

# Snowmass Early Career:

*Rare Processes and*

*Precision Frontier*

Leadership...and a call for involvement!

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BY JOSHUA BARROW ([JBARROW@FNAL.GOV](mailto:JBARROW@FNAL.GOV))

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SUBSCRIBE SNOWMASS-EC-RAREPROCESSES FIRSTNAME LASTNAME

# What do we want to do, with your help!

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RF is generally focused on unique and powerful low energy observables with high energy scale implications

## What new things can search for experimentally?

- Where did the matter-antimatter asymmetry come from? **(RF4)**
- Why is there only flavor violation in the neutrino sector? **(RF5)**
  - Who ordered that?
- Are there richer phenomenologies of dark matter which are testable? **(RF6)**
- Can far reaching measurements of certain observables be made with ~table-top/cheap/quick experiments? **(RF3)**

## What discrepancies are waiting to be discovered in “known” physics?

- How can we break the Standard Model?⇒With precision!
- Are we missing things in weak decays of  $b$  or  $c$  quarks at current facilities? **(RF1)**
- Are we missing dynamics of light or strange quarks? **(RF2)**
- What can exotic, heavy, excited hadrons and their decays tell us anew? **(RF7)**

**Encouraging Early Career involvement in these experimental programs is paramount for the development and enactment over the coming decade! Get involved!**

# Semipermanent Points of Contact

Will serve in this capacity as long as necessary, but will request SEC input one, three, and six+ months from now to see if others would like to switch into the role (*one at a time for continuity*)

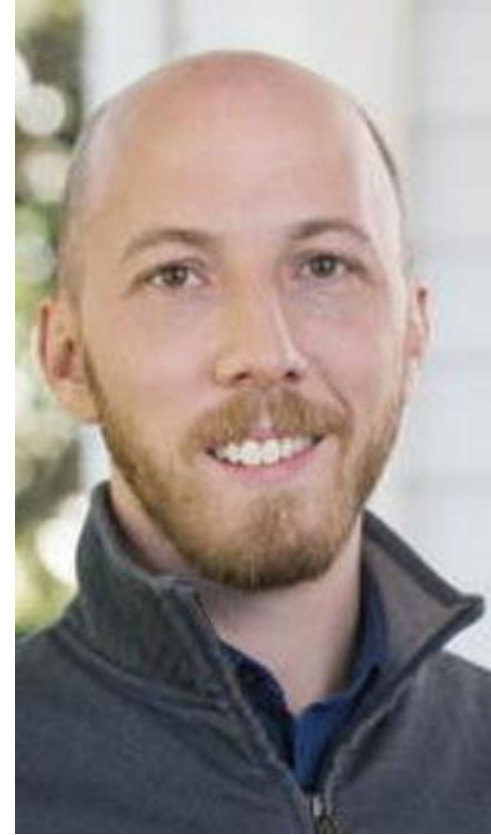
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JOSHUA BARROW



- PhD Candidate, University of Tennessee, Knoxville
- URA Visiting Scholar, Fermilab
- Member of DUNE, NNBAR, and ORNL/UTK  $n \rightarrow n'$  Collaborations

JAKE BENNETT



- Assistant Professor, University of Mississippi
- Member of the Belle and Belle II Collaborations
- Data production coordinator for Belle II

# Subtopical Group Liaisons

Planning to serve in these capacities relatively indefinitely (quite small SEC group...)

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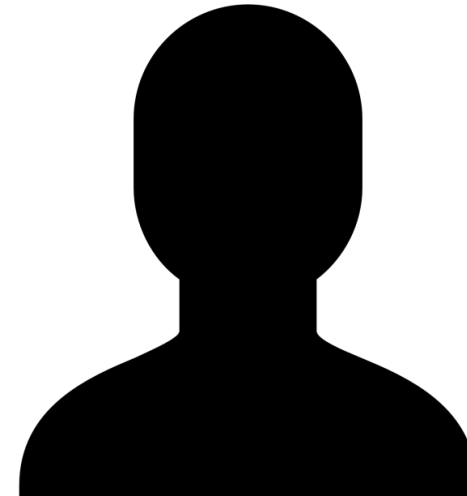
**RF1: WEAK DECAYS OF  $B$  AND  $C$  QUARKS**

[JAKE BENNETT](#)



**RF2: WEAK DECAYS OF STRANGE AND LIGHT QUARKS**

**NEED SOMEONE! SEND US YOUR RECOMMENDATIONS!**



# Subtopical Group Liaisons

Planning to serve in these capacities relatively indefinitely, *jointly* (where applicable)

## RF3: FUNDAMENTAL PHYSICS WITH SMALL EXPERIMENTS

## RF4: BARYON AND LEPTON NUMBER VIOLATION

### 1. JOSHUA BARROW & 2. MANOLIS KARGIANTOULAKIS

### JOSHUA BARROW



- Research Associate, Fermilab
- Muon g-2, Run Coordinator
- Mu2e, Tracker front-end electronics
- Interested in RPP searches addressing flavor issues and anomalies
  - Proponent of Mu2e-II



# Subtopical Group Liaisons

Planning to serve in these capacities relatively indefinitely, *jointly*

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## RF5: CHARGE LEPTON FLAVOR VIOLATION

### 1. MANOLIS KARGIANTOULAKIS



&

### 2. RICHIE BONVENTRE



- Staff Scientist, Berkeley Lab
- Mu2e, tracker firmware and simulation
- Particle Data Group

