

What is this contribution about?

This contribution is about the possibility of find observable features in ultrahigh energy neutrino fluxes due to active-sterile secret interactions.

Why is it relevant/interesting?

Active-sterile neutrino interactions become relevant at very different energy scales depending on the masses of the scalar mediator and of sterile neutrino. As consequence, the final active fluxes can present a measurable depletion observable in future experiments.

What have we done?

We have investigated the effects on high- and ultra high- energy active neutrino fluxes due to active-sterile secret interactions mediated by a new pseudoscalar particle. We adopted two prescriptions for the neutrino flux, namely high-energy represented by a power-law, and ultra high-energy with cosmological origin (cosmogenic) in order to take into account the multi-scale energy phenomenology, varying from 10^6GeV up to 10^9 GeV .

What is the result?

When the depletion is around 10^6GeV , this effect could be very interesting for IceCube because it can produce a cutoff-like feature in the spectrum, which could potentially explain the lack of observed events above 10 PeV. For larger values of mediator and sterile masses, the depletion effect instead could be only visible at larger energy, around 10^9GeV , with future experiments like GRAND. Another interesting phenomenological aspect of active-sterile secret interactions is represented by the changing in the flavor ratio as a function of neutrino energy. This effect could be interesting for next generation of neutrino telescopes like IceCube-Gen2 or KM3NeT.