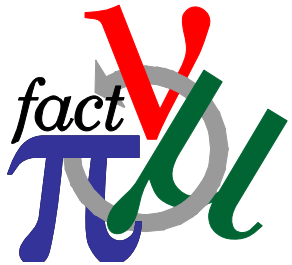


Muon Collaboration

Muon Collaboration Meeting

WELCOME

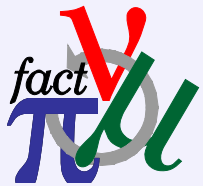
Muon Collaboration

Meeting Focus

Broad review of the status of our R&D and our progress over the last year.

Opportunity to discuss our plans for this year and beyond.

Muon Collaboration Institutions



130 Scientists & Engineers from 37 Institutions

6 US Labs
ANL
BNL
FNAL
LBNL
Oak Ridge Nat. Lab.
Thomas Jefferson Lab.

17 US Universities
Columbia Univ.
Cornell Univ.
IIT
Indiana Univ.
Michigan State Univ.
NIU
Northwestern Univ.
Princeton Univ.
UC-Berkeley
UC-Davis
UCLA
UC - Riverside
Univ. Chicago
U. Illinois, Urbana-Champaign
Univ. of Iowa
Univ. Mississippi
Univ. Wisconsin

14 Foreign Institutes
BINP
CERN
DESY
Imperial College, London
INFN - LNF
JINR, Dubna
Karlsruhe
KEK
Kernfysisch Versneller Instit.
Osaka Univ.
Oxford Univ.
Pohang Univ.
RAL
Tel Aviv Univ.

Muon Collaboration Goals

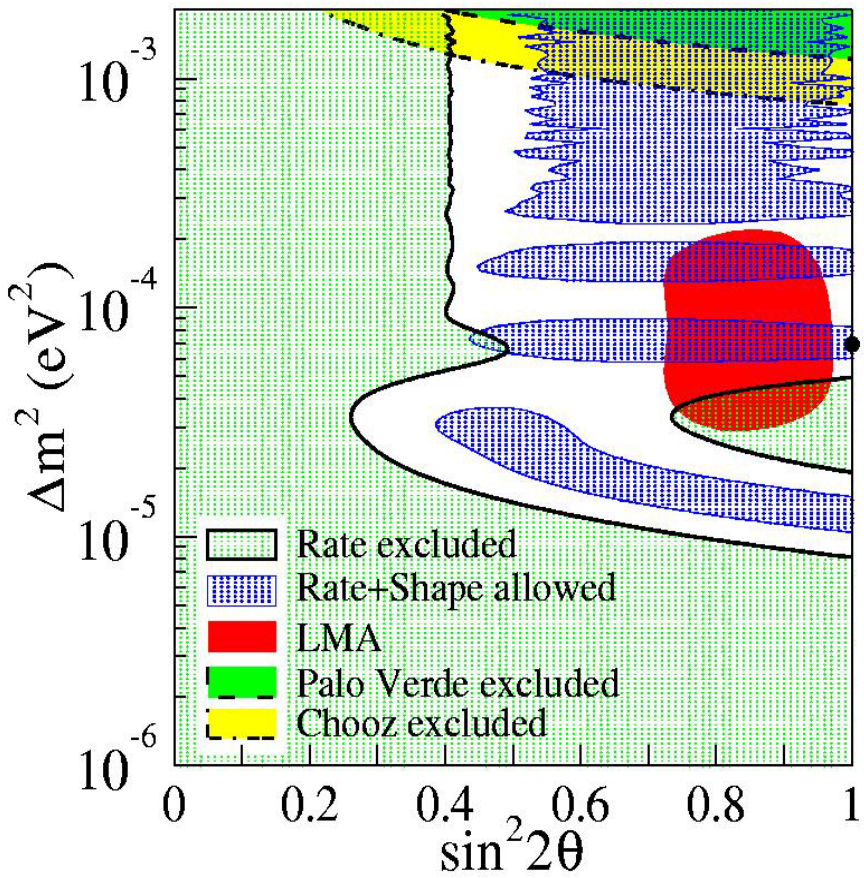
The collaboration is governed by a charter which defines its goals and organization. The goals are defined :-

"*To study and develop the theoretical tools and the software simulation tools, and to carry out R&D on the unique hardware, required for the design of Neutrino Factories and Muon Colliders.*"

Muon Collaboration

Physics Motivation

KamLAND



In the last couple of years:

1. SNO has confirmed that the solar neutrino deficit is due to neutrino flavor transitions: Electron neutrinos disappear and the LMA solution is preferred.

