

Developing theory and experiment in particle physics at PUCP. Neutrinos, active galactic nuclei and violation of CPT

Researcher: Alberto Gago

Research assistants: Mauricio Bustamante and Carlos Argüelles

Funded by: PUCP, Proyecto Helen

Involved institutions: PUCP, IFIC (Spain)

Department of Sciences - Physics Section

The neutrino oscillations are caused by non-diagonality between mass states and flavor states. Thus, mass states interfere as they evolve over time, resulting in the oscillations between different flavors. This interferometric nature makes the neutrinos system constitutes a natural setting to test effects of physics beyond the standard model (model that describes the nature of forces and elementary particles).

Within these exotic possibilities are: non-standard neutrino interactions with matter, equivalence principle violation, the CPT symmetry violation (charge-parity and time reversal, etc.). In the event of superstring theory is valid; effects of CPT symmetry violation using neutrino oscillations may be observed.

Since the magnitude of these effects would be small, we need to test high energy neutrinos that flow a great distance before detection. We will test these effects of CPT violation using high energy neutrinos that could be produced in active galactic nuclei, and detected in IceCube. The findings we use for this test are the reasons for the flow of neutrinos arriving at Earth.