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# *Absorber and Focus Coil Safety*

## *Working Group*

**Michael S. Zisman**

*CENTER FOR BEAM PHYSICS*

**MICE Collaboration Meeting—CERN**

**March 29, 2003**



# Outline

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- Function of group
- Membership
- Status
- Recent progress
- Summary



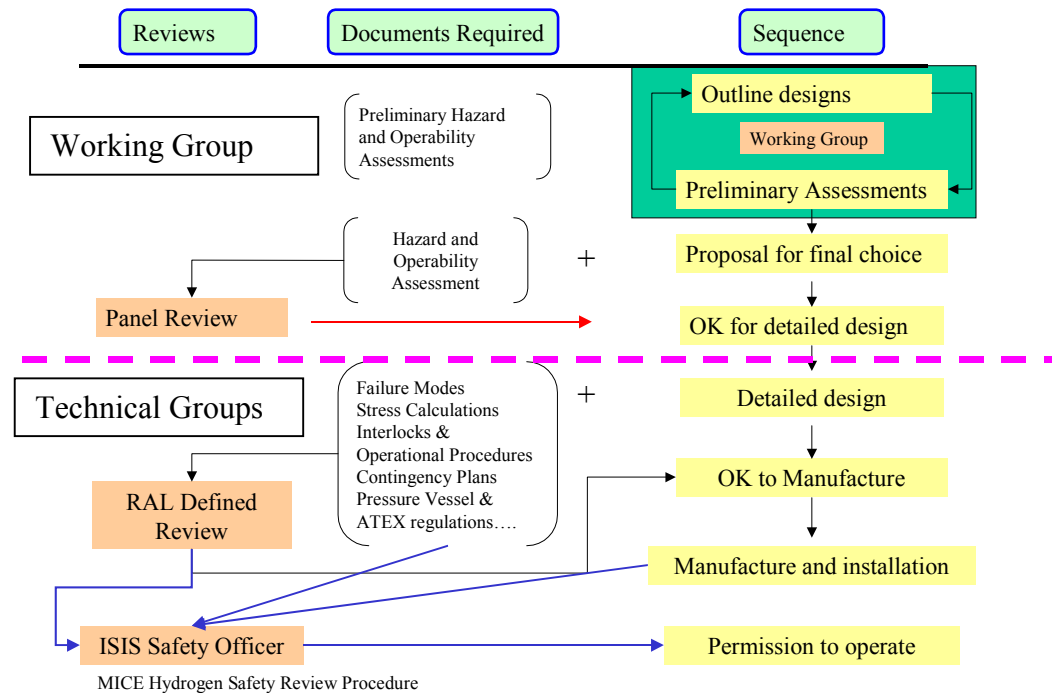
## Function of Group



- Charged by Paul Drumm and Alain Blondel to set up Working Group
  - mission
    - work through an **integrated solution** to the absorber and focusing coil module, with the goal of satisfying the **MICE** experimental requirements in a manner judged (by RAL) to be **acceptably safe**
  - deliverables
    - develop an agreed-upon **design concept**
    - produce **preliminary hazard and operability assessment documentation**
    - set up a **MICE "internal" review** to assess the plan **prior to beginning detailed engineering**
      - the review will include outside persons, but **reports to MICE management**, not to RAL

# Function of Group

- Subsequently, **detailed design will be done by existing Technical Groups (Absorbers, Magnets, Integration)**
  - Working Group **may review progress periodically** to ensure readiness for formal RAL-sponsored review prior to starting fabrication
- Diagram of work





# Membership



- Members taken from
  - existing Technical Groups (Absorbers, Magnets, Integration)
  - technical experts within **MICE** group and from RAL
    - ...and me (representing the last half of the alphabet)
- List is:

Giles Barr (Oxford)  
Elwyn Baynham (RAL)  
Ed Black (IIT)  
Tom Bradshaw (RAL)  
Mary Anne Cummings (NIU)  
Mike Green (LBNL)  
Shigeru Ishimoto (KEK)  
Iouri Ivaniouchenkov (RAL)  
Wing Lau (Oxford)  
Mike Zisman (LBNL), convener



## Status

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- First meeting of group (via telephone) held **March 14 at 1500 GMT**
- Agenda included summaries from Technical Groups covering:
  - **issues that need addressing** to reach an integrated, safe design
  - summary of **what has been done** to date to address these issues
  - indication of **what remains** to be done
  - identification of **"interface" issues** (those not within purview of a single group)



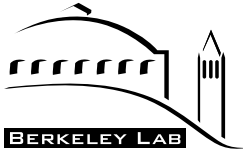
## Status



- Defined regular meeting cycle + style (phone) at first meeting
- Guiding principle:
  - meetings should be (roughly) equally inconvenient to all parties
    - given our geographical distribution, this was easily achieved
- Most of our meetings will be during “summer” (daylight savings time)
  - 1400 GMT (Friday) gives meeting on the same *day* everywhere

	1400 GMT	
Lab	Winter	Summer
LBNL	0600	0700
Fermilab	0800	0900
RAL	1400	1500
CERN	1500	1600
KEK	2300	2300

- start every two weeks, will meet weekly if we need to



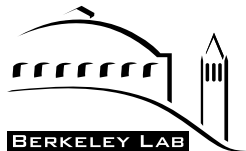
## Recent Progress

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- Met here in person on **Thursday a.m. March 27** and **Friday a.m. March 28** in the parallel session slots
- Objectives:
  - work on answers to RAL review “homework” questions
  - find out what the detailed design choices are
    - and their **pros and cons**
  - understand what will be needed in terms of hazard and operability documentation





## Recent Progress



- RAL homework questions

Liquid hydrogen absorbers (M. Zisman and new Working Group)\*

The R&D on this system is widely dispersed.

What are the plans for assembling and testing the completed system—liquid hydrogen container, vacuum, and focusing coils? [Black, Green]

Where will it occur? [Black, Ivaniouchenkov]

Who supplies the infrastructure and safety needs? [Bradshaw, Ivaniouchenkov]

While liquid hydrogen is the baseline absorber in MICE, to what extent can other absorbers be explored? [Barr, Zisman]

\*Assignment comes from MICE Steering Group

- Person underlined is the one who I will pester until I get a write-up!
  - I will edit the comments for the WG to approve



## Recent Progress



- Plans and venues for assembly and testing of completed system
  - goal is to make assemblies modular
  - initial testing (magnet, absorber) to occur at institute doing production
  - complete absorber assembly will be tested with  $LH_2$  at Fermilab (MTA)
  - integrated assembly will be tested as a unit prior to operation
    - either at Fermilab or at RAL
- Infrastructure and safety needs
  - RAL is responsible institute for both, with safety items funded by MICE common funds
    - RAL must (and does) have final responsibility and authority on safety



## Recent Progress



- To what extent will other absorbers be studied
  - $\text{LH}_2$  and  $\text{LHe}$  are the primary absorbers
  - solid absorbers will also be studied; it is likely that some of these will have safety implications to be dealt with (e.g.,  $\text{Li}$ )
    - the safety review will address this aspect
  - the system will be capable of switching from liquid to solid absorbers **reversibly**...but not rapidly (few weeks)
    - the run plan will take account of the required changeover time



## Recent Progress

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- Agenda:

Assembly and testing plans and venues [**Black**]: 20 min

Alternative absorber possibilities [**Barr**]: 10 min

Rationale for experimental requirements [**Blondel**]: 15

Experimental requirements for liquid absorbers [**Ishimoto**]: 15 min

Experimental requirements for solid absorbers [**Barr**]: 15 min

Centrally attached absorber design [**Lau**]: 30 min

End-attached absorber design [**Green**]: 30 min

Infrastructure and safety needs [**Ivaniouchenkov**]: 15 min

Safety hazard and operability issues [**Baynham**]: 30 min



## Recent Progress



- There will be a **safety meeting at RAL on March 31** (which I will attend via videoconference)
- From our discussions here, the first order of business is to get **specifications** for what is required by experiment
  - do the liquid absorbers require variable length?
  - do we need to insert additional material to shield detectors at high RF gradients?
  - what turnaround time is acceptable (days, weeks, months)?
  - do we need to remove central absorber, or is enough to simply empty it



## Summary



- Just beginning **structured process** to develop a safe and effective absorber and focusing coil module
- First step is to create a design and documentation suitable for an internal **MICE** review
  - aim for completing in time for October meeting at RAL
    - ...sooner would be even better
- Will need help from others
  - to finalize the **MICE** experimental requirements
  - to define acceptable level for hazard and operability documentation
  - to ensure we develop a safe design
- Link to group activities, found on main **MICE** web site, is <http://hep04.phys.iit.edu/cooldemo/afcswg/afcswg.html>
- *Wish us luck!*