Contribution ID: **129** Type: **Working Group Sessions**

Supernova Neutrinos, Atmospheric Neutrinos and Proton Decay at the DUNE Experiment

Wednesday, 21 June 2017 17:10 (20 minutes)

The Deep Underground Neutrino Experiment (DUNE) experiment, a 40-kton underground liquid argon time-projection-chamber detector, will have unique sensitivity to the electron flavor component of a core-collapse supernova neutrino burst. We present expected capabilities of DUNE for measurements of neutrinos in the few-tens-of-MeV range relevant for supernova detection, and the corresponding sensitivities to neutrino physics and supernova astrophysics. Due to the detector's excellent energy resolutions, angular resolutions, and particle ID capabilities, atmospheric neutrino analyses in DUNE can also provide valuable information about 3-flavor oscillations, despite the relatively modest statistics. These data provide a complementary analysis approach to beam neutrinos, and can help resolve ambiguities in beam-only analyses. DUNE will also search for nucleon decay in the range of lifetimes predicted by a variety of GUT models. Large LAr experiments will particularly be sensitive to nucleon decay modes, favored by SUSY models, that involve positive kaons in the final state.

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Session Classification: Working Group: Astroparticle physics and cosmology

Track Classification: Astroparticle Physics and Cosmology Working Group