Contribution ID: **28** Type: **not specified**

$e4\nu$ & $\mu4\nu$: Brightening the Future of Neutrino Oscillation Measurements

Wednesday, May 25, 2022 10:02 AM (23 minutes)

Sensitivities of future large underground neutrino oscillation experiments are critically dependent upon precisely understanding the initial energy of an incoming neutrino via cross section models and event generator predictions which summarize prospective final states. Extracting the true initial energy of the neutrino is thus model dependent, requiring a deep understanding of the biases present within the community's generators and various reconstruction paradigms. The Electrons-for-Neutrinos ($e4\nu$) and Muons-for-Neutrinos ($\mu4\nu$) Initiatives aim to constrain both of these issues by studying the light charged leptonic cousins of the neutrino, exploiting universal vector-like interactions to better understand underlying systematic modeling uncertainties, improve neutrino cross sections models, and calibrate reconstruction techniques \textit{in situ}. $e4\nu$ has recently taken new electron scattering data on ^{12}C, ^{40}Ar, and many other nuclei using the CLAS12 detector in Hall B at Thomas Jefferson National Accelerator Laboratory, and plans to release many relevant measurements for the neutrino community in the coming years. $\mu4\nu$ is a burgeoning concept, and currently works within the MicroBooNE Collaboration at Fermilab to study cosmic muon scattering topologies relevant for testing energy reconstruction techniques in calorimetric experiments such as future flagship experiments like DUNE. Each of these programs will be discussed, and recent work will be shown.

Primary author: BARROW, Joshua

Co-authors: ASHKENAZI, Adi (Tel Aviv University (IL)); PAPADOPOULOU, Afroditi; HEN, Or; WEINSTEIN, Lawrence (ODU); KALRA, Daisy (Columbia University)

Presenter: BARROW, Joshua

Session Classification: Machine Learning, Neutrino