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Non-Vanilla Sterile Neutrinos: Long-Baseline Signatures and BSM Connections

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Long-standing experimental anomalies have driven an extensive search for eV-scale light sterile neutrinos, though conclusive evidence remains elusive. Notably, recent results from Fermilab experiments have ruled-out the traditional sterile neutrino explanation for these anomalies. However, long-baseline accelerator experiments offer a unique probe for very light sterile signatures. In this talk, we present a modified light sterile neutrino framework capable of producing distinct signatures at long baselines. We further demonstrate how this scenario naturally bridges sterile neutrino physics with broader Beyond the Standard Model (BSM) sectors.

Academic position of the presenting author

Professor

Primary author: VANEGAS FORERO, David (Universidad de Medellín)

Co-authors: ARBELÁEZ RODRÍGUEZ, Carolina (Universidad Técnica Federico Santa María); Dr ZAPATA NOREÑA, Oscar Alberto (Instituto de física, Universidad de Antioqua)

Presenter: VANEGAS FORERO, David (Universidