

RF05 – Charged Lepton Flavor Violation

Rare and Precision Frontier Convener Meeting - Sep 8, 2021

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

White paper – consolidating LOIs 1/3

Theory

Rare muon decays and light new physics

Physics potential with MEGII-fwd

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

Searching for $\mu^- \rightarrow e^+$ Conversion at Upcoming Radiative Muon Capture

Search for Muon to Positron Conversion in $\mu^- \rightarrow e^-$ Conversion Experiments

Theory challenges and opportunities of Mu2e-II (**also in Mu2e II WP**)

Several scenarios under discussion

1) A single WP to cover all theory,

2) every LOI becomes a WP

3) an overview theory WP and selected WP on specific topics (seems favored right now)

Current muon-to-electron conversion

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

COMET

Mu2e

Single WP, editor TBD

Current $\mu \rightarrow e \gamma$

The MEG II experiment and its future developments

Need to contact author to inquire about writing WP – might combine with “New experiment for $\mu \rightarrow e \gamma$ ”

Mu2e II

All Mu2e-II stuff (13 LOIs)

Single WP, editor F. Porter

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

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

Need to contact author to understand if this will be part of the new facility WP, combined with MEG II or a standalone paper

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

Need to contact EIC to understand if they want to contribute

Single WP, editor S. Banerjee

White paper – consolidating LOIs 3/3

Low-energy muon facility at FNAL

Upgraded Low-Energy Muon Facility at Fermilab

Single WP, editor D. Kaplan

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 TBD

High-energy colliders

Charged Lepton Flavour Violation at the FCC-ee

Need to contact author to inquire about writing WP with all heavy-state material

Motivation – theory overview

- Motivation to search for CLFV
- Complementarity with other frontiers / probes
- Theory overview

Current situation

- Muon conversion, decays and oscillations
- Tau
- Heavy states
- Meson / baryon decays

New opportunities at existing facilities

- Mu2e II @ PIP II
- MACE @ EMuS in China
- New mu \rightarrow e gamma @ PSI or FNAL
- Taus

Next generation facilities

- Low energy muons
- High intensity muon facility + experiments
- Tau (if any)
- Heavy states (if any)

Conclusion and perspectives

Alternative possibility to organize content by topic if other groups do the same

Next events

Nothing scheduled yet, we might resume the coffee hour until the end of the year