5. The tasks which lie on the Step~V baseline critical path for Plan B: Table-5-StepV_Critical_Near_Flat.pdf
6. The UK requirement for the completion of Step V according to Plan A: Table-6-UK-Advanced_Spend_profile.pdf
7. The UK requirement for the completion of Step V according to Plan B: Table-7-UK-Flat_funded_Spend_profile.pdf
8. The UK requirement for the completion of MICE at Step IV: Table-8-UK-Stop_Step_IV_Spend_profile.pdf
9. Top level risks for the sub-projects for which the UK is responsible: Table-9-STFC-RiskRegisterAug.pdf
10. Top level risks for the sub-projects for which the US is responsible: Table-10-MAP-RiskRegister.pdf
11. Risk history for US risks: Table-11-US-risk_history.pdf

2. Response to feedback from the RLSR panel and MPB

3. MICE Project Assumptions Document

4. Planning the MICE Step IV Data Campaign

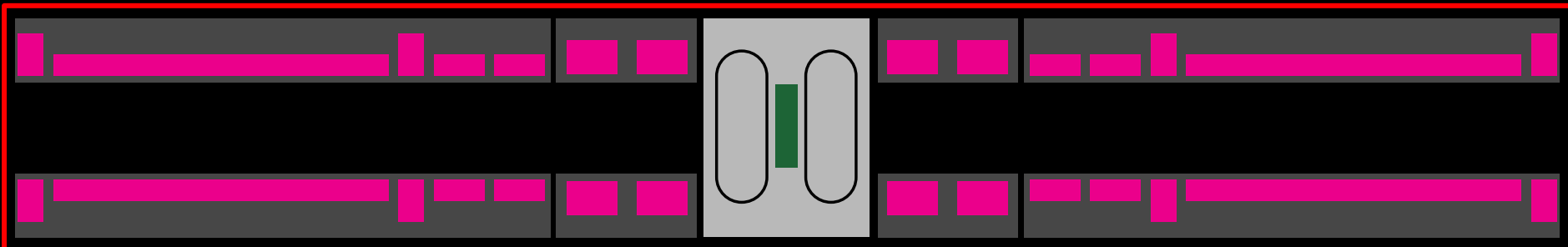
5. Magnet and Beam Commissioning at Step IV

Anecdotal report on the review itself [1]:

- Excellent preparation by all concerned:
 - Join with me in commending the MIPO, MEMO and others involved in preparing the documentation
- Excellent presentations, carefully prepared and presented with vigour:
 - Again, please join with me in commending the presenters
- Day 1:
 - Set the scene; high-level overview;
 - Left issues of detail, management and planning to the second day;
 - “Cooling with acceleration” accepted as critical to success:
 - “Must be done”; but not at any price!
 - Must fit within DOE (and STFC) funding envelope and STFC won’t “go it alone”
- Day 2:
 - Dealt with the scientific and project detail;
 - Very well received, demonstrated that we’re on top of the project;
 - Identified key project risks and pressures:
 - Risk: coupling coil
 - Project pressures; well, cost and schedule but ...
 - Schedule in particular;
 - » Given P5, strong pressure to have “Step V” on the floor by end US FY 17
 - DOE (because of P5) _&_ STFC because can’s “go solo” on support for commissioning, operations and analysis
 - Given challenge to review options for delivering “Step V” by end US FY 17 and report in the am

Anecdotal report on the review itself [2]:

- Delivering nominal Step V on the required timescale:
 - Preece, Grant, Garbicius, Bross:
 - Possible, but:
 - Requires refit of Hall for Step V to start essentially immediately
 - » I.e. would imply no Step IV
 - Requires significant front-loading of US investment
 - » And sufficient priority within US laboratories
 - Requires departure from flat-cash funding in UK
- Brainstorming:
 - Based on suggestion from Dan K (from discussion between DK and Bob Palmer):
 - Agreed to consider options that did not include coupling coil;
- Impressive!
 - Blackmore, Pasternak, Rogers:
 - “Compete” overnight to generate “best” compromise lattice that does not require CC;
 - Result, concept of Step $3\pi/2$ (below) advantages:
 - Much more closely aligned with modern (e.g. IDS-NF) cooling lattice designs
 - Preserves possibility of Step IV running;
 - Removes substantial “chunks” of US and UK technical risks
 - MTA is ideal to manage RF in magnetic field risk
 - A crucial moment!



Cartoon of reference Step $3\pi/2$ configuration

Anecdotal report on the review itself [3]:

- The following morning Mark Palmer was able to present two scenarios:
 - “Super expedited” Step V:
 - Including cost, schedule and risk analysis developed overnight by “MIPO team”;
 - Step $3\pi/2$:
 - Analysis by “MEMO team”:
 - Indicated that substantial fraction of Step V programme could be achieved;
 - Likelihood require $>8\text{MV/m}$ (e.g. 12 MV/m , even 16 MV/m);
 - Optics and configuration similar to IDS-NF solution
 - Analysis by “MIPO team”:
 - Indicated that cost, schedule and risk could be controlled;
 - » Significant (and obvious) project-management advantages noted
 - MTA was critical to establishing operation of cavities at high gradient in the FC field
 - MP emphasised that more work needed to be done to be sure that Step $3\pi/2$ could deliver the required demonstration of ionization cooling
- The fact that there were options and the Step $3\pi/2$ option in particular were welcomed by the reviewers

Review outcome (as it affects MICE):



Review Committee

Dr. Leigh Harwood	JLAB
Dr. Erk Jensen	CERN
Dr. David McGinnis	ESS
Prof. Ian Robson	STFC
Mr. Claus Rode	JLAB
Prof. Mike Syphers	FRIB
Mr. Thomas Taylor	CERN
Prof. Mark Thomson	STFC

Funding Agency Personnel

Ms. Charlotte Jamieson	STFC
Dr. LK Len	DOE
Dr. Michael Procaro	DOE
Dr. Bruce Strauss	DOE Chair



Response to Charge Questions

OFFICE OF
SCIENCE

Ian Robson and Mark Thomson

Can Stage IV or Stage V of the MICE experiment be achieved with the quoted profile?

