



Report from the NFMCC

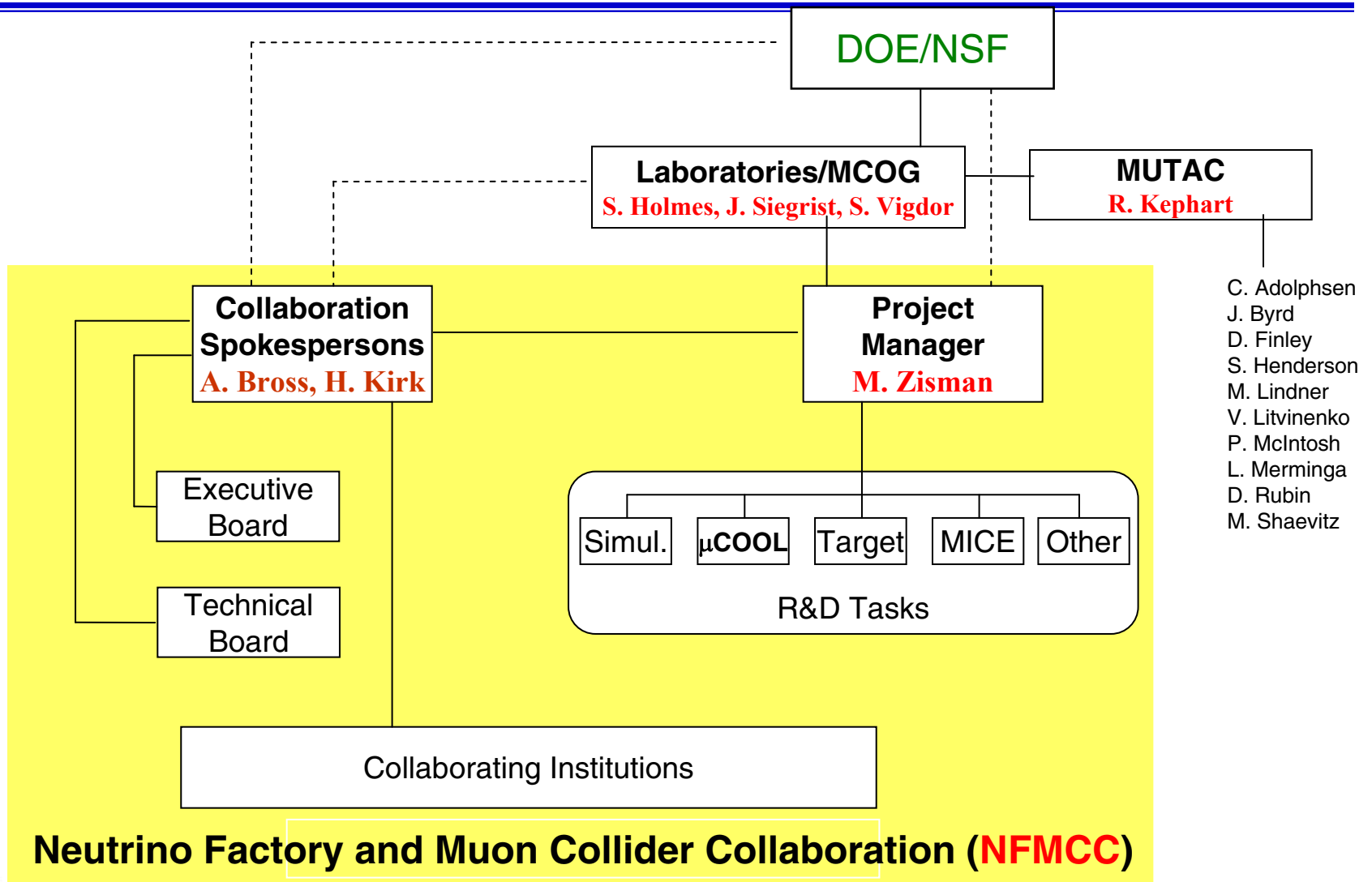
MUTAC REVIEW

Lawrence Berkeley National Laboratory

April 8, 2008



NFMCC Organization



Neutrino Factory and Muon Collider Collaboration (NFMCC)

Collaborating Institutions

US

National Labs

ANL
BNL
FNAL
LBNL
ORNL
TJNAF

Corporate Partners

Muons Inc.
Particle Beams
Lasers, Inc
Tech-X Corp.

