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Environmentally-induced neutrino decoherence with IceCube/DeepCore, and neutrino oscillation physics prospects with the IceCube Upgrade

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Neutrino oscillations result from the interference between neutrino quantum states as they propagate. Weak coupling between neutrinos and their environment, including the quantum gravitational structure of space-time, can modify this interference, resulting in neutrino decoherence and the damping of oscillation probability over distance. This talk will present a search for neutrino decoherence using the IceCube/DeepCore neutrino observatory, which exploits a cubic km of glacial South Pole ice instrumented with over 5000 optical sensors to detect Cherenkov light produced by atmospheric and astrophysical neutrino interactions.

Looking to the future, the recently funded IceCube Upgrade will densely instrument a central region of IceCube with over 700 new optical modules, significantly enhancing low energy neutrino detection where atmospheric neutrino oscillations are observed. Prospects for neutrino oscillations measurements with this new detector will be presented.

Summary

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