Step IV, **yes** certainly

Is the resource-loaded plan for achieving all deliverables to MICE at RAL well documented and complete?

Yes, see comments

Are the skilled personnel need to accomplish these goals available and committed to the effort?

Yes, but see comments.

Is the resource-loaded plan for achieving all deliverables to MICE at RAL well documented and complete?

The documentation is sufficient to have reasonable confidence that the programme could be implemented given the appropriate resources.

Are the milestones provided by MAP and MICE partners for hardware assembly, testing and delivery suitable for tracking progress in this plan?

The milestones are adequate, but a few major milestones, which could represent future decision points, should be identified.

Are technical, cost and schedule risks understood?

With the possible exception of the technically challenging RFCC – yes. The committee notes that the coupling coil is eliminated in faster de-scoped scenario 2, thus reducing the risks to the project.

Review outcome (as it affects MICE):



U.S. DEPARTMENT OF
ENERGY

Recommendations

Recommendations

1. Accelerate the RF testing in a magnetic field in order to check out operation of the coupler, and identify any other potential issues.
2. Pursue further development of the $3\pi/2$ scenario.



U.S. DEPARTMENT OF
ENERGY

Action Item

- 1. Present to DOE a detailed plan for Step $3\pi/2$ by 15 September 2014.**

**NB: Recommendations are from DOE to MAP;
of course, MICE must help to discharge them.**

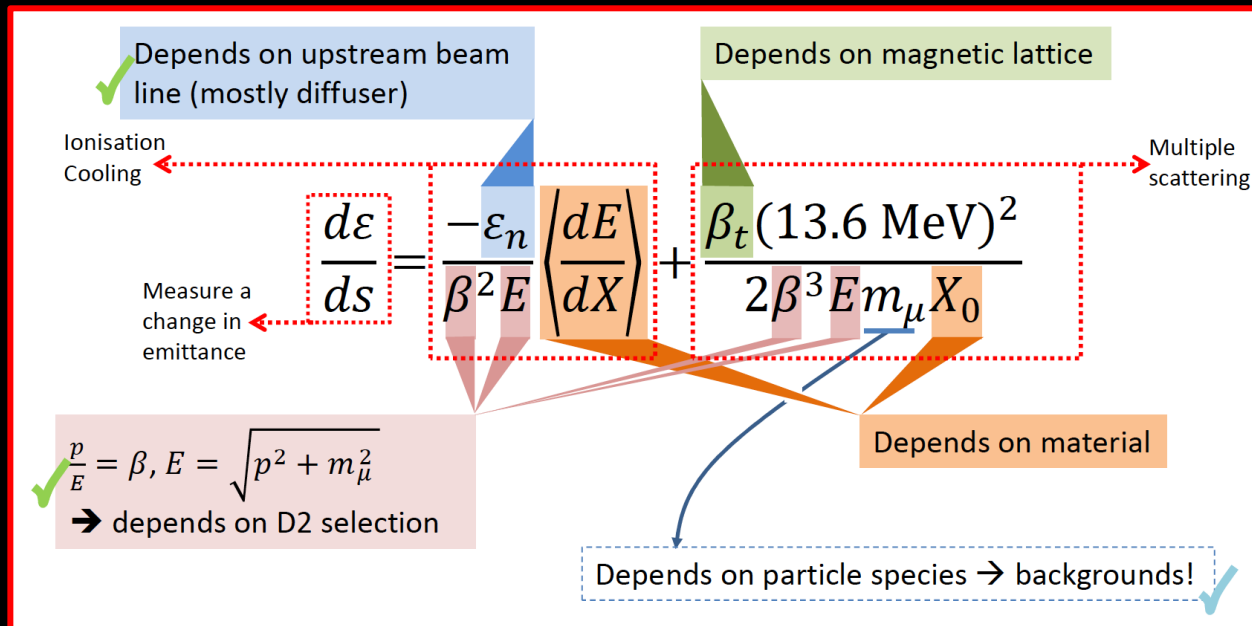
Going forward; my view:

- Support preparation of document as requested in the DOE by 15Sep14:
 - Initial “good enough) analysis of Step 3pi/2;
 - Initial analysis of cost/schedule/risk;
- The revised plan is further developed and “put before” the collaboration at its next meeting (24-28Oct 2014):
 - By this time the necessary detailed studies to assess the level of performance will have been done carefully and the collaboration will have had time to deliberate;
- The next international review of the project (Nov 2014):
 - Resource Loaded Schedule Review panel; and the
 - MICE Project Board
- will then review the consensual revised plan and present to the Funding Agency Committee their recommendations
 - If we do our work properly I would anticipate that the recommendations will be in line with the our analysis