2. K2K has confirmed that the atmospheric neutrino deficit is due to flavor transitions: Muon neutrinos disappear.

3. KamLAND has confirmed the LMA solution to the solar neutrino problem !

Nature has been kind … the oscillation parameters are such that the physics is within reach of accelerator based experiments

Huber & Winter, hep-ph/0301257

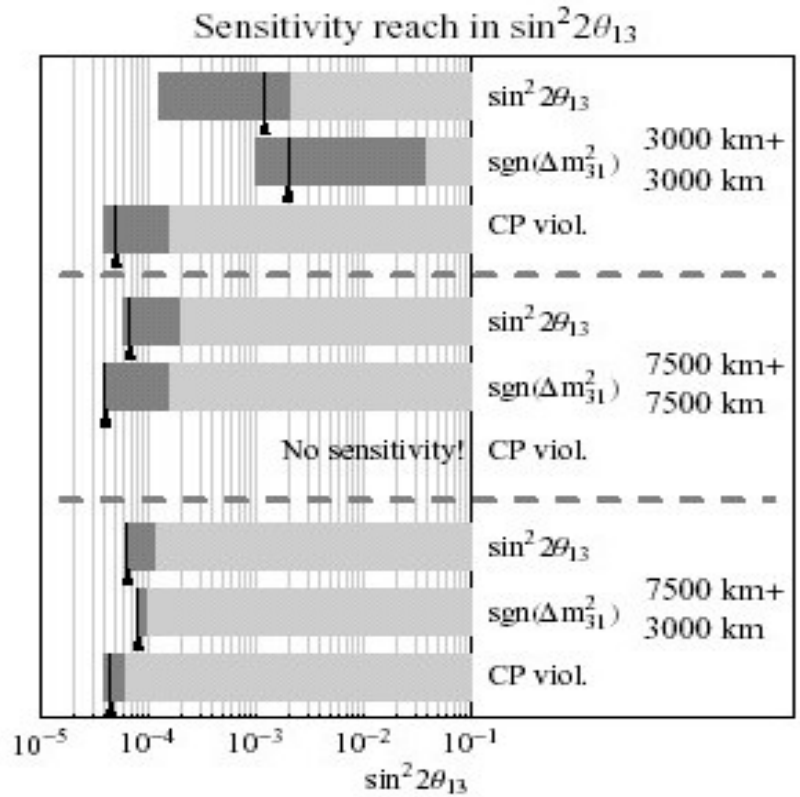


FIG. 3: The sensitivity reaches as functions of $\sin^2 2\theta_{13}$ for $\sin^2 2\theta_{13}$ itself, the sign of $\Delta m^2_{31} > 0$, and (maximal) CP violation $\delta_{CP} = \pi/2$ for each of the indicated baseline-combinations. The bars show the ranges in $\sin^2 2\theta_{13}$ where sensitivity to the corresponding quantity can be achieved at the 3σ confidence level. The dark bars mark the variations in the sensitivity limits by allowing the true value of Δm^2_{21} vary in the 3σ LMA-allowed range given in Ref. [19] and others ($\Delta m^2_{21} \sim 4 \cdot 10^{-5}\,\mathrm{eV}^2 - 3 \cdot 10^{-4}\,\mathrm{eV}^2$). The arrows/lines correspond to the LMA best-fit value.

Physics Sensitivity

With two carefully chosen baselines, the correlations & ambiguities can be overcome at a Neutrino Factory.

The calculated $\sin^2 2\theta_{13}$ reach (3σ) is below 10^{-4} for all three physics goals (measuring $\sin^2 2\theta_{13}$, determining the mass hierarchy, & observing maximal CPV) !!

For the right baseline choice, the physics reach is not sensitive to Δm^2_{21} (variation within dark grey bands).

The calculations are for a 50 GeV Neutrino Factory.

Muon Collaboration

International Activity

Motivated by the physics interest in Neutrino Factories there has been lots of international activity:

1. MICE has scientific approval

2. MICE was launched by an ad hoc international grass roots steering group. Equivalent international groups are being put in place for:

   Targetry
   FFAGs
   The World Design Study
   Physics and Detector

US Activity

Our Collaboration has also been very active …

MEETINGS: February – September 2003

Muon Collaboration

High-power Targetry for Future Accelerators	H. Kirk	Long Island (NY)	September 8-12, 2003	
Ring Coolers/Emittance Exchange	R. Raja	Fermilab	August 25-29, 2003	
FFAG03	Y. Mori, S. Machida	KEK	July 7-12, 2003	Workshop office: Dr. M. Yoshimoto, ffag03_secretary@hadron.kek.jp
MICE Collaboration Meeting	D. Kaplan, Y. Torun	Columbia University	June 12 (PM)-14 (AM), 2003	Y. Torun
Collaboration Meeting	Bob Palmer, Steve Geer	Columbia University	June 11 (AM)-12 (AM), 2003	Juan Gallardo
NUFACT 03	R. Fernow, M. Shaevitz	Columbia University	June 5-11 2003	
NuFact 03 Summer Institute	Debbie Harris	Shelter Island (NY)	May 26 - June 4, 2003	Contac Kathy Tuohy
Ring Cooler Workshop	Yasuo Fukui	UCLA	March 20, 2003	
LH2 Absorber	D. Kaplan	Fermilab	February 21-22 2003	

