



# Closing Remarks

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MICE Collaboration Meeting 30—Oxford  
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# Outline



- **Goals for This Meeting**
- **Technical Board Issues**
- **Detector Issues**
- **Software Issues**
- **Magnet Issues**
- **RF Issues**
- **Target Issues**
- **LH<sub>2</sub> System**
- **Publications**
- **Step 4 Goals**
- **By Next Meeting**
- **Final Remarks**



# Goals for Meeting

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- **Schedule of data taking**
  - now to Step IV ✓
  - including Step V and Step VI
- **Status of construction** ✓
- **Status of first MICE paper** ✓
- **Status of software** ✓

# "Official" Schedule



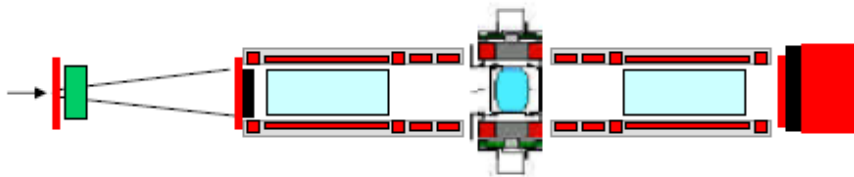
MICE SCHEDULE  
update June 2011 V1

Run date:

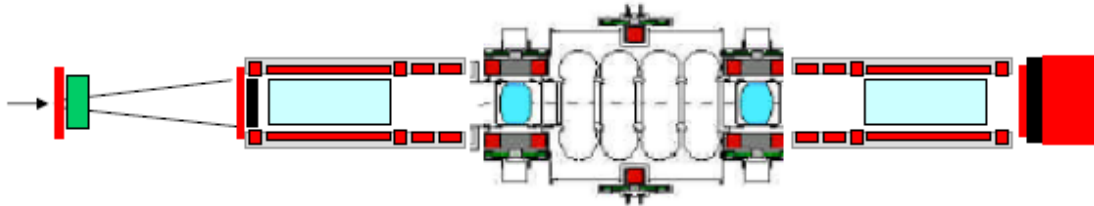


STEP I

completed -> Aug2010  
EMR run Q1 2012



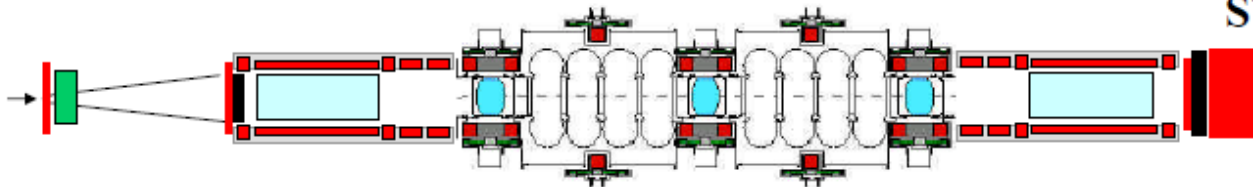
STEP IV Q3 2012



STEP V

Q2 2014

Still aspirational

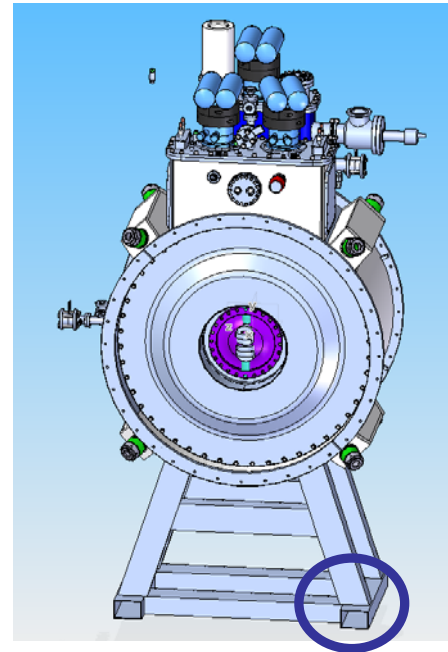
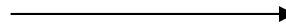
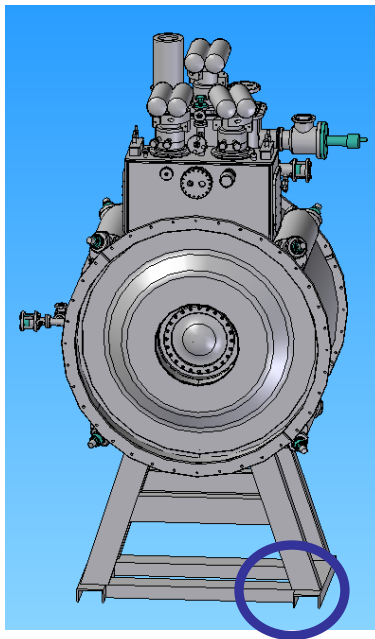


STEP VI

2016

- Integration issues (**Tarrant**)

- numerous interferences with mezzanine uncovered and are being dealt with
  - RFCC, EMR, AFC, H<sub>2</sub> system
- mezzanine will require modifications
  - straightforward, but width becomes marginal from safety perspective in one spot
- some module changes also needed at interface with floor and mezzanine

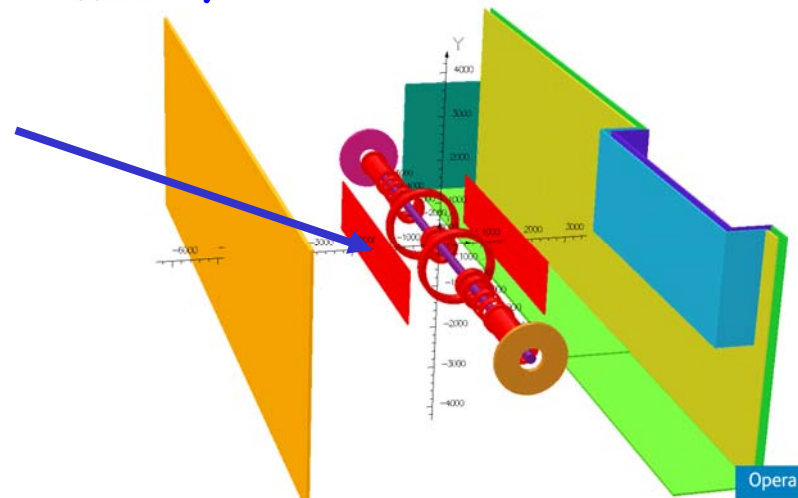


The price of configuration control is eternal vigilance

1534!  
Asked to change back to 1515

- Magnetic field estimates for MICE Hall and ISIS CR remain high (**Courthold**)
  - explored solutions with Vector Fields
    - most practical approach seems to be to restrict access to ISIS CR during extreme MICE running conditions
  - even outside the shield wall may be a “no credit card” zone
- There remain questions about the maximum imbalance loads on devices
  - most loads are handled between modules, not to the floor

Close-in shielding  
(impractical)



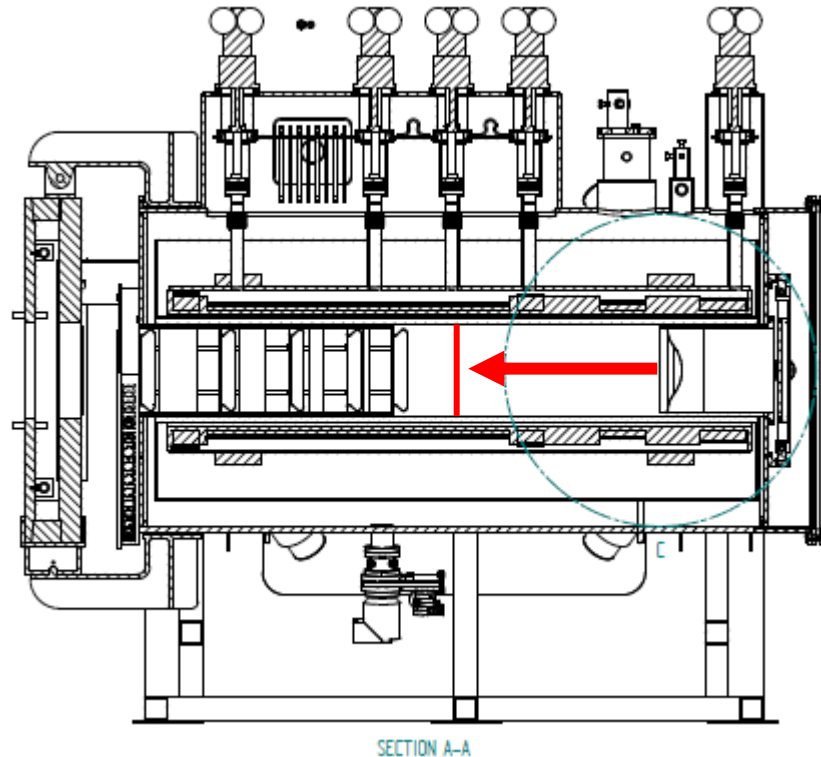
- He window (**Hayler**)

- proposal for window examined

- several disadvantages so prefer to keep thinking

- better to put window closer to tracker

- can we use window *identical* to absorber safety window design?





# Detector Issues



- Lack of understanding of detector positions during data-taking runs has been an impediment
  - need someone to understand where things are placed and when they are moved
    - fiducials on all devices
    - understandable survey data
      - preferably translated into MICE coordinate system
- TOF1 “cage” seems to be a bit of an orphan
  - parts fabricated and at RAL, but not presently located
  - Bonesini and Tortora will pay attention to this
- Progress on radiation shield engineering
  - need someone from tracker group to own this
- Is tracker acquisition time window unnecessarily wide in Step 5 or 6 cases?





# Software



- On-line reconstruction presently broken
  - needed for running, so use old system in interim
    - effort level dangerously low and new version not ready until October 1
- Insistence on having documented and understood code to produce “official” MICE results is the right approach
  - it must be followed to have scientific credibility
    - and to have maintainable software
  - do not compromise on this point!
- Controls and monitoring software remains an issue
  - milestones for this must be included in subsystem delivery plans
  - develop standard list of readout hardware
  - define “states” for each subsystem
- Software scope appears grossly out of whack with available resources
  - need to descope, change schedule, or get more skilled help



# Magnet Issues (1)



- Brackets for Virostek plates were inadequate
  - RAL will remake
    - mounting plates on magnet vacuum shell must be improved as well
- Spectrometer solenoid repair plan essentially ready and *already under way*
  - still a few questions to resolve
    - quench protection calculations; eddy current forces on shield
- Minor interferences being worked out by **Tarrant** and **Hayler**, along with **Virostek**, **DeMello**, and **Li**
  - bolted-on stand will be designed by **Virostek/Preece**
- First focus coil well on its way to delivery to RAL
  - second one will start winding soon
    - but don't forget we need a third one
  - alignment/fiducialization issue should be resolved soon
  - testing on-site with real control system is excellent goal



# Magnet Issues (2)

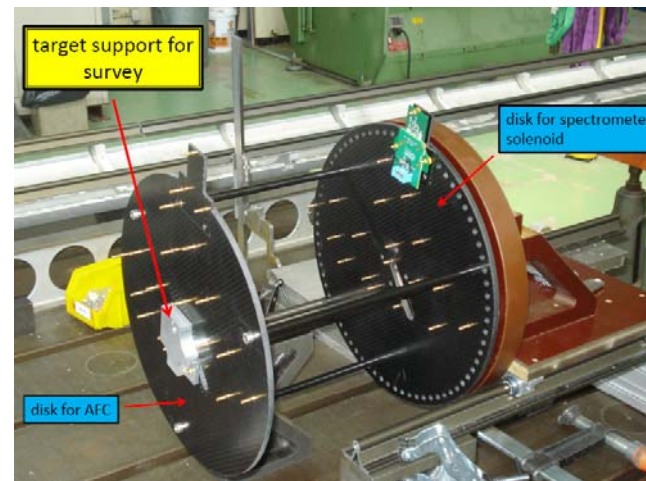


- Coupling coil issues still need resolution
  - testing possibilities starting to firm up
  - coil expected in US by September '11
    - concern is that test time frame is too long
      - minimum of 6 months to get ready...and could be as long as one year
        - testing program must be well planned and well instrumented (⇒ needs magnet experts)
- Option of waiting for cold mass test before winding CC #2 seems incompatible with Step 5 schedule goal
  - at a minimum, must develop confidence in quench protection scheme before proceeding
    - this must be a high priority!
- Will need some parallelism on all CCs to make up time
  - aspects of cryostat effort seem (to me) most plausible to farm out

# Magnet Issues (3)

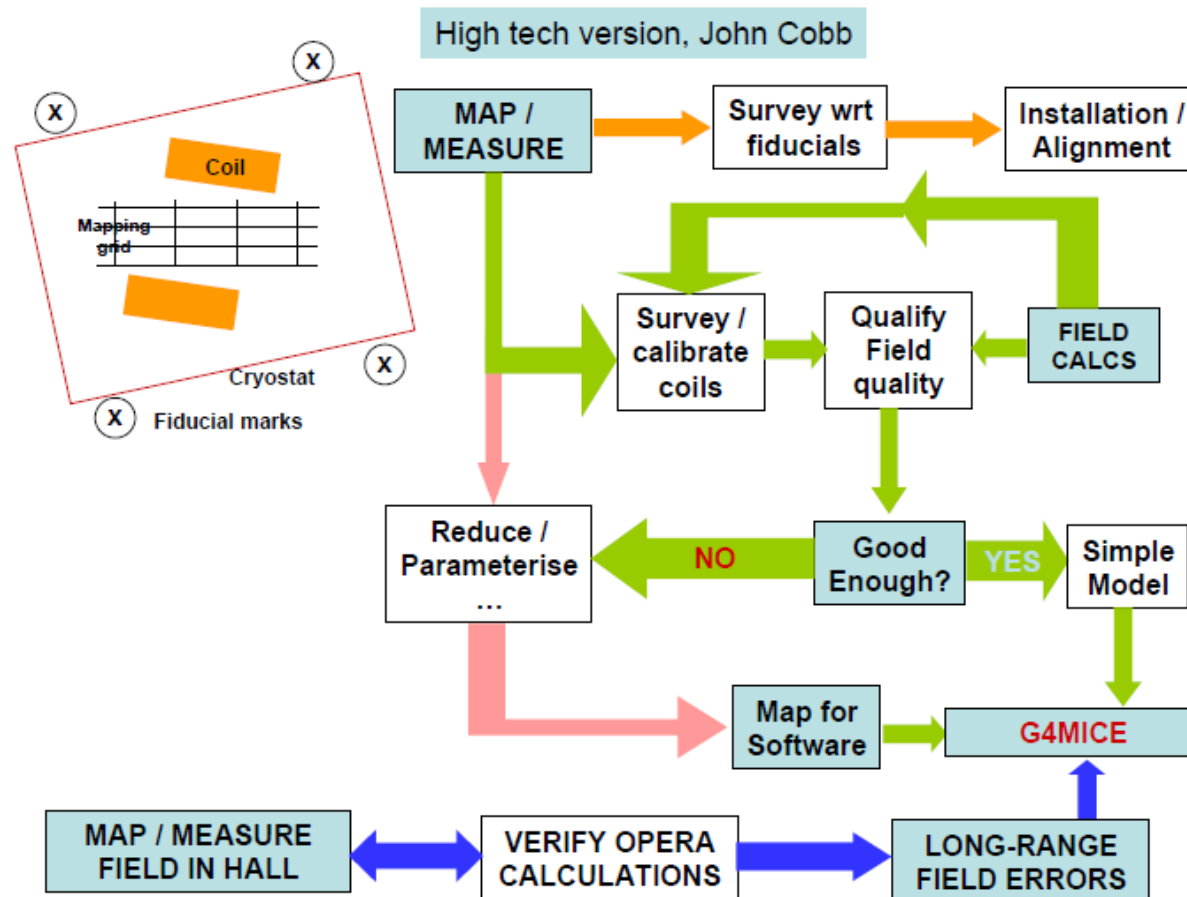
- Measurement plans progressing well (**Bergsma et al.**)
  - need sensors from NIKHEF soon (Filthaut)
  - schedule: AFC-Dec. '11; Sp.Sol-Feb. '12 (vendor), Apr. '12 (RAL)
- MICE must decide on need for second carriage in case spectrometers and AFC measurements are needed on similar time scale (*...we should be so lucky!*)
  - debate on whether detailed measurements of spectrometers should take place at vendor or at RAL (or both) needs to be settled
    - if detailed measurements are desired at RAL anyway, may not make sense to do them twice

Need to decide by August



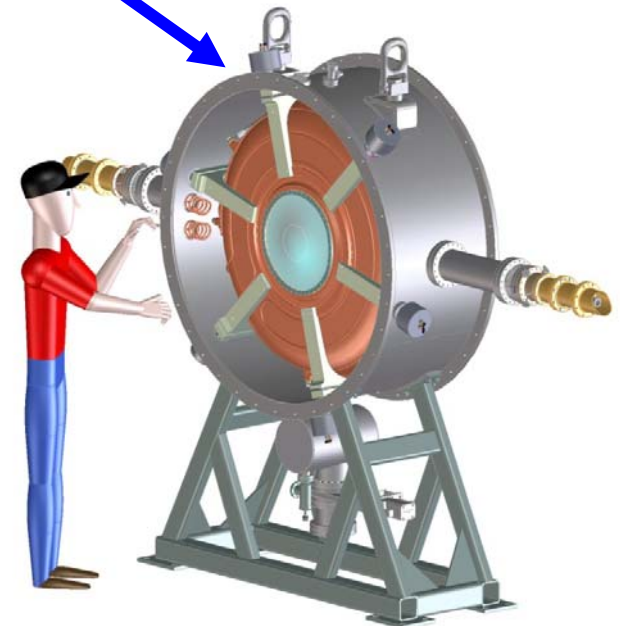
# Magnetic Measurements

- Proposed MICE parlor game being developed (**Cobb**)



# RF Issues (1)

- Cavity processing at LBNL will start in October (Li, DeMello)
  - delayed due to magnet priority (cash flow)
- LBNL-designed (DeMello) test vessel out for bid at Fermilab
  - will be used at MTA for cavity tests
    - how many cavities should be tested?
  - need at least 6 tuner arms fabricated
    - too big a job for U-Miss, so LBNL will handle
  - first MICE cavity under test early next year

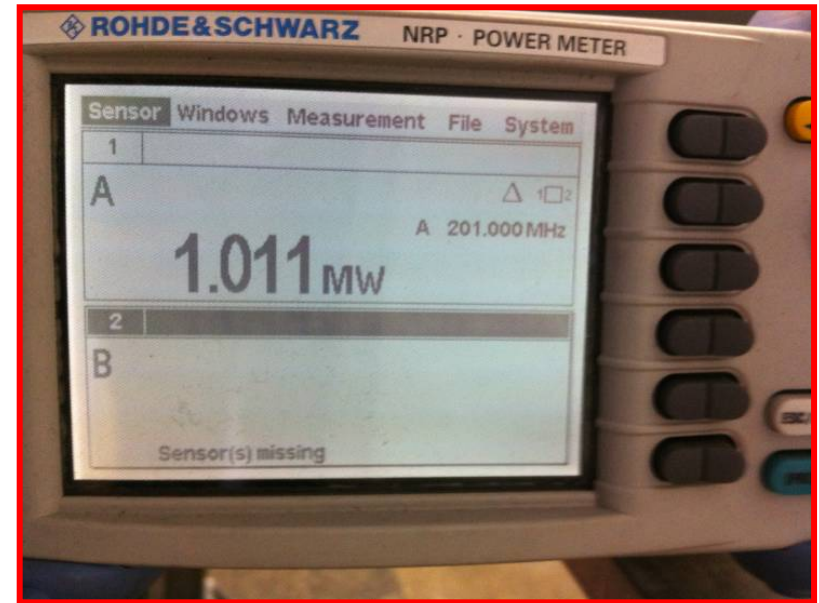


RF cavity test plan needed!

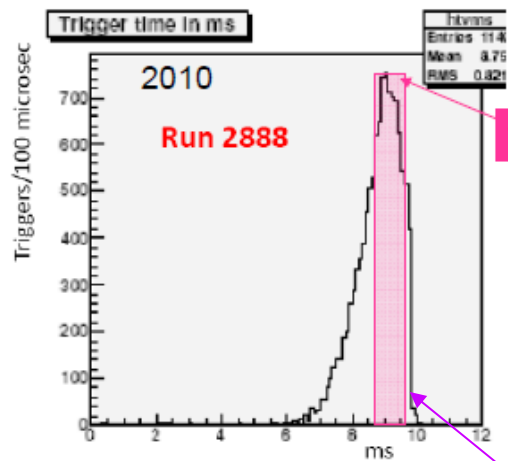


# RF Issues (2)

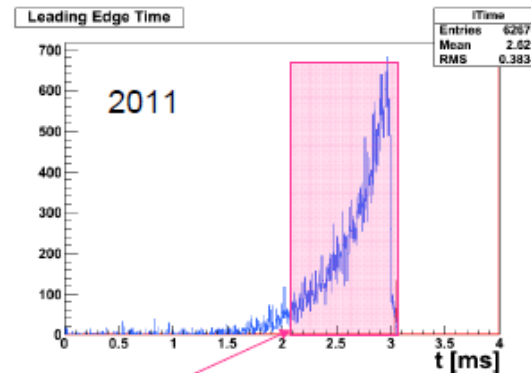
- Daresbury Lab RF group (**Moss**) reached 1 MW RF power output with first MICE RF unit
  - still with old tubes
    - at least one of which is older than many MICE collaborators!
  - no evidence of x-ray emission at this power level
- Must remain vigilant for radiation emission and magnetic field interference *in situ*



- Real progress in this area
  - congratulations to entire target team for achieving *millions* of test pulses with vespel bearings, even without well-aligned stator and shaft
  - controller improvements (**Smith**) also noteworthy
- Spill structure remains an issue
  - want flat 1 ms spill, zero outside this
    - this maximizes production vs. loss rate
  - will proposed beam bump (**Adams**) achieve this?



Stefania



Yordan

desired

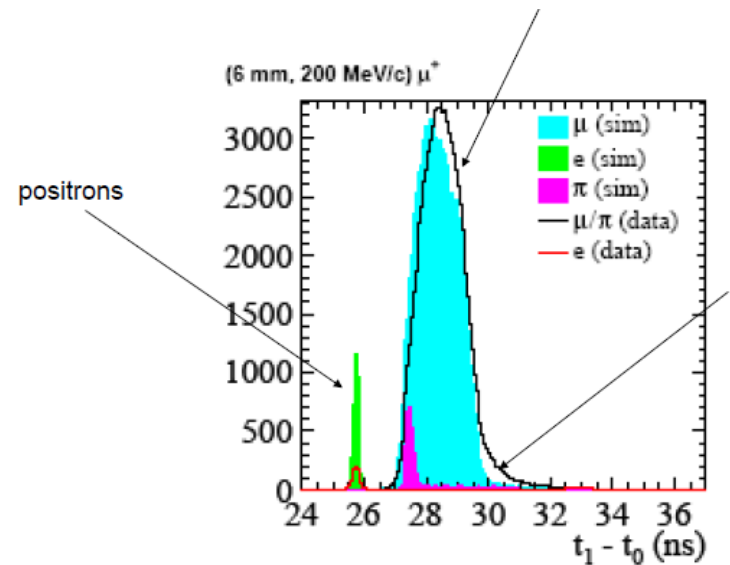


# LH<sub>2</sub> System

- Good progress by RAL cryo group and DL controls group
  - tests going well
    - effective collaboration between Labs on critical system
  - should be ready to commission in AFC module by May '12

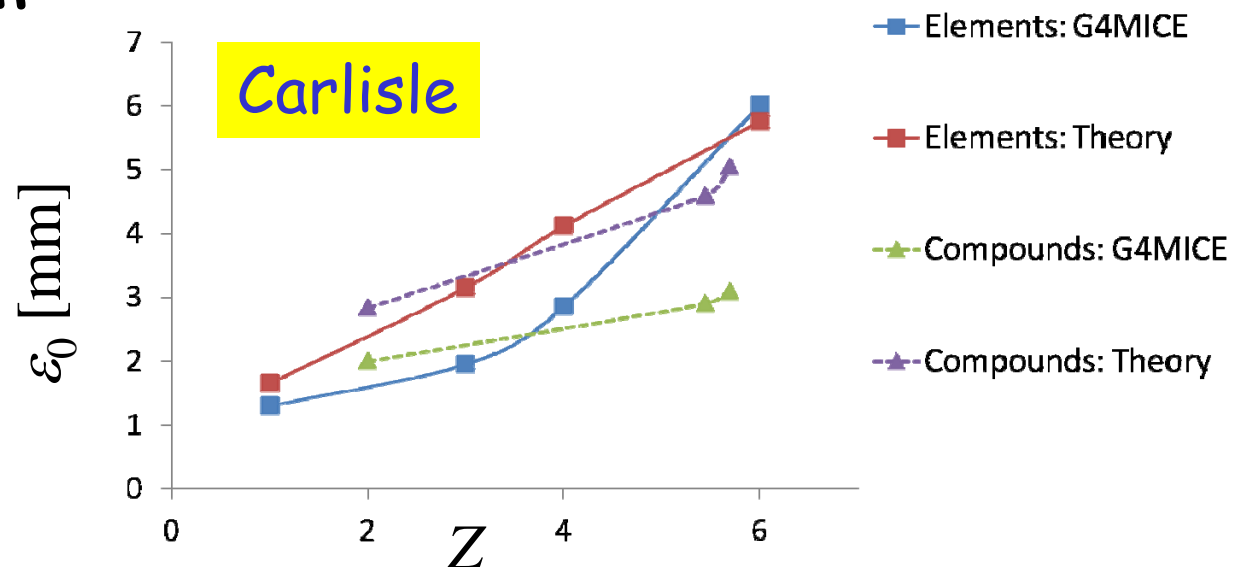


- Good discussion on format and content of first MICE papers
  - beam line paper circulated to MICE for comments
    - due by July 21; please read it!
  - paper on momentum and emittance measurements nearly ready
    - a few details to correct
      - $2^{10} \neq 1000$  in time calibration
    - other work remains
      - production rate per volt of beam loss
      - electron vs. positron time difference
    - where should it go?
      - Phys. Rev. Lett. or Phys. Lett.
- Monte Carlo good, but not perfect
  - does it matter?



# Step 4 Goals

- Order of operations considerations
  - maximize efficiency and minimize risk
    - changeover times will dominate choice
      - empty, solid, empty LH<sub>2</sub>, filled LH<sub>2</sub> is my preference
  - decide at CM31
    - list of solid absorbers will reflect time available to look at them
      - create a priority order
- Some puzzles remain





# By Next Meeting (1)

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- Two MICE papers accepted for publication
- Initial results from summer runs
- EMR production issues resolved and production in full swing
- Preparations to choose Step 4 physics goals under way
  - finalize choices at CM31



# By Next Meeting (2)



- Continue to work toward adopted goal of trying for Step 5 running before long ISIS shutdown
  - as fallback, assess scientific ramifications of going straight to step 6
- Take delivery of first AFC module and first CC cold mass
- Develop measurement plans:
  - RF cavity
  - CC cold mass
    - and review both
- Flesh out fabrication and assembly plans for RFCC module:
  - CC cryostat (who, where, when)
  - order conductor for remaining magnets



# By Next Meeting (3)



- Magnetic measurement *strategy* needs to be settled before meeting
  - not how, but when and where
- Get MAUS on-line reconstruction software operational
  - TOF code integrated
  - event display available
- Make NTUPLES available to shifters?
  - are only the accelerator physicists trustworthy enough?
- Each group should list a few items in this “by next meeting” category in its future presentations
  - Chris Rogers did this yesterday



# Final Remarks



- **MICE** management is grateful for the continued hard work of the collaboration
  - pleased to see the younger members giving talks, taking responsibility, and delivering!
- Please continue to support **Andy Nichols and Gail Hanson**
  - cooperate with requests in a complete and timely fashion
    - management of the project must be on a solid footing
- Be vigilant about opportunities to publicize **MICE**



# Kudos

- Thanks to **John Cobb, Victoria Blackmore, and Chris Tunnell** (CM30 organizers)
  - for a well-planned and well-organized meeting...and a great dinner!



Next meeting "again" at Oxford! 😊





# Personal Comments



- I have very much enjoyed my tenure as Deputy Spokesperson for MICE and regret being unable to continue this role
  - working with Alain has been both instructive and enjoyable
  - working with such a group of dedicated and talented individuals has been very rewarding for me
    - especially seeing the transformation from “dreamers” to “doers”
- I am confident that the MICE collaboration will succeed in its quest to demonstrate ionization cooling
  - and that this success will enable the worldwide particle physics community to have options at both the intensity and the energy frontiers
- Please do not forget in the “heat of battle” that *we are doing something important for science*