Universities

Chicago
Cornell
Illinois
IIT
Indiana
Iowa
Michigan State
Mississippi
Northern Illinois
Princeton
UC-Berkeley
UC-Davis
UC-Los Angeles
UC-Riverside
Wisconsin

International

National Labs

Budker
CERN
DESY
INFN
JINR, Dubna
KEK
RAL
TRIUMF

Universities

Karlsruhe
Imperial College
Lancaster
Max Planck
Osaka
Oxford
Pohang
Harbin
Tel Aviv



The NFMCC Mission

To study and develop the theoretical tools, the software simulation tools, and to carry out R&D on the hardware that is unique to the design of Neutrino Factories and Muon Colliders

Extensive simulation and experimental program



MUTAC07 Recommendations

- 1. Give highest priority to acquisition of a coupling coil for MUCOOL.**
- 2. Continue participation in MICE and MERIT as much as possible.**
- 3. Continue to grow ties with IDS for a neutrino factory.**
- 4. Take advantage of newly established efforts on a design of a Muon Collider (MCTF).**
- 5. Leverage resources within the MCTF and UKNF collaborations, and Muons, Inc. to increase the manpower directed towards simulations of the acceleration system and storage ring.**



MUTAC07 Recommendations (2)

Recommendation

Coordination of MCTF with NFMCC is essential to ensure that the muon collider effort makes best use of limited resources, avoids duplication, and shares infrastructure, codes, and results. Although coordination is important, we recommend that the NFMCC remain independent, so that initiatives are not restricted by local (FNAL) preferences and constraints.



Design and Simulations

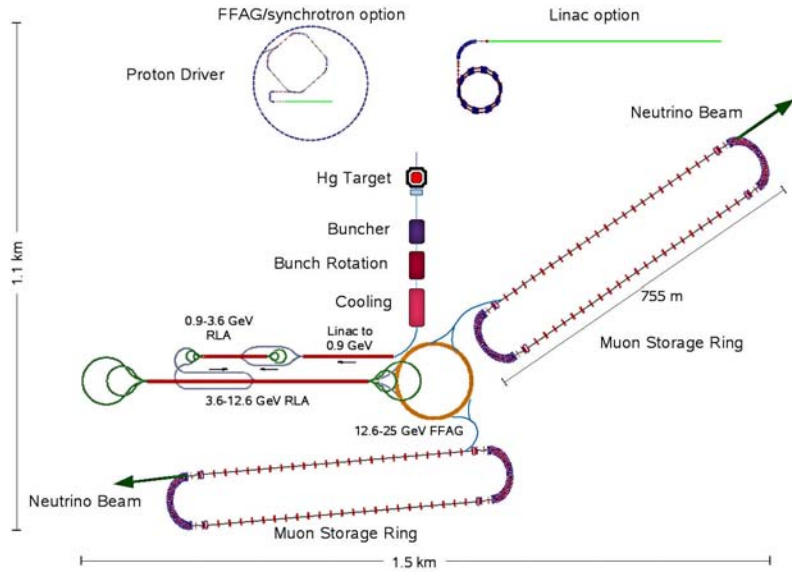
The Simulations Effort

- Targetry
- Capture and Collection
- Initial Cooling
- 6D cooling
- Acceleration
- Storage Rings
- Collider Rings

Charge: Review and comment on Simulation Group accomplishments and plans and on FFAG acceleration system activities.

Talks by J.S. Berg, R. Fernow, R. Johnson, and A. Jansson

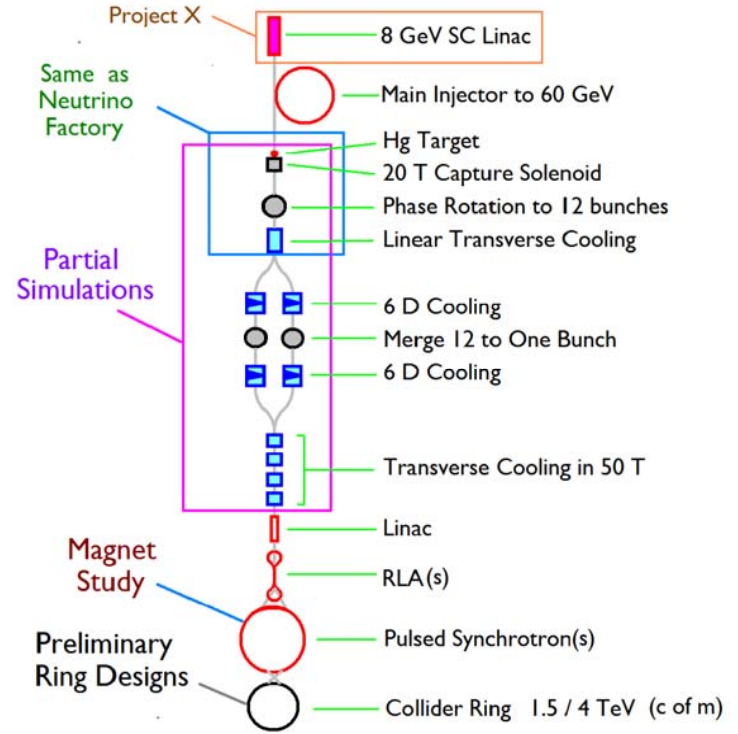
Machine Scenarios



IDS – Neutrino Factory

Charge: Assess participation in the International Design Study.

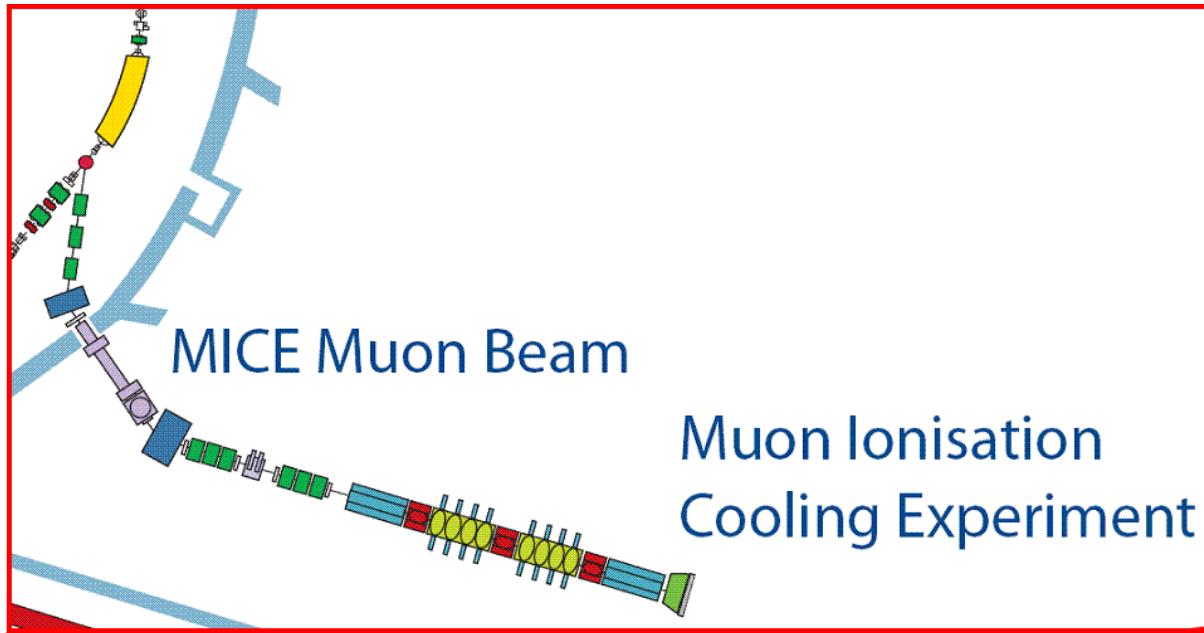
Charge: Assess and comment on goals, strategy, and progress in the Muon Collider design.



Muon Collider

Talks by K. Long and R. Palmer

The MICE Experiment

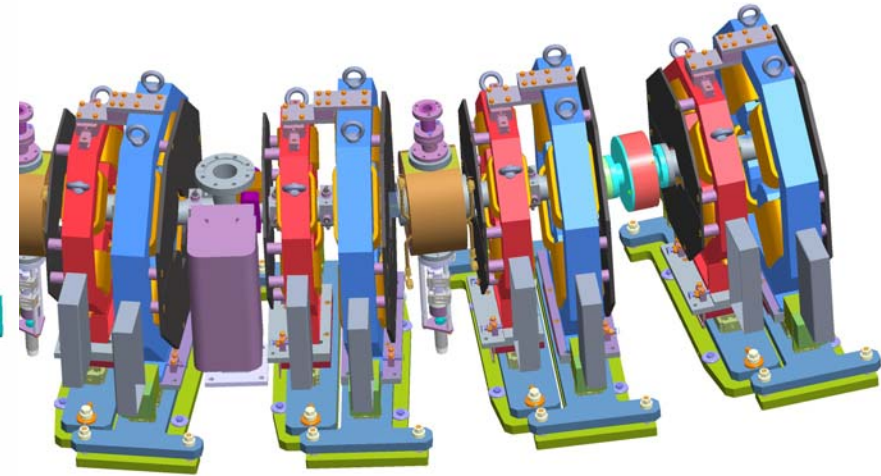
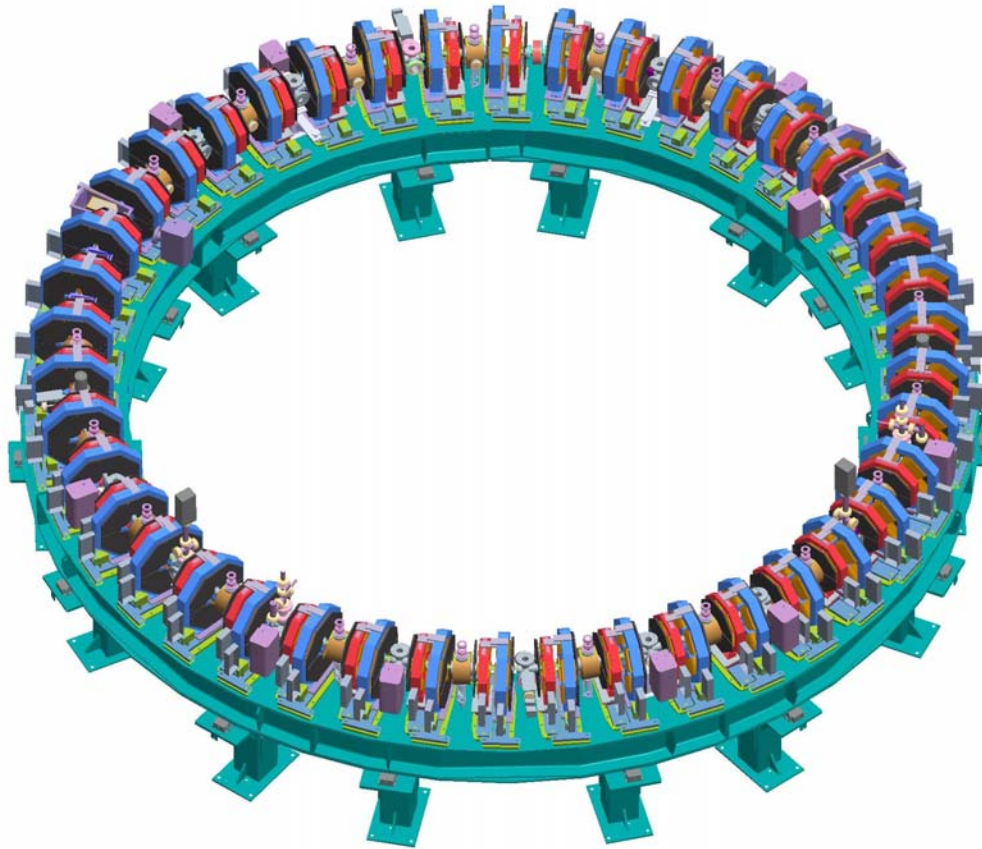


First Beam!
March 30, 2008

Charge: Assess program and comment on first results from the international MICE experiment.

Talks by M. Ellis and D. Kaplan

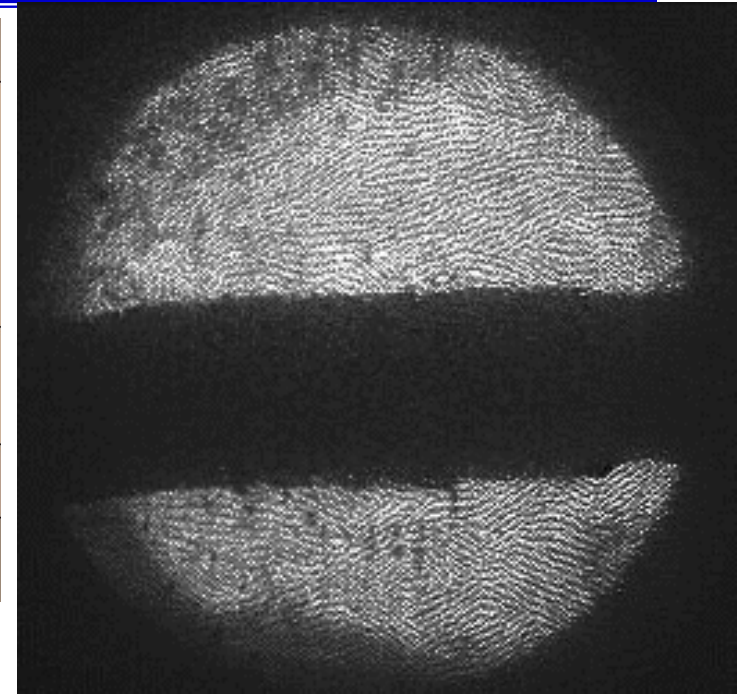
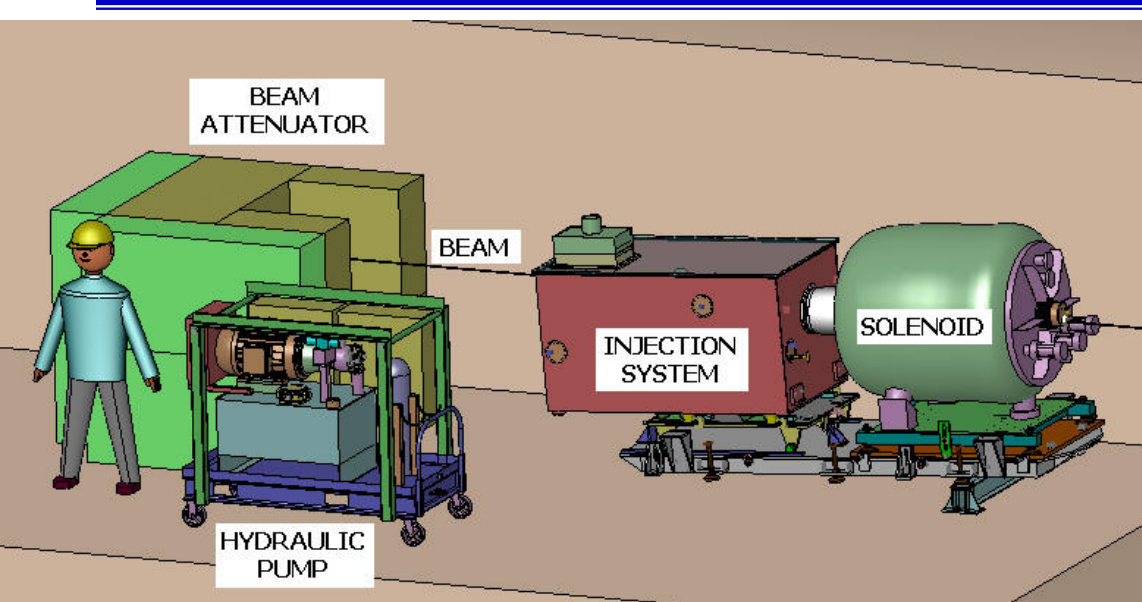
The EMMA Experiment



Experiment Scheduled—
Dec'09 to Sept'10

Talk by S. Koscielniak

The MERIT Experiment

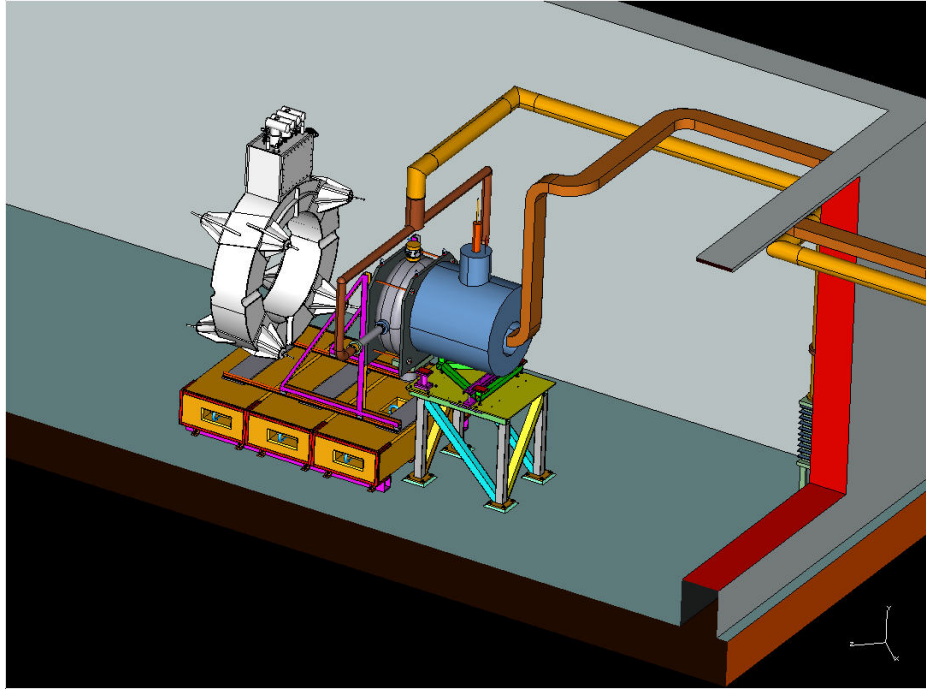


Experiment Run—Oct.21-Nov.11, 2007

Charge: Assess program and comment on results and possible follow up to the international MERIT experiment.