# Subtopical Group Liaisons

Planning to serve in these capacities relatively indefinitely, *jointly*

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## RF6: DARK SECTORS AT HIGH INTENSITIES

### 1. YU-DAI TSAI



- Post-doctoral fellow, Fermilab
- Temporary SEC Theory Frontier Coordinator
- Studies dark matter models
- Proposes terrestrial experiments and astrophysical searches for detection of hypothetical dark sector particles
- Selected articles [here](#)

&

### 2. TOM EICHLERSMITH

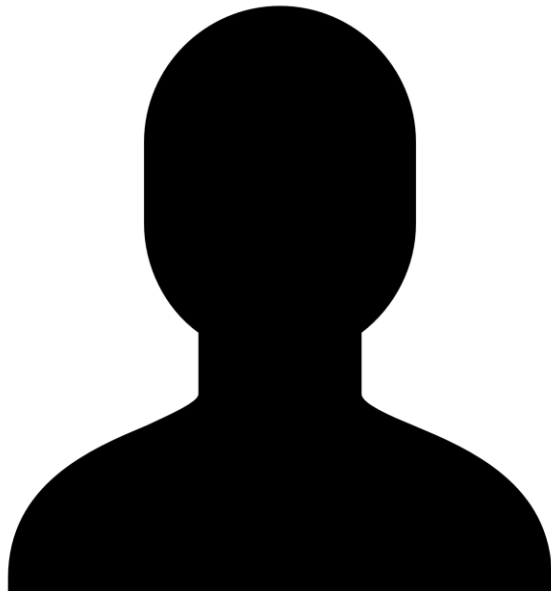
- PhD Student, University of Minnesota (he/him/his)
- SEC Computational Frontier Liaison
- Working on LDMX with analysis and software development

# Subtopical Group and Frontier Liaisons

Planning to serve in these capacities relatively indefinitely (quite small SEC group...)

RF7: HADRONIC SPECTROSCOPY

NEED SOMEONE! SEND US YOUR RECOMMENDATIONS!



COMMUNITY ENGAGEMENT FRONTIER LIAISON

[SOPHIE MIDDLETON](#)



- Post-doctoral scholar at Caltech
- Intensity Frontier Fellow at Fermilab
- Mu2e, LDMX and Mu2e-II
- Works on: software, analysis, calorimetry, and DAQ



# Documents, Share Drives, Meetings

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Please see the [SEC Leadership Plans Google Doc](#) for a quick overview

See also the most recent [SEC General Meeting Minutes](#) for a more complete overview of all goings-on in Snowmass Early Career



Our shared Google Drive can be accessed [here](#) *with editing rights*—**BE CAREFUL**

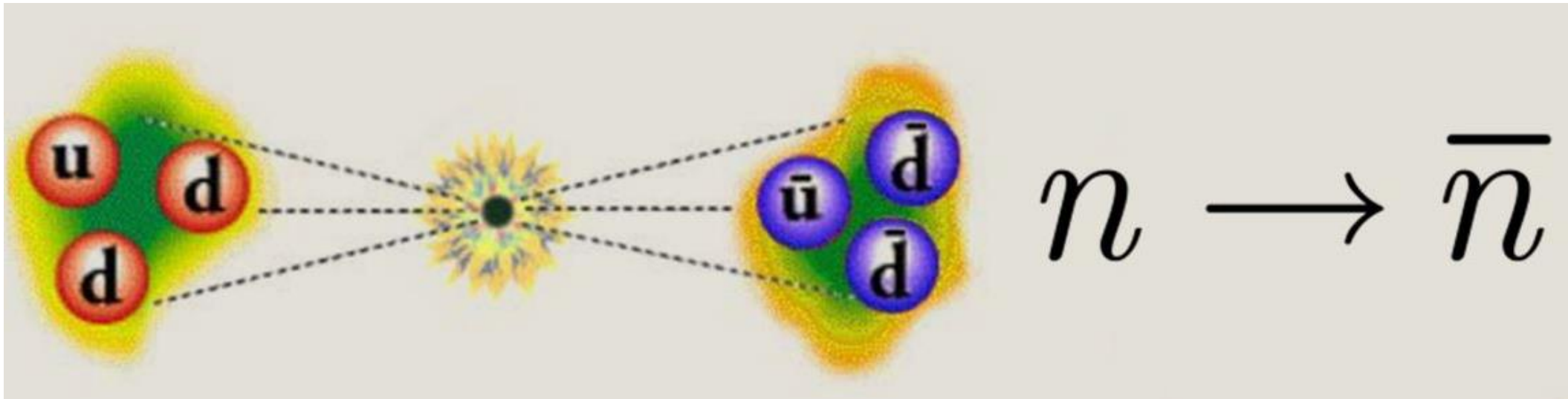
Will contain running minutes, other documents from SEC group members' attendance at various Rare Processes and Precision Measurements Frontier subtropical group meetings, and beyond



SEC RPPMF Meetings are planned to occur once every month (or so)

Allow group members to attend workshops, meetings, etc., and report to others on continual progress throughout the Frontier

Shameless plug...



Theoretical Innovations for Future Experiments Regarding Baryon Number Violation, Part 1  
An Amherst Center for Fundamental Interactions Workshop  
In coordination with Snowmass 2021 Rare Processes and Precision Measurements  
Frontier: Topical Group on Baryon & Lepton Number Violation (RP4)