Spokesman's update

**THE MICE MEASUREMENT
PROGRAMME**

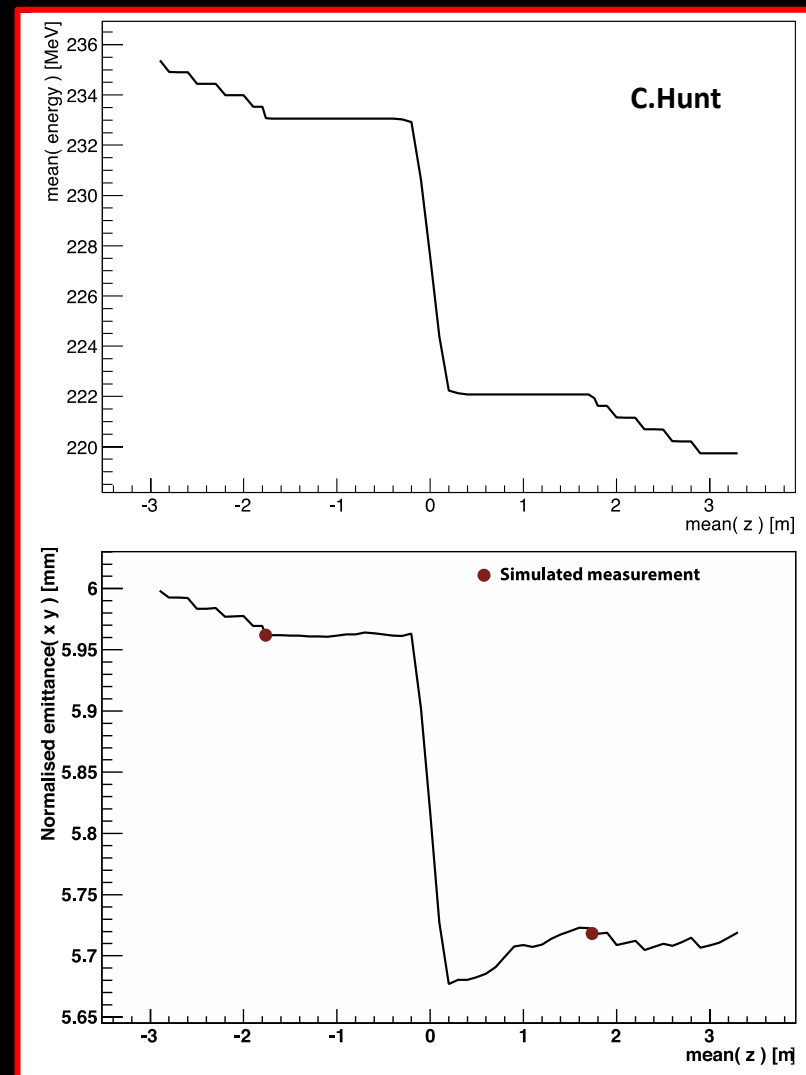
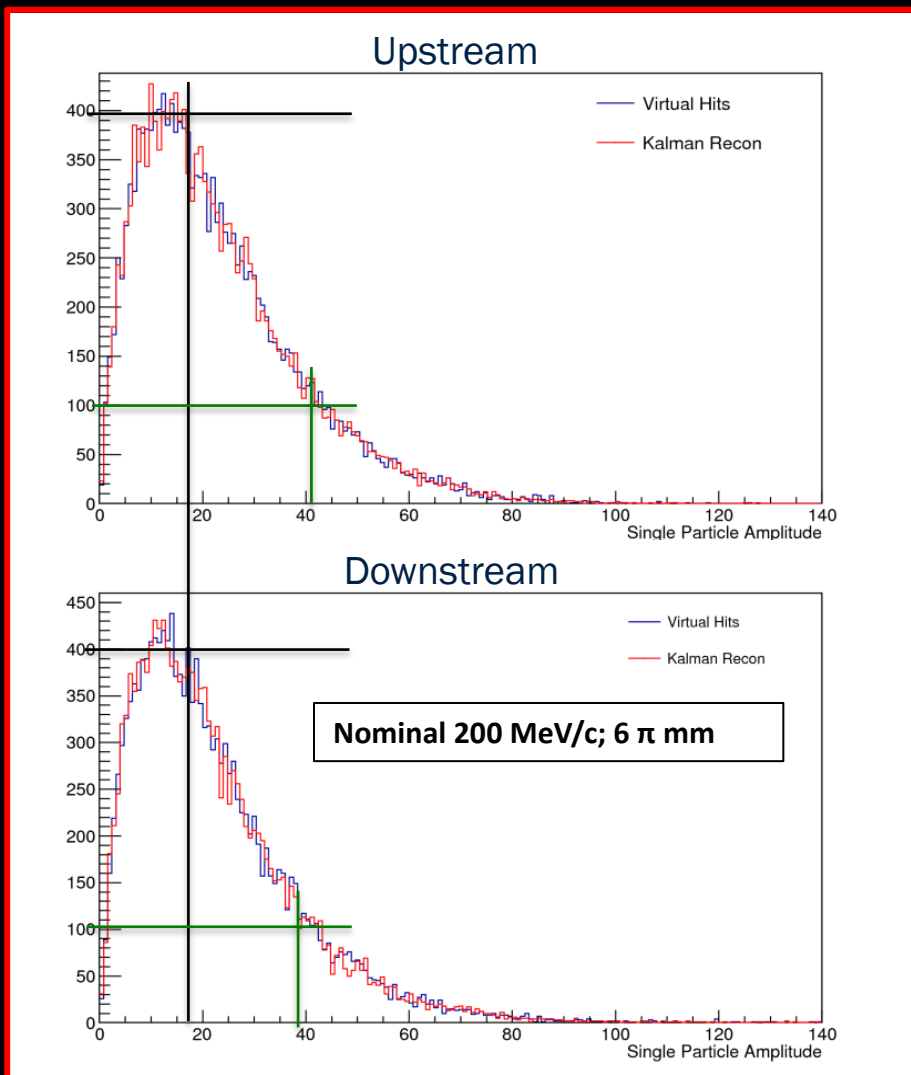
- Exploration of the cooling equation:

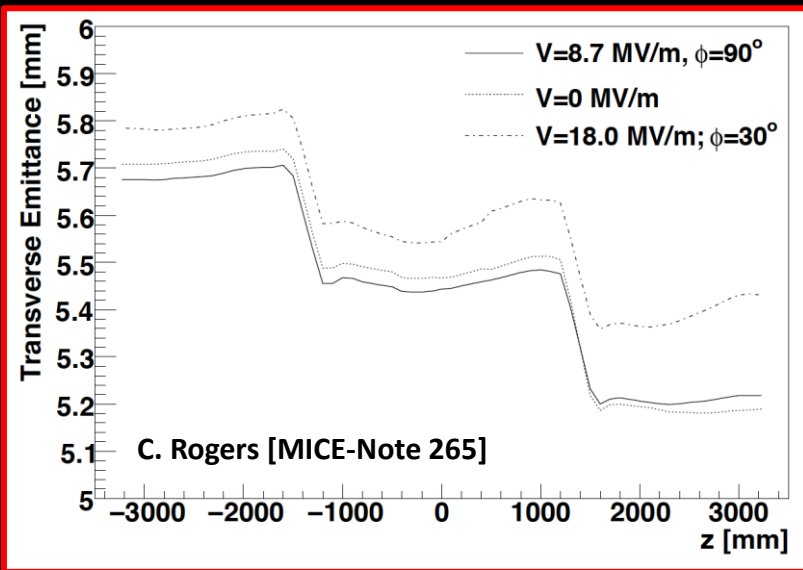


- **Emittance:**
 - MICE Muon Beam optics and diffuser settings
- **Material:**
 - Absorber change (LH2; LiH);
- **p, E and β :**
 - Vary beam momentum, optics

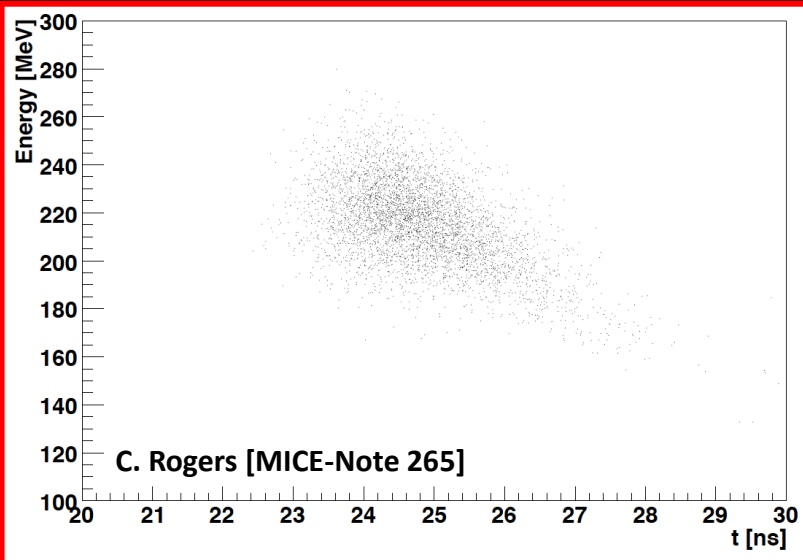
Simulation of Step IV

- Single-particle emittance & emittance measurement





- Transverse emittance reduction at Step V



- Longitudinal phase space at the exit of the downstream absorber at Step V

Headline measurements by Step

	Step IV	Step $\frac{3\pi}{2}$
Study of properties that determine cooling performance		
Material properties of LH ₂ and LiH	Yes	LH ₂ and/or LiH
Observation of ϵ_{\perp}^n reduction	Yes	Yes
Demonstration of sustainable ionization cooling		
Observation of ϵ_{\perp} reduction with re-acceleration		Yes
Observation of ϵ_{\perp} reduction and ϵ_{\parallel} evolution		Yes
Observation of ϵ_{\perp} reduction and ϵ_{\parallel} and angular momentum evolution		Yes [†]

[†] Requires systematic study of “flip” optics.

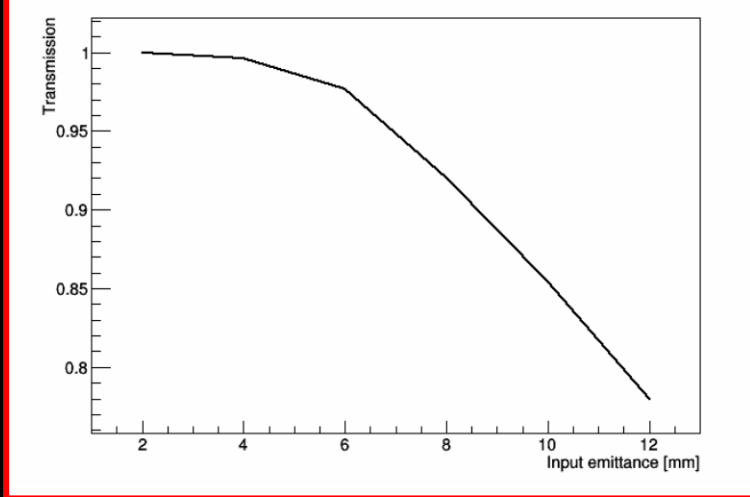
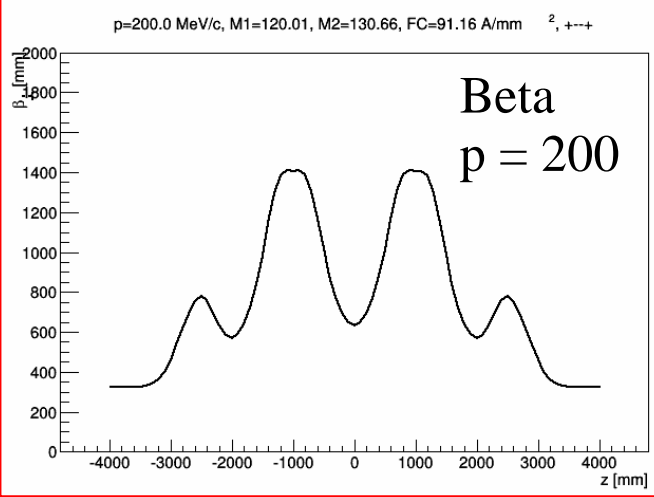
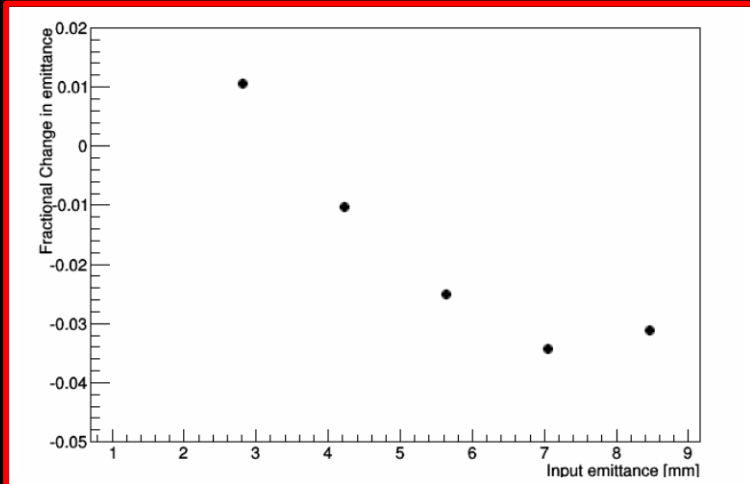
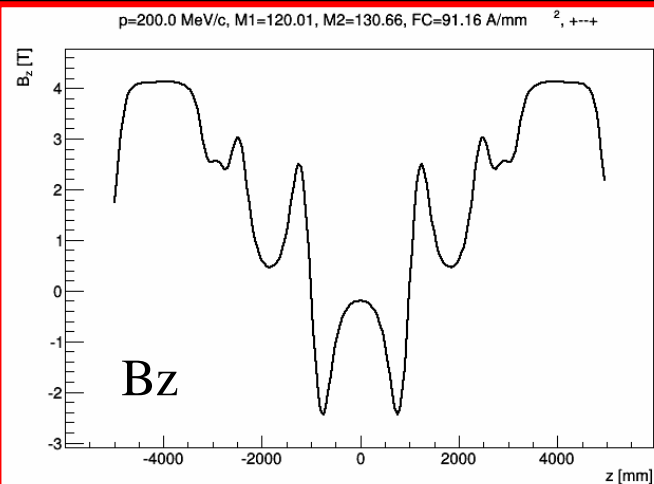
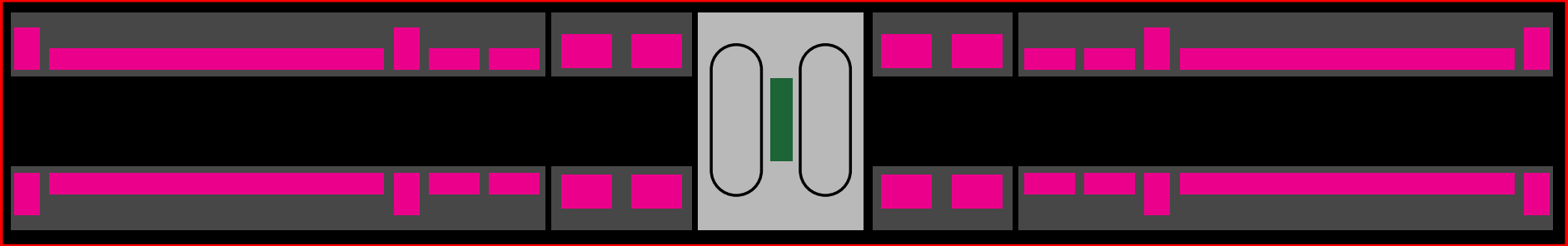
Spokesman's update:

STEP 3PI/2

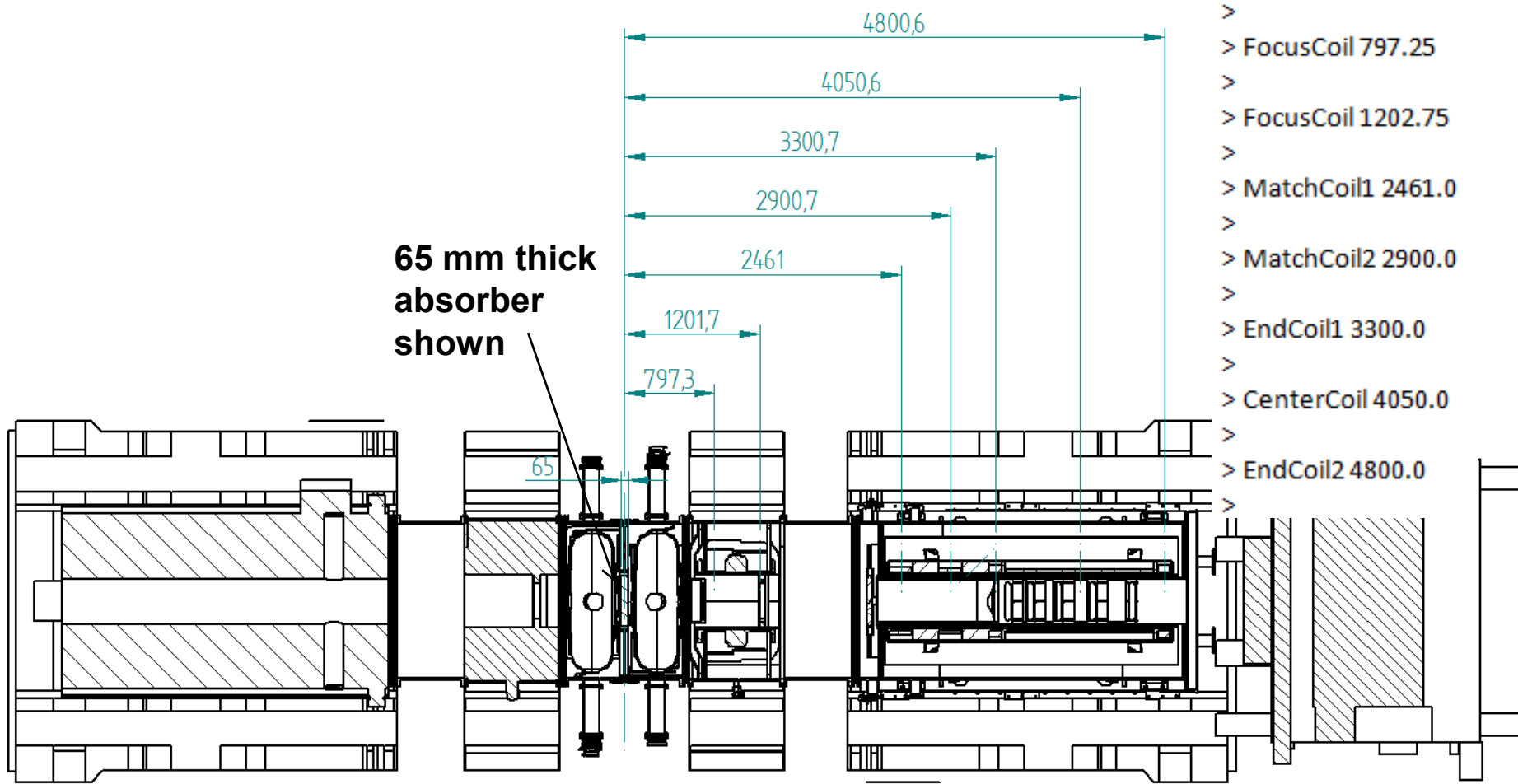
Step 3pi/2 initial development:

- **Taskforce:**
 - **Optics/performance analysis (MEMO+):**
 - Victoria Blackmore, Jaroslaw Pasternak, Chris Rogers, Rob Ryne, Pavel Snopok, Diktys Stratakis
 - **Construction/project (MIPO):**
 - Alan Bross, Alan Grant, Roy Preece, Peter Garbincius
 - **“Management”:**
 - Ken Long, Mark Palmer
- **Communication:**
 - **MICEmine:**
 - <http://micewww.pp.rl.ac.uk/issues/1543>
- **Keeping it “tight” until we’ve met the 15Sep14 deadline**

Reference design:



Reference design:



65 mm thick absorber shown

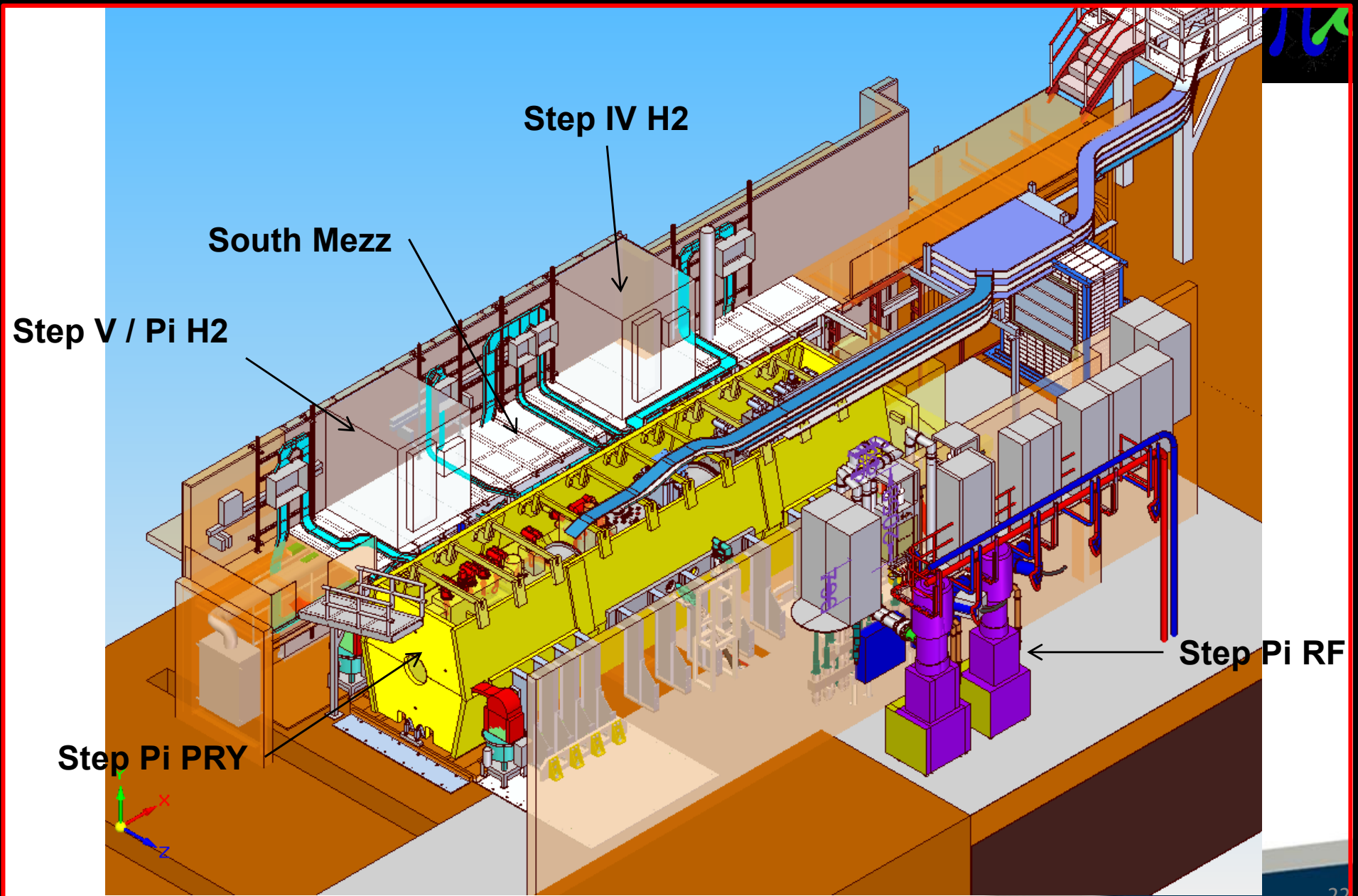
- >
- > FocusCoil 797.25
- >
- > FocusCoil 1202.75
- >
- > MatchCoil1 2461.0
- >
- > MatchCoil2 2900.0
- >
- > EndCoil1 3300.0
- >
- > CenterCoil 4050.0
- >
- > EndCoil2 4800.0
- >

View from TD-1189-2458 (20-08-14)

