

RF05 – Charged Lepton Flavor Violation

Rare and Precision Frontier Convener Meeting - Dec 6, 2021

S. Davidson (LUPM), B. Echenard (Caltech)

Theory

No dedicated WP – theorists will contribute to the theory section of other WPs

Physics potential with MEGII-fwd → MEG II

Possibility of Search for Bound $\mu^- \rightarrow e^- \alpha$ Decay → COMET

Searching for $\mu^- \rightarrow e^+$ Conversion at Upcoming ... Radiative Muon Capture → COMET / MU2E

Search for Muon to Positron Conversion in $\mu^- \rightarrow e^-$ Conversion Experiments → COMET / MU2E

Theory challenges and opportunities of Mu2e-II → MU2E II

Current muon-to-electron conversion

Search for μ -e Conversion by using Muonic AtomsTarget (DeeMe)

COMET

Mu2e

Single WP. All experiments are actively writing.

Editor: S. Middleton (with Y. Kuno and M. Aoki).

Current $\mu \rightarrow e \gamma$

The MEG II experiment and its future developments

Committed to make contribution. Still under discussion to understand if this white paper will include “A new experiment for the $\mu \rightarrow e \gamma$ search” – see corresponding entry

Editor: A. Papa

Current $\mu \rightarrow e e e$

No LOI submitted

Mu2e experiment agreed to make a contribution.

Editor: A. Schoening

Muonium-antimuonium

Physics of muonium and anti-muonium oscillations
Search for Muonium to Antimuonium Conversion (MACE)

Single WP combining theory + experiments.

Editor: A. Petrov

Tau

Tau Physics and Precision Electroweak Physics at SuperKEKB/Belle II
Physics Potential of a Super tau-Charm Facility*
Precision experiments at Super Charm-Tau Factory*
Physics in the t-charm Region at BESIII

On-going discussion with EIC (A. Deshpande *et al.*) to understand sensitivity and complementarity with other experiments.

V. Cirigliano will coordinate the theory part (as co-editor), discussing generic CLFV at tau scale (along talk he gave at previous CLFV workshop).

Single WP combining theory + experiment

Editor: S. Banerjee (with V. Cirigliano)

High-energy colliders

Charged Lepton Flavour Violation at the FCC-ee

Single WP covering all aspects of heavy state decays (Z, H, Z', exotics, FCC-ee,...).

Editor: M. Dam, with the help of EF02/09 people and theorists (W. Altmannshofer)

Mu2e II

All Mu2e-II stuff (13 LOIs)

Single WP, work is progressing

Editor: F. Porter.

New experiment for $\mu \rightarrow e \gamma$

A new experiment for the $\mu \rightarrow e \gamma$ search

Contacted author, on-going discussion with MEG to understand if a joint WP is possible, or if this should be a standalone contribution (or joint with another WP).

Author agreed he should be bugged until he replies, we are happy to oblige!

New facility at FNAL – ENIGMA

A New Charged Lepton Flavor Violation Program at Fermilab

A Phase Rotated Intense Source of Muons (PRISM) for a $\mu \rightarrow e$ Conversion Experiment

Bunch Compressor for the PIP-II Linac

Single WP.

Editor: B. Echenard

In summary, expect 8-9 experimental WPs with theoretical contributions

Topical group meeting this Thursday (Dec 9 @ 10 CT) to discuss white papers – see Snowmass CLFV wiki page for link to indico

White papers - summary

Topic	Editor	Comment
Current muon-to-electron conversion	S. Middleton (+ Y. Kuno and M. Aoki)	Theory + Expt
Current $\mu \rightarrow 3e$	A. Schoening	
Current $\mu \rightarrow$ electron gamma	A. Papa	Discussion to include A new experiment for the $m \rightarrow eg$ search
New concepts for $\mu \rightarrow$ electron gamma (?)	G. Tassielli (???)	Standalone or included with MEG II or something else
Mu2e-II	F. Porter	Theory + Expt
Muonium-antimuonium	A. Petrov	Theory + Expt
Tau	S. Banerjee and V. Cirigliano	Theory + Expt
New facility at FNAL	B. Echenard	
Heavy state decays	M. Dam	With EF02/09 and theorists