

WG4—Muon Physics Plans and Questions for 2014

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Muon Physics

- At its heart a **Neutrino Factory** is also a **Muon Factory**



- Producing these intense neutrino beams will require new high intensity muon beam lines
- This will greatly increase the number of μ 's available to probe for hints of physics beyond the standard Model

Muon Physics

- Enables new searches for CLFV in the μ sector
- Enables new generations of precision $g-2$ /EDM measurements

But...

- Is there a deeper connection between muon physics and neutrino physics?
 - Fundamental questions of lepton flavor

Questions posed for 2014

- Three “Big” questions we wanted to address at this year’s workshop:

- Expt:

What is the ultimate $\mu \rightarrow e\gamma$ and $\mu \rightarrow eee$ reach once $\mu N \rightarrow eN$ has set the limit.

- What are the roles of the ratios of cLFV processes and other precision experiments at this point?

- Beams:

What are the beam specifications for precision muon physics?
(our requirements)

- Are these compatible with the NuFact?
- Are there other options?

- Theory:

What else besides cLFV? EDMs?

- What does theory tell us once we observe cLFV?
- How do we relate our results to the models?

Plenary Talks — Friday 29th

Expt:

Lepton Flavour Violation Experiments

Ajit Kurup, Imperial College London

Beams:

Muon Facilities for Precision Experiments

Naohito Saito, KEK

Theory:

Lepton Flavour Violation Theory

Lorenzo Calibbi, University of Brussels

The Week to Come:

- Charged Lepton Flavor
 - $\mu \rightarrow e\gamma$, $\mu \rightarrow eee$, $\mu N \rightarrow eN$, $\tau \rightarrow cLFV$
 - Connections to theory

11 talks
- Precision Measurements
 - muon $g-2$
 - μ hyperfine splitting
 - proton radius
 - μ capture

7 talks
- Muon Facilities
 - Progress on mu cooling
 - New methods for intense mu beams

7 talks

*25 talks total including
two joint session with WG3*

Mon 25

- The search for CLF violation in the MEG & MEG II Experiments (F.Tenchini)
- The Mu3e Experiment (M.Kiehn)
- τ cLFV decays (C.Onderwater)



Tues 26

- MuSun Experiment: Measuring the Rate of Muon Capture on Deuteron (X.Luo)
- MUSE Experiment: Studying the Proton Radius Puzzle with μ p Elastic Scattering (K.Mesick)
- Measurement of the hyperfine splitting energy of the ground-state muonic hydrogen (K.Ishida)

- Search for muon to electron conversion at J-PARC MLF: Recent status on DeeMee (Y.Nakatsugawa)
- Status of the New Muonium HFS Experiment at J-PARC/MUSE (P.Strasser)
- Status of the Alcap Experiment (P.Litchfield)

precision

CLFV +
precision

Wed 27

- J-PARC MUUSE (Y.Miyake)
- Tuning of the ultra slow muon beamline by utilizing ionized hydrogen (T.Adachi)



Thur 28

JOINT Session with WG₃ #1

- Status of MuSIC facility (Y.Matsumoto)
- COMET Phase-I (P.Litchfield)
- Muze (Y.Kolomensky)
- PRISM (J.Lagrange)

Joint Session with WG₃ #2

- Design Update for MOMEN (J.Tang)
- Synergies between muon projects
- Opportunities for Experiments Based on Stored Muon Beams at Fermliab (M.Popovic)



Fri 29

- Muon $g-2$ /EDM at J-PARC (K.Ishida)
- $g-2$ at Fermilab (J.Grange)

- Backgrounds studies for COMET Phase-I & Phase-II (A.Sato)
- COMET Phase II (A.Kurup)

precision

CLFV +
precision

Regrets

- Giovanni, Hai Bo and myself send our regrets as we are unexpectedly unable to attend in person
- We would like to thank everyone who has agreed to chair sessions this week
- And give a special thanks to Ishida-san who will give the WG4 summary talk on Saturday
- We know that the sessions will be as vital and interesting as usual and hope to see you all in person in 2015!