Contribution ID: **124** Type: **Parallel Contributed Talk**

The Future of High-Energy Astrophysical Neutrino Flavor Measurements

Monday, February 22, 2021 5:50 PM (20 minutes)

The next generation of neutrino telescopes, including Baikal-GVD, KM3NeT, P-ONE, TAMBO, and IceCube-Gen2, will be able to determine the flavor of high-energy astrophysical neutrinos with 10% uncertainties. With the aid of future neutrino oscillation experiments — in particular JUNO, DUNE, and Hyper-Kamiokande — the regions of flavor composition at Earth that are allowed by neutrino oscillations will shrink by a factor of ten between 2020 and 2040. We critically examine the ability of future experiments and show how these improvements will help us pin down the source of high-energy astrophysical neutrinos and a sub-dominant neutrino production mechanism with and without unitarity assumed. As an illustration of beyond-the-Standard-Model physics, we also show that the future neutrino measurements will constrain the decay rate of heavy neutrinos to be below $2 \times 10^{-5}\ m$/eV/s assuming they decay into invisible particles.

Collaboration name

Primary authors: SONG, Ningqiang (Queen's University and Perimeter Institute); LI, Shirley (SLAC National Accelerator Laboratory and Fermilab); ARGUELLES, Carlos (Harvard University); BUSTAMANTE, Mauricio (Niels Bohr International Academy and DARK); VINCENT, Aaron (Queen's University and Perimeter Institute for Theoretical Physics)

Presenter: SONG, Ningqiang (Queen's University and Perimeter Institute)

Session Classification: Astrophysical Models

Track Classification: Neutrino Telescopes and Multimessenger