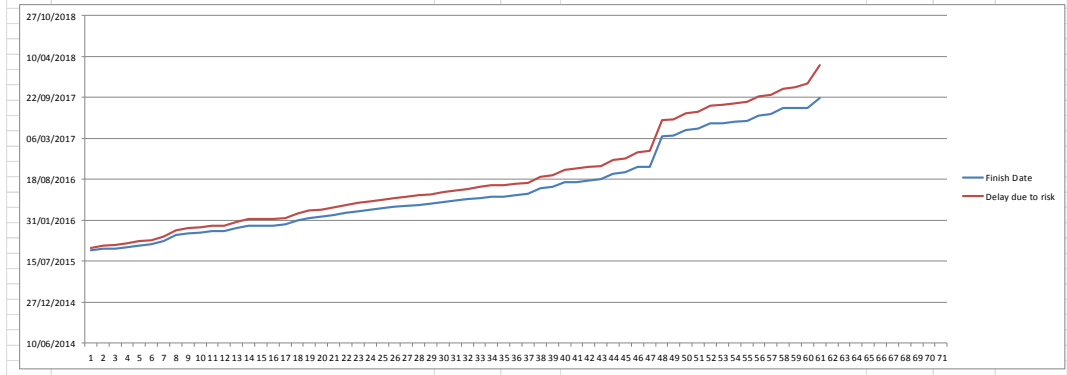
SECTION A-A

Note: spool pieces might also contain LH2

Reference design:



WBS	Name	Finish Date	Risks_Level	Risk_Impact	Risk Level Duration	Probability	Delay due to risk
4	End of STEP IV Operations	07/09/2015	(RISK)-(R3)	Additional data runs required to complete matrix	20	0.5	17/09/2015
6.1.1	Disconnect Northside Waveguides	15/09/2015	(RISK)-(R5)	Expert Personnel not available	5	0.75	28/09/2015
6.1.3	Disconnect Southside Waveguides	15/09/2015	(RISK)-(R5)	Expert Personnel not available	5	0.75	02/10/2015
6.1.4	Move South side Tracker Cryostats to R9	21/09/2015					08/10/2015
6.2.1	Remove TOF1 & KL & EMR	30/09/2015	(RISK)-(R5)	Expert Personnel not available	5	0.75	21/10/2015
6.2.2	Move TOF, KL & EMR to R9	05/10/2015					26/10/2015
6.3.1	Remove North side PRY	22/10/2015	(RISK)-(R5)	Lifting equipment missing / damaged	5	0.25	13/11/2015
6.4.1	Disconnect all magnet cooling lines, instrumentation and power	19/11/2015	(RISK)-(R4)	Expert Personnel not available	10	0.25	14/12/2015
6.4.2	Move Upstream Spectrometer Solenoid magnet to R9	26/11/2015	(RISK)-(R5)	Expert Personnel not available	5	0.25	22/12/2015
6.4.3	Move Downstream Spectrometer Solenoid magnet to R9	02/12/2015	(RISK)-(R5)	Expert Personnel not available	5	0.25	29/12/2015
6.4.4	Move Focus Coil Magnet to R9	08/12/2015	(RISK)-(R5)	Expert Personnel not available	5	0.25	05/01/2016
6.4.5	All Channel Magnets moved out of the Hall	08/12/2015		Expert Personnel not available			05/01/2016
6.3.3	Remove South side PRY	25/12/2015	(RISK)-(R5)	Lifting equipment missing / damaged	5	0.25	24/01/2016
6.3.5	Remove Downstream underfloor supports	05/01/2016	(RISK)-(R5)	Lifting equipment missing / damaged	5	0.25	05/02/2016
6.3.6	PRY Material removed from the Hall	05/01/2016					05/02/2016
6.6	Step IV De-Commissioning Complete	05/01/2016					05/02/2016
7.4.1.1	Remove step IV false floor plates	11/01/2016					11/02/2016
7.4.1.2	Begin drilling and tapping holes in the false floor sufficient for step V	29/01/2016	(RISK)-(R3)	Floor strength found to be insufficient	20	0.2	04/03/2016
7.4.1.3	Fit intermediate surface (tiled steel plates) for the false floor step V position	11/02/2016	(RISK)-(R5)	Inaccurate drilling	5	0.2	18/03/2016
7.4.1.4	Trial RFCC #1 base plate installation including survey and marking out	17/02/2016					24/03/2016
7.4.1.5	Drill and tap threaded holes in the false floor intermediate surface	24/02/2016	(RISK)-(R5)	Tooling failures	5	0.2	01/04/2016
7.4.1.6	Create level surface with washers at bolt locations (survey level)	08/03/2016					14/04/2016
7.4.1.7	Install base plate - RFCC #1	14/03/2016	(RISK)-(R3)		20	0.25	25/04/2016
7.4.1.8	Install through bolts and survey, level and tighten the complete arrangement	22/03/2016					03/05/2016
7.4.1.9	Trial AFC #2 base plate installation including survey and marking out	29/03/2016					10/05/2016
7.4.1.10	Drill and tap threaded holes in the false floor intermediate surface	06/04/2016	(RISK)-(R5)	Tooling failures	5	0.2	19/05/2016
7.4.1.11	Create level surface with washers at bolt locations (survey level)	11/04/2016					24/05/2016
7.4.1.12	Install base plate - AFC #2	15/04/2016	(RISK)-(R3)		20	0.25	02/06/2016
7.4.1.13	Install through bolts and survey, level and tighten the complete arrangement	20/04/2016					07/06/2016
7.4.1.14	Trial spectrometer #2 base plate installation including survey and marking out	28/04/2016					15/06/2016
7.4.1.15	Drill and tap threaded holes in the false floor intermediate surface	05/05/2016	(RISK)-(R5)	Tooling failures	5	0.2	23/06/2016
7.4.1.16	Create level surface with washers at bolt locations (survey level)	13/05/2016					01/07/2016
7.4.1.17	Install base plate - Spectrometer Solenoid Downstream	18/05/2016	(RISK)-(R3)		20	0.25	11/07/2016
7.4.1.18	Install through bolts and survey, level and tighten the complete arrangement	26/05/2016					19/07/2016
7.4.1.19	Base Plate work complete	26/05/2016					19/07/2016
7.4.2.1.1	Survey Floor & PRY legs	02/06/2016					26/07/2016
7.4.2.1.2	Cut shim	08/06/2016					01/08/2016
7.4.2.1.3	Install frame legs (inc drilling plates)	04/07/2016	(RISK)-(R4)	Inaccuracy of the frame / floor drilling	10	0.3	30/08/2016
7.4.2.1.4	Survey PRY legs	12/07/2016					07/09/2016
7.4.2.1.5	Fit south side yoke plates	05/08/2016	(RISK)-(R4)	Inaccuracy of the plates / frame setup	10	0.3	04/10/2016
7.4.2.1.6	South side SS return yoke installation complete	05/08/2016	(RISK)-(R3)	Additional machining or replacement of parts	20	0.3	10/10/2016
7.4.2.2.1	Survey Floor & PRY legs	12/08/2016					17/10/2016
7.4.2.2.2	Cut shim	18/08/2016					23/10/2016
7.4.2.2.3	Install frame legs (inc drilling plates)	13/09/2016	(RISK)-(R4)	Inaccuracy of the frame / floor drilling	10	0.3	21/11/2016
7.4.2.2.4	Survey PRY legs	21/09/2016					29/11/2016
7.4.2.2.5	Fit south side yoke plates	17/10/2016	(RISK)-(R4)	Inaccuracy of the plates / frame setup	10	0.3	28/12/2016
7.4.2.2.6	South side RFCC return yoke installation complete	17/10/2016	(RISK)-(R3)	Additional machining or replacement of parts	20	0.3	03/01/2017
7.4.2.3.1	Survey Floor & PRY Legs	16/03/2017					02/06/2017
7.4.2.3.2	Cut shim	22/03/2017					08/06/2017
7.4.2.3.3	Install frame legs (inc drilling plates)	17/04/2017	(RISK)-(R4)	Inaccuracy of the frame / floor drilling	10	0.3	07/07/2017
7.4.2.3.4	Survey PRY Legs	24/04/2017					14/07/2017
7.4.2.3.5	Fit North side yoke plates	19/05/2017	(RISK)-(R4)	Inaccuracy of the plates / frame setup	10	0.3	11/08/2017
7.4.2.3.6	North side SS return yoke installation complete	19/05/2017	(RISK)-(R3)	Additional machining or replacement of parts	20	0.3	17/08/2017
7.4.2.4.1	Survey Floor & PRY Legs	26/05/2017					24/08/2017
7.4.2.4.2	Cut shim	01/06/2017					30/08/2017
7.4.2.4.3	Install frame legs (inc drilling plates)	27/06/2017	(RISK)-(R4)	Inaccuracy of the frame / floor drilling	10	0.3	28/09/2017
7.4.2.4.4	Survey PRY legs	04/07/2017					05/10/2017
7.4.2.4.5	Fit North side yoke plates	31/07/2017	(RISK)-(R4)	Inaccuracy of the plates / frame setup	10	0.3	04/11/2017
7.4.2.4.6	North side RFCC return yoke installation complete	31/07/2017	(RISK)-(R3)	Additional machining or replacement of parts	20	0.3	10/11/2017
6	MICE step V installation complete	31/07/2017	(RISK)-(R2)	Delay due to currently non-critical items reaching critical path	40	0.5	30/11/2017
9.1	Cooling Channel magnet tests	19/09/2017	(RISK)-(R2)	Commissioning of the channel is an unknown	40	1	28/02/2018

