

# **RF05 – Charged Lepton Flavor Violation**

**Rare and Precision Frontier Convener Meeting - Nov 4, 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**)

**Still under discussion, but maybe difficult to write a comprehensive white paper on all theory aspects. Instead, (some) contributions could be integrated with experimental WPs.**

**Discussing if a white paper on light new physics could be produced, eventually with contributions from other LOIs. We will know more in a week or two.**

## Current muon-to-electron conversion

Search for  $\mu$ -e Conversion by using Muonic Atoms .....Target (DeeMe)  
COMET  
Mu2e

**Single WP, Sophie Middleton is our point of contact. All experiments are actively writing.**

## Current $\mu \rightarrow e \gamma$

The MEG II experiment and its future developments

**Author contacted - no response so far, but on-going discussion with “New experiment for  $\mu \rightarrow e \gamma$ ” to understand possibility to make a joint contribution. In any case, I would expect a contribution on MEG. Nothing started yet**

## Current $\mu \rightarrow eee$

No LOI submitted

**Contacted Mu3e experiment about possibility of writing a white paper even if no LOI were submitted. They agreed to make a contribution. Nothing started yet.**

# White paper – consolidating LOIs 2/3

## Mu2e II

All Mu2e-II stuff (13 LOIs)

**Single WP, editor F. Porter. Work is progressing**

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

## Muonium-antimuonium

Physics of muonium and anti-muonium oscillations

Search for Muonium to Antimuonium Conversion (MACE)

**Single WP combining theory + experiments, editor A. Petrov. I assume the editor will make a stellar contribution.**

## 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. Starting to organize work.**

# White paper – consolidating LOIs 3/3

## Low-energy muon facility at FNAL

Upgraded Low-Energy Muon Facility at Fermilab

**Looks like this belongs to RF4 (contacted them but Peter was on vacation) – let's settle this now.**

## 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 is likely to be Bob (he's only 185% busy these days, he needs more work).**

## High-energy colliders

Charged Lepton Flavour Violation at the FCC-ee

**Mogens is interested...we are waiting for him to get back to us with his decision. Will be written with EF02/09 contribution.**

**In summary, experimental WP are more or less on track, theorist are more free spirited!**

**Expect 1-a few theory WP, and 8-10 experimental WPs.**

**Plan to have topical group meeting early December to discuss white papers (and another in Feb 22)**

**We asked the community if they would be interested by the CLFV coffee, and we received no answers so far, so it seems unlikely we will continue these meetings.**