

RF05 – Charged Lepton Flavor Violation

Snowmass Day - Sep 24, 2021

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

CLFV events so far

- Muon transitions and decays, muonium-antimuonium (July 2, 2020)
- Tau decays and transitions (July 23, 2020)
- Heavy states decays (September 3, 2020)
- LFV and LFU in meson and baryon decays with RF01/RF02 (Sep. 28-29, 2020)
- CLFV with high intensity muon factory (Dec. 10, 2020)
- Monthly coffee hour – various topics (Feb. – May 2021)

Agendas and slides are available on indico

Future activities

- Meetings to discuss white paper progress (tentative: mid-Nov. and early Feb.)
- Cross-frontier workshops (e.g. targetry for high-intensity muon beams with AF)
- Coffee hour if there is an interest from the community
- Frontier meeting in May 2021 @ Cincinnati (date TBC)

All meetings will be announced on Slack / mailing list

White paper – consolidating LOIs

Combine LOIs into ~10 WPs to be more aligned with TG report structure and make them more relevant.
On-going discussion with authors to define final strategy – we will contact LOI authors soon

Theory

Rare muon decays and light new physics
Physics potential with MEGII-fwd
Possibility of Search for Bound $\mu^- \rightarrow e^- a$ Decay
Searching for $\mu^- \rightarrow e^+ \dots$ Radiative Muon Capture
Search for Muon to Positron ... Experiments
Theory challenges and opportunities of Mu2e-II

Ongoing discussion to define strategy

Current muon-to-electron conversion

Search for μ -e Conversion by usingTarget (DeeMe)
COMET
Mu2e

Single WP – under discussion

Mu2e II

All Mu2e-II LOIs (13)

Single WP

Current $\mu \rightarrow e \gamma$

The MEG II experiment and its future developments

Need to define strategy with author

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

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

Need to define strategy with author

Muonium-antimuonium

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

Single WP

Tau

Tau Physics and Precision Electroweak 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

Single WP – contact EIC to inquire about contribution

Low-energy muon facility at FNAL

Upgraded Low-Energy Muon Facility at Fermilab

Single WP, need to coordinate with RF3

New facility at FNAL – ENIGMA

A New Charged Lepton Flavor Violation Program at Fermilab
A Phase Rotated Intense Source of Muons ... Conversion Experiment
Bunch Compressor for the PIP-II Linac

Single WP

High-energy colliders

Charged Lepton Flavour Violation at the FCC-ee

Need to define strategy with author to combine all heavy-state material

Proposed structure for the topical group report

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

Important dates

CLFV meetings on white paper progress: mid-November and early February (tentative dates). We will contact LOI authors soon

White papers: due March 15, 2022

Preliminary TG reports: due March 31, 2022

RP Frontier meeting: May 2022

Snowmass meeting: July 2022