Talks by I. Efthymiopoulos and K. McDonald/H. Kirk

The MUCOOL Program



201 and 805 MHz RF Testing Program



The MTA Beam Line (MCTF)

Talks by M. Green, D. Huang, C. Johnstone, and D. Li

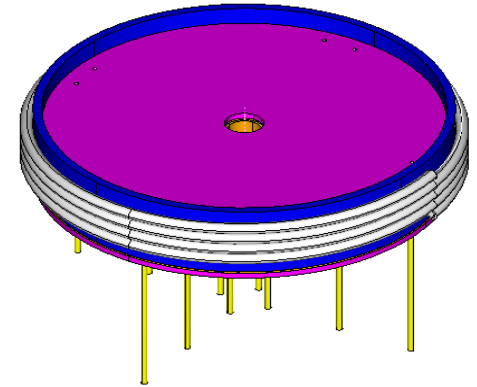
Absorbers and Windows



LH₂ Absorber



Window Development

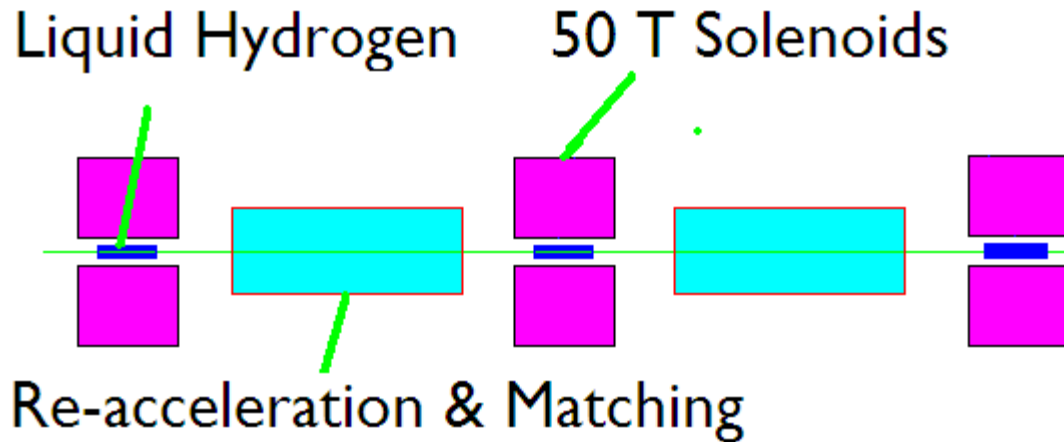


LiH Absorber

Charge: Assess and comment on the MUCOOL R&D Program

Talk by A. Bross

High Field Solenoids



**Achieving a final transverse emittance of $25 \pi \mu\text{m-rad}$
Requires use of High Temperature Superconductors**

Charge: Assess and comment on Muon Collider technology development programs.

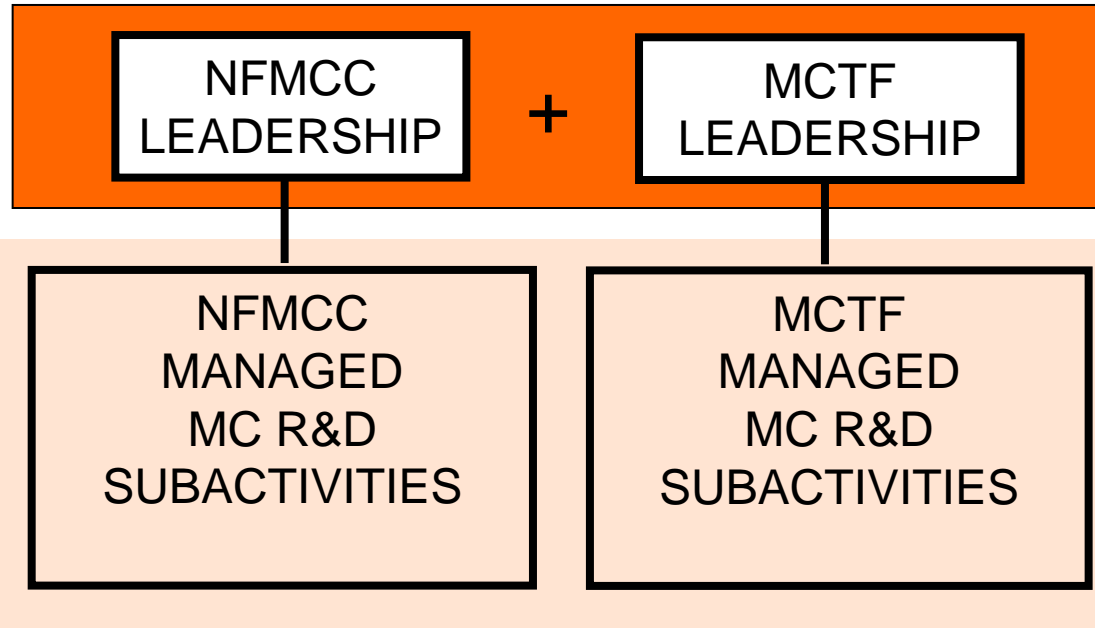
Talks by R. Palmer, A. Zlobin and A. Tollestrup



The NFMCC & MCTF Steering Group

PURPOSE: (S. Holmes) To co-ordinate the NFMCC and MCTF proposed and ongoing R&D activities to maximize their joint effectiveness and facilitate cross-participation in these activities where it makes sense.

MUON COLLIDER R&D CO-ORD COMMITTEE

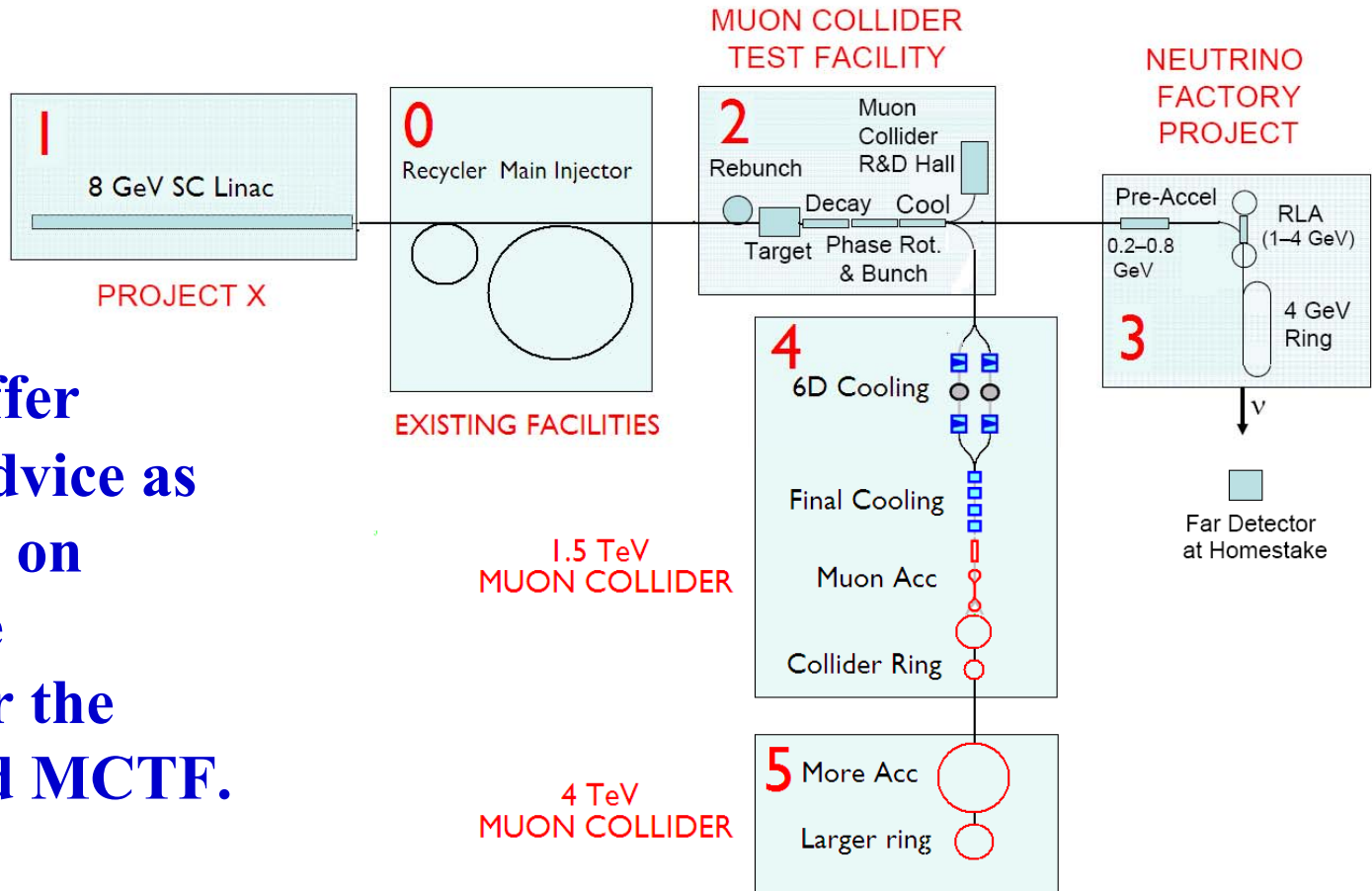


MUON COLLIDER R&D PROGRAM

Charge: Review and comment on the R&D progress achieved since the last MUTAC review, including both NFMCC and MCTF activities.

Talks by A. Bross, S. Geer, and V. Shiltsev

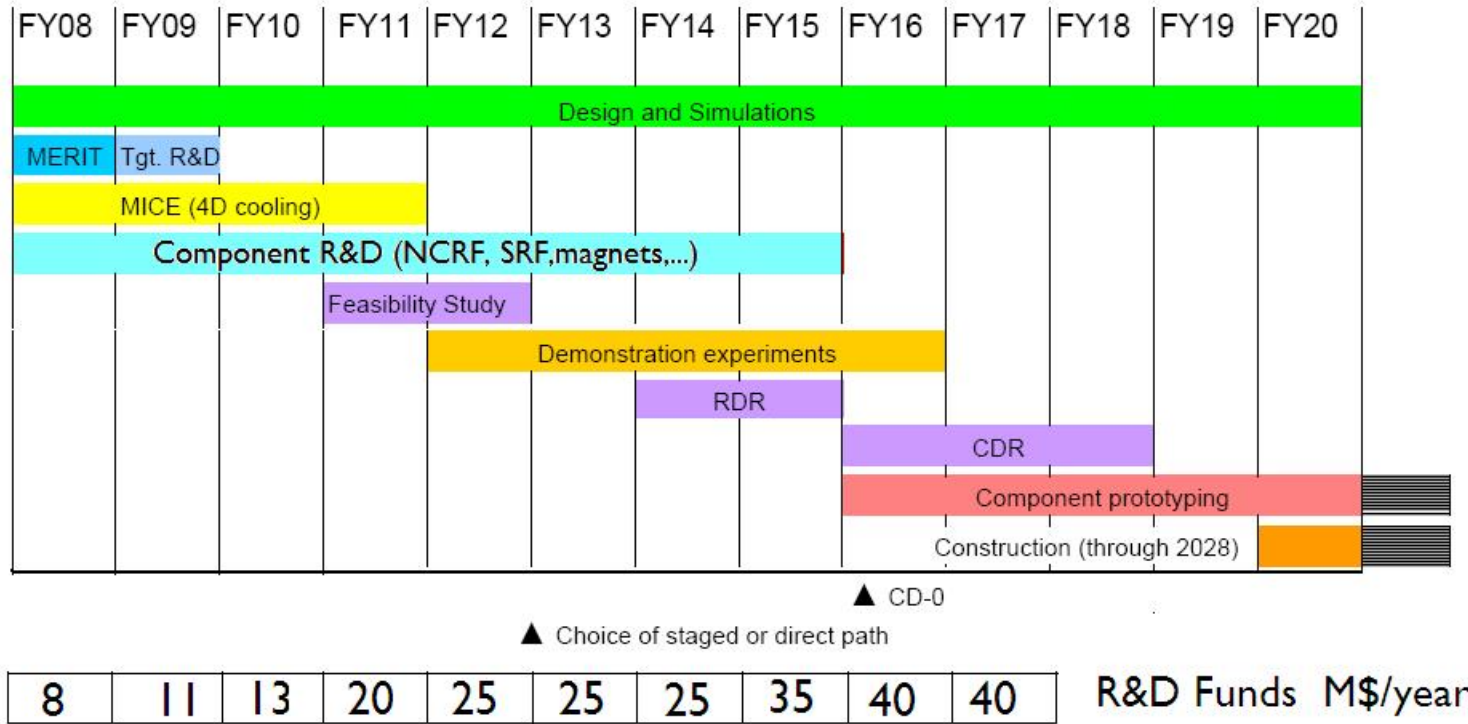
The Long-Term Vision



Charge: Offer comments/advice as appropriate, on longer range strategies for the NFMCC and MCTF.

Talk by V. Shiltsev

Palmer's P5 Presentaion



Funding request includes that for Neutrino Factory R&D

Funding increase (~3X) is needed if Muon Collider is to be a credible option by 2012



Charge to MUTAC08

- 1. Review and comment on the R&D progress achieved since the last MUTAC review, including both NFMCC and MCTF activities.**
 - 1a. Assess and comment on results and possible followup to the international MERIT experiment.**
 - 1b. Assess and comment on the MUCOOL R&D program**
 - 1c. Assess program and comment on first results from the international MICE experiment.**
 - 1d. Review and comment on Simulation Group accomplishments and plans, including Neutrino Factory design optimization, FFAG acceleration system activities, Muon Collider studies, and participation in the International Design Study.**
 - 1e. Review and comment on goals, strategy, and progress in the Muon Collider design and technology development programs.**
- 2. Review and give advice on the R&D plans and corresponding budgets for FY08 and directions for FY09.**
- 3. Offer comments/advice as appropriate, on longer range strategies for the NFMCC and MCTF.**



Summary

Great Progress since MUTAC07!

Experimental Program

- **MERIT run successful**
- **MICE experiment has started**
- **MUCOOL program progressing**
- **EMMA experiment being fabricated**

Simulation Program

- **6D cooling simulations**
- **Neutrino Factory design work with IDS**
- **Muon Collider design effort with MCTF**

Both NF and MC program has been presented to P5

MUTAC07 recommendations have been satisfied

We look forward to the MUTAC08 recommendations