

# Academic Career

**Tufts**  
UNIVERSITY



Colorado  
State  
University

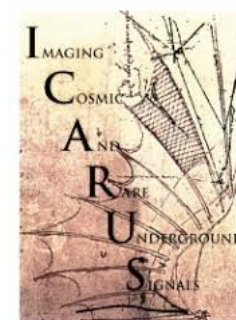


UNIVERSITY of  
**HOUSTON**



**DUNE**

**T2K**



**DUNE**

**T2K**

You are  
here

# Academic Career Highlights

- MINOS:
  - NC ( $\pi^0$ ) coherent cross section on Fe
  - Various tasks contributing to the  $\nu_e$  appearance,  $\nu_\mu$  disappearance, and NC (sterile) oscillation analyses
- T2K
  - Future sensitivity task force
  - CC  $1\pi^+$  cross section in the POD
  - Current cross section convener
- LBNE/DUNE
  - Convener of the long-baseline (LBL) physics working group
  - Deputy convener of the Near Detector Task Force
  - Provided text and simulations for the LBL physics section of the DUNE CDR

# Plans For ICARUS Hardware

- Hardware contributions: Cosmic Ray Tagger
  - Front end board (FEB) testing
    - Purchase ~20 FEBs and associated SiPM boards
    - Test each FEBs response to SiPMs
    - Test daisy-chaining multiple boards
  - Purchase DAQ computers (~30)
  - Timeline: money available starting Sept 1, 2018
- Person-power
  - Me:
    - Will have teaching release in Fall 2018, but not spring 2019
    - May be able to spend some time at FNAL in Fall 2018, Summer 2019, but probably not in Spring 2019
    - Hope to set up a basic lab by the end of the year
  - Postdoc:
    - Hope to hire quickly, but depends on candidate availability
    - May be able to spend significant time at FNAL for commissioning
  - Graduate students:
    - Support for two students on TA
    - Not sure how easy to find new students, but likely starting in Spring 2018 or later
- Caveat: I have not started yet, so uncertainties are large

# Plans for ICARUS Analyses

- Measurements of  $\nu$ -Ar interaction cross sections in the context of DUNE
  - Energy range of NuMI  $\nu$ 's match interesting region for DUNE
  - More  $\nu_e$  with NuMI  $\nu$ 's
  - Measurement program with NuMI  $\nu$ 's:
    - CC  $\nu_\mu$ , CC  $\bar{\nu}_\mu$ , and CC  $\nu_e$  cross sections
    - Ratios of  $\nu_e/\nu_\mu$ ,  $\bar{\nu}_\mu/\nu_\mu$  cross sections
    - NC  $\pi^{+/-0}$  production
  - First steps: Flux, flux, flux!
- Biggest issue in cross section analyses: efficiency corrections
  - Goal: accurate estimate of efficiency over all possible topologies
  - Use advanced machine learning techniques to:
    - Produce fast detector response simulations
    - Reduce dimensionality of the problem