MEETINGS: Oct 2003 – Summer 2004

Subject	Organizer	Place	Date	Additional Information
NUFACT 04		Ozaka, Japan	July 26-Aug. 1, 2004	
MUTAC	Bob Palmer, Steve Geer, Mike Zisman	BNL	February 18-19, 2004	Elaine Zukowski(zukowski@bnl.gov)
Collaboration Meeting	Gail Hanson	Mission Inn, Riverside CA	Jan. 27-31, 2004	
Ring Coolers/Emittance Exchange	Gail Hanson	Mission Inn, Riverside CA	Jan. 21-26, 2004	
Ring Cooler Meeting	Yasuo Fukui	Radisson Hotel, Tucson Az	Dec. 15–16, 2003	Sylvia Vartan
MICE Collaboration Meeting	Rob Edgecock	Cosener's House, Abingdon, UK	Oct. 30 - Nov. 2, 2003	
FFAG Workshop	J. Scott Berg	BNL	October 13–17, 2003	
High Gradient rf Cavities	J. Norem	ANL	Oct. 7 - 9, 2003	P. Malhotra

Muon Collaboration

NEW IMPORTANT MEETING : APS Neutrino Study

In the US there is an ongoing APS sponsored neutrino study, which has a neutrino factory working group.

Bob Palmer is on the organizing committee, Mike Zisman and S.G. are convenors for the neutrino factory group.

We will have a 1 ½ day workshop at ANL 3-4 March.

Web page available – Please register (needed for gate pass)

Muon Collaboration

Funding is tight but ...

1. Visits to DOE (17 Mar 03 and 6 Aug 03) and NSF (7 Jan 04) suggest continued support with hopes of (modest) increases.

2. We had an excellent MUTAC review last year.

3. We have this years MUTAC review coming up … and we think/hope we have the ammunition to do well this year (Review is set for 18-19 Feb at BNL)

Muon Collaboration

MUTAC Review – January 2003

The review last year was in January, and resulted once in a very positive report. In their transmittal letter to the laboratory directors, MCOG say:

> *The successful record of progress is epitomized by the summary judgment in the report, namely that "Overall, MUTAC was impressed by the accomplishments since the last meeting, particularly given the strained financial situation. MUTAC can enthusiastically assure MCOG that the limited funding is being well and carefully utilized."*

> *MCOG has concluded that it is imperative that DOE seek to provide enhanced R&D funding for this work if it is to meet either the intent or the recommendations of the Long Range Plan laid out in the 2002 Gilman Report of HEPAP.*

Muon Collaboration

MCOG Recommendations to the DOE (Spring 2003)

1. In the area of experimental work, the highest priority should continue to be accorded to the 800 MHz and 200 MHz RF work, especially the testing of the 800 MHz cavity in a magnetic field. This work is critical to the advancement and eventual success of the MUCOOL and MICE projects. High power target R&D is important to a number of future high energy accelerator projects under consideration in the U.S. program and this work should be continued as resources allow.

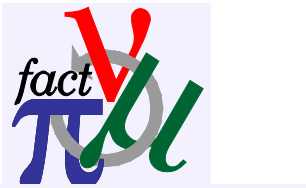
2. MCOG supports participation by the U.S. in the Muon Ionization Cooling Experiment (MICE) and urges DOE to support this valuable international activity.

3. The creative conceptual advances made by the Muon Collaboration are strengthening the notion that a muon-storage-ring-based neutrino factory is feasible and will offer opportunities for a future facility. As such, we recommend continued support for conceptual development activities in parallel with the strengthened experimental and engineering R&D activities described above.

AGENDA - 1

Tuesday, January 27			
Time	**Topic**	**Speaker**	**Duration**
1:30 - 2:00	Introduction	S. Geer	30
Front-End Simulation & Theory Session Convener: R. Fernow			
2:00 - 2:10	Overview of front end simulations	R. Fernow	10
2:10 - 2:35	Realistic magnetic fields for small rings	S. Kahn	25
2:35 - 2:50	Cooling channels with Li lens	Y. Fukui	15
2:50 - 3:05	COSY field computations	M. Berz	15
3:05 - 3:35	Coffee Break		
3:35 - 4:05	Recent progress on Quad/Dipole rings	H. Kirk	30
4:05 - 4:35	Simulating the RFOFO ring in GEANT	A. Klier	30
4:35 - 5:00	Ring simulations in GEANT	R. Godang	25
Wednesday, January 28			
Front-End Simulation & Theory Session (cont.) Convener: R. Fernow			
8:30 - 8:55	Front end optimization	K. Paul	25
8:55 - 9:15	Adiabatic buncher & linear transverse cooler	D. Neuffer	20
9:15 - 9:35	Optimizing adiabatic bunching & phase rotation	A. Poklonksiy	20
9:35 - 10:00	Present ideas for the Study 2a front end	R. Palmer	25
10:00 - 10:30	Coffee Break		
10:30 - 10:45	Straight quad cooling channel	K. Makino	15
10:45 - 11:00	Front end with ring cooler	R. Fernow	15