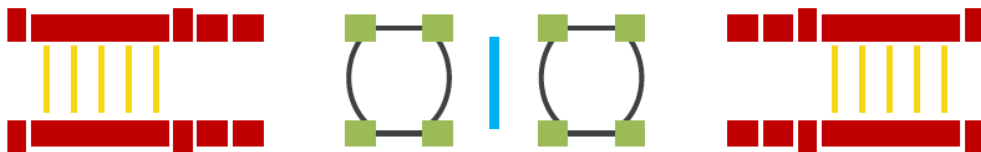


Reference design:

- Provides for minimal Step IV programme;
 - Need to evaluate physics measurements against the priorities we have agreed;
- Delivers Step 3pi/2 in line with the DOE review's recommendation

Alternatives under study:

Case 1: 6cm LiH in centre



Case 2: 10cm LiH in centre



Case 3: 6cm LiH either side of an "RF gap"



Case 4: 6cm LiH at beta minima



Case 5: Filling the AFC with LH2



Spokesman's update:

NUFACT14 AND UPCOMING CONFERENCES

Upcoming conferences:

- Tell it the way it is!
- Physics programme:
 - Measurement of material properties that affect cooling (aka Step IV);
 - Demonstrate, and study, ionization cooling (aka Step (V) $3\pi/2$);
- [my reason for this is to gradually move away from the “Step” concept which is gradually becoming a millstone]
- Use the table presented on slide 17 as the “headlines” of the programme
- Do not make the mistake of saying that we “demonstrate cooling at Step IV”
- On the demonstration of ionization cooling note:
 - DOE review of MAP/MICE recommends:
 - Demonstration of ionization cooling with reacceleration;
 - Equipment required to make this demonstration must be “on the MICE Hall floor” such that experiment is taking data before the end of calendar 2017;
 - The collaboration is evaluating the options by which this can be achieved, including:
 - A simplified “Step $3\pi/2$ ” configuration

Spokesman's update:

CONCLUSIONS

Conclusions:

- The review outcomes are good for our programme:
 - Endorsement of our science aims:
 - Material properties that affect cooling (aka Step IV);
 - Demonstration/study of ionization cooling (aka Step 3pi/2)
 - Recognition of the strength of the construction and operations and analysis projects/teams
- We're under very helpful pressure:
 - To get the demonstration of ionization cooling done, and to do it soon
- I was/am very impressed by the collaborations strength, resilience and ability to respond rapidly
 - These attributes will be of the essence in the coming months
- Must:
 - Stay focused on the delivery of Step IV on (or in advance of) the scheduled date;
 - Be creative to design, and then deliver, the best possible demonstration of ionization cooling on the required timetable
- Exciting! I'm confident we can pull it off.