

An aerial photograph of the California Institute of Technology (Caltech) campus. The image shows various academic buildings, a large green sports field in the foreground, and a dense forest of trees. In the background, a range of rugged mountains is visible under a clear sky. The text is overlaid on this image.

WELCOME

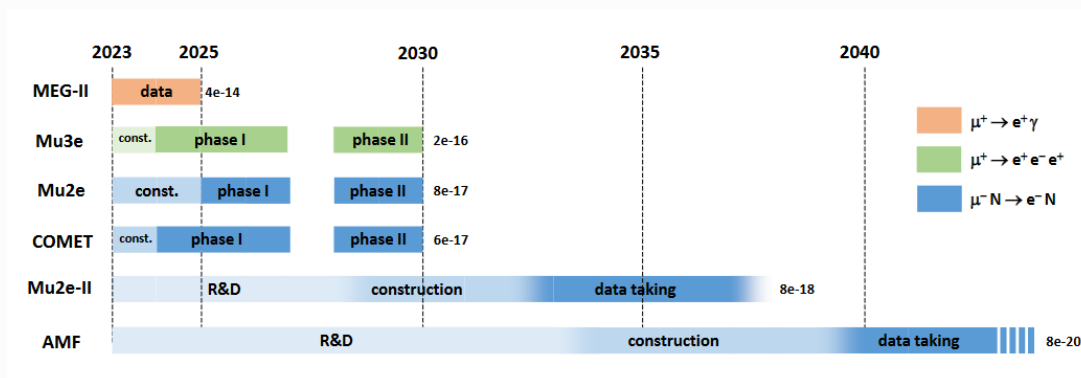
WORKSHOP ON THE FUTURE MUON PROGRAM AT FERMILAB

Bertrand Echenard – Caltech

Frank Porter – Caltech

During Snowmass, the RF5 group articulated a vision for a future CLFV program at FNAL (<https://arxiv.org/abs/2209.00142> and <https://arxiv.org/abs/2210.04765>)

- Completion of Mu2e, followed by the Mu2e-II upgrade
- Proposal for a new muon facility at FNAL (AMF) to search for all three main muon CLFV modes with unprecedented sensitivity, $\mu^- \rightarrow e^+$ searches, muonium-antimuonium experiments,....
- Positively received by the community



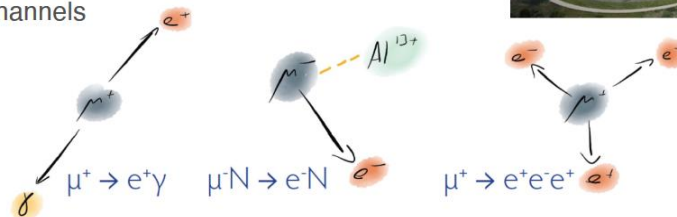
Followed by a lot of recent interest in CLFV and muon program

- About 80 participants to this workshop (1/3 in person, 2/3 remote)
- Three muon / CLFV conferences in the next few months

P5 meeting at FNAL - talk on the future Fermilab program by B. Fleming

Muon Charged Lepton Flavor Violation for the Future

- Mu2e-II is designing for another 10x in sensitivity with direct injection of PIP-II beam
- Future muon experiments could leverage the PIP-II linac and ACE to power next-generation charged lepton flavor violation experiments
 - Up to 100x gains in key muon CLFV channels



- Precision muon experiments have synergies with muon collider R&D and Fusion Energy Science, including target design, rad-hard solenoids

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03/22/2023 Fleming | Fermilab Program



+ mention in Lia Merminga's talk at NAS EPP forum on Fermilab's future

This is a great opportunity!

We need to build on this momentum and move forward!

The workshop has been organized to start / continue R&D efforts and coordinate future studies for Mu2e-II and AMF

- Survey current efforts / proposals / ideas
- Discuss major R&D / design efforts
- Define a roadmap for R&D / design studies for the next year(s), and understand how this program can be realized
- Coordinate between the different efforts
- Exploit synergies with other R&D programs

In short, set up a plan to make tangible progress (i.e. actionable items) in the coming years. We really want this workshop to be more than just a set of talks!

Our (very) ambitious goals:

- Mu2e-II: construction on time scale commensurate with Mu2e completion
- AMF: conceptual design for next Snowmass / P5

Introduction (Monday morning)

- Theory overview
- Mu2e-II and AMF overview

Mu2e-II parallels (Monday afternoon / Tuesday morning)

- Physics sensitivity
- Magnets
- Targetry (joint with AMF)
- Sub-systems: tracker, calorimeter, CRV and TDAQ

AMF parallels (Tuesday afternoon / Wednesday morning)

- Accelerator and compressor ring + DM experiment
- Conversion expts
- Decays expts
- Muonium-antimuonium and other expts

Summary (Wednesday afternoon)

- Short summary talks and closing discussion

Summary talks

Each sub-group has been asked to summarize the discussion during the closing session.

