Dansk Fysisk Selskab

Contribution ID: **9** Type: **Contributed talk**

Probing environmentally-induced neutrino decoherence with IceCube

The mismatch between neutrino mass and flavor states, combined with the mass difference between these states, produces the interference phenomena known as neutrino oscillation. However, any coupling between the neutrino and the environment in which it propagates degrades the coherence between neutrinos, resulting in the damping of neutrino oscillations probability over distance. Such an environment is predicted by quantum gravity models, meaning that precision measurements of neutrino oscillations as a function of distance provide one of the only known experimental methods to probe this Planck-scale physics.

The IceCube detector at the South Pole measures atmospheric neutrinos that have traversed a range of distances, up to 12,742 km for neutrinos crossing the Earth's diameter, making it sensitive to decoherence effects. This talk will present a phenomenological model of neutrino environmental decoherence using the formalism of open quantum systems, alongside an analysis searching for this signal using 3 years of IceCube data.

Author: STUTTARD, Tom (Niels Bohr Institute, IceCube)

Presenter: STUTTARD, Tom (Niels Bohr Institute, IceCube)