AGENDA - 2



Convener: R. Fernow			
11:00 - 12:00	Discussion:Plans for Study 2a simulations	Moderator: J. Gallardo	60
12:00 - 1:30	Lunch		
Acceleration Session Convener: J.S. Berg &C. Johnstone			
1:30 - 2:00	Optimization of FFAG Lattices	S. Koscielniak	30
2:00 - 2:15	Ring Designs for Proton Driver and Electron Model FFAGs	D. Trbojevic	15
2:15 - 2:30	RLA Progress	A. Bogacz	15
2:30 - 2:50	Comparison of Acceleration Options	R. Palmer	20
2:50 - 3:10	Electron Model for a Non-Scaling FFAG	A. Sessler	20
3:10 - 3:40	Coffee Break		
3:40 - 4:00	200 MHz SCRF R&D	D. Hartill	20
4:00 - 5:00	Executive Board Meeting		
Thursday, January 29			
Targetry Session Convener: K. McDonald & H. Kirk			
8:30 - 9:00	Outlook & Plans	K. McDonald	30
9:00 - 9:30	Pulsed Solenoid Fabrication	P. Titus	30
9:30 - 10:00	CERN experiment initiative	H. Haseroth	30
10:00 - 10:30	Coffee Break		
10:30 - 11:00	Simulations	R. Samulyak	30
11:00 - 11:30	Material Studies	K. Yoshimura	30
11:30 - 12:00	High-Power Targetry Workshop	H. Kirk	30
12:00 - 1:30	Lunch		

AGENDA - 3

MUCOOL Session Convener: A. Bross			
1:30 - 1:40	Introduction	A. Bross	10
1:40 - 2:10	MTA status & plans	M. Popovic	30
2:10 - 2:30	Beam diagnostic: CDV diamond	K. Hoffman	20
2:30 - 3:00	Plans for rf testing	J. Norem	30
3:00 - 3:30	Coffee Break		
3:30 - 3:50	Lab G status	A. Moretti	20
3:50 - 4:10	201 MHz cavity status	D. Li	20
4:10 - 4:30	rf cavity windows: Grid	M. Alsharo'a	20
4:30 - 5:00	Cavity windows: Domed	D. Li	30
Friday, January 30			
MUCOOL Session (cont.) Convener: A. Bross			
8:30 - 8:50	Convective absorber tests	M. Cummings	20
8:50 - 9:10	Convective absorber modeling	W. Lau	20
9:10 - 9:30	Flow-through absorber	C. Darve	20
9:30 - 9:50	Absorber window status & safety	M. Cummings	20
9:50 - 10:20	Coffee Break		
10:20 - 10:35	Absorber program and technical issues	E. Black	15
10:35 - 10:55	Energy deposition/mult. scatt calculations	I. Rakhno	20
10:55 - 11:25	Muons Inc. status & plans	R. Johnson	30
11:25 - 12:00	Discussion	Moderator: A. Bross	35
12:00 - 1:30	Lunch		

AGENDA - 4

12:00 - 1:30	Lunch		
MICE & MUCOOL-MICE Interface Session Convener: M. Zisman			
1:30 - 2:00	MICE Status	D. Kaplan	30
2:00 - 2:30	MICE Cooling Channel Integration Issues	W. Lau	30
2:30 - 3:30	Discussion	Moderators: A. Bross & D. Kaplan	60
3:30 - 4:00	Coffee Break		
4:00 - 5:00	Technical Board Meeting		
7:00 - 9:00	Banquet Meeting		
Saturday, January 31			
Concluding Session Convener: Spokespersons			
8:30 - 9:30	Project Manager Report	M. Zisman	60
9:30 - 9:45	Speakers Committee Report	G. Hanson	15
9:45 - 10:00	NSF Proposal Content & Status	G. Hanson	15
10:00 - 10:30	Coffee Break		
10:30 - 11:00	Study 2a	M. Zisman	30
11:00 - 12:00	Summary	B. Palmer	60
12:00 NOON	**ADJOURN**		

… HENCE

The agenda is full … so lets get started !