Ideally, these talk should focus on:

- Summary of current R&D efforts and/or design ideas
- Plan for future R&D work – how do we make progress
- Synergies and coordination – who should we talk to
- Discussions and suggestions

We respectfully ask the speakers to make sure they stay within their allotted time !!!

It has proposed to capture the discussions in a written document

- Probably a good idea
- Update the Snowmass contributions (big job, but we already have a starting point) or simple workshop summary?
- Should we create a central repository to collect useful material?
- What about future design studies? Publications would be good incentive to work on this.

Please discuss these questions during the parallel sessions and include your thoughts in the summary talk

Meeting rooms

- Lauritsen 269 – main meeting room
- Lauritsen 469 – 4th floor on top of 269, take the stairs right next to this room. The door has a code: push 13 at the same time, then 5, 2 and 4
- Lauritsen 257 – 2nd floor, south side
- Lauritsen 362 – 3rd floor, quiet space for private use (ask us for the key)
- **Restrooms are located near the center of the building, next to the elevators**

Coffee breaks

- Right outside Lauritsen 269

Wireless connection

- Eduroam or Caltech visitor networks are available
- Secured network in each meeting room (see black board for connection info)

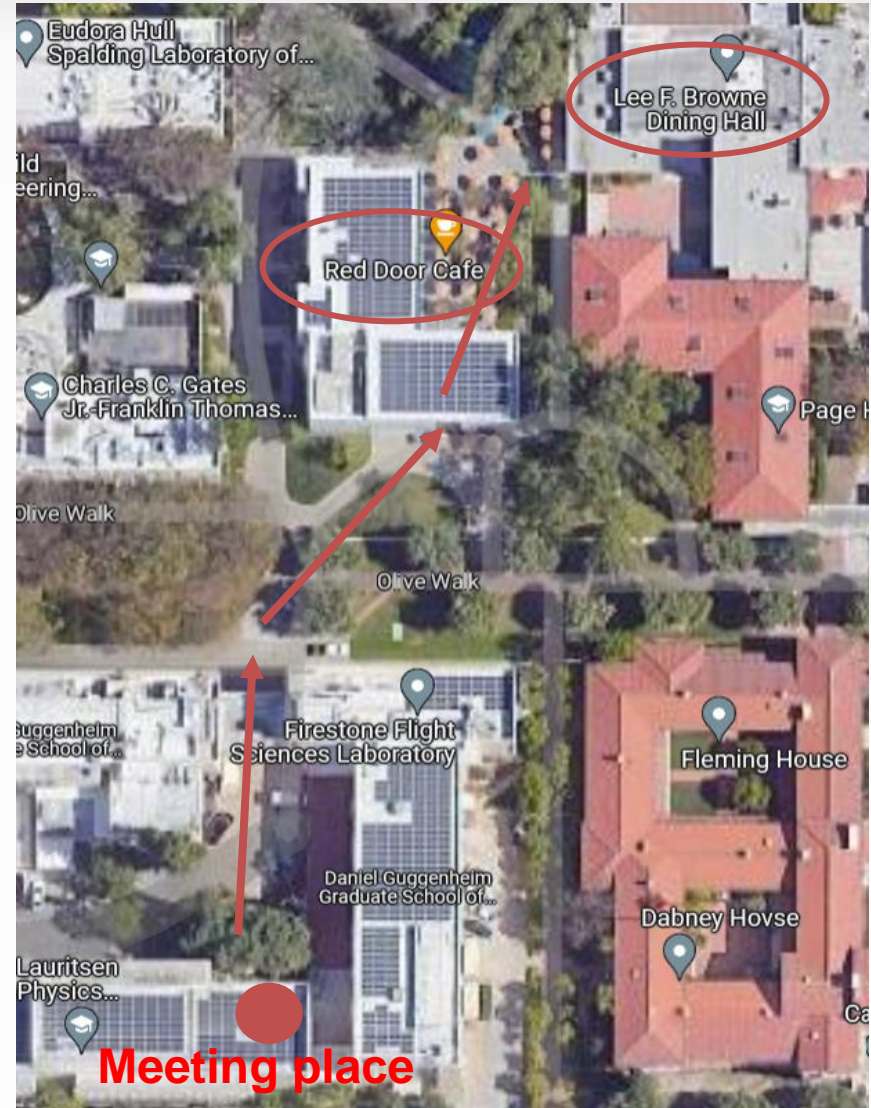
Lunch options

The Browne Café is the main dining hall at Caltech:

wood-fired pizza, salads, grill,
Mongolian bowl, pasta, sushi,...

The Red Door cafe (Hameetman center):
smaller selection of salad,
sandwiches and hot plates.

Both location are “credit card only”



Reception on Monday afternoon

Outside room 469 (we can try to move outside if weather permits)

Dinner on Tuesday evening @ 18h30

At the Oak tree inn in South Pasadena,
Chinese restaurant with seafood
specialties and traditional fares

1315 Fair Oaks Ave, South Pasadena
- a short drive from Caltech.

I'll set up a link to organize carpooling if
needed

Cost settled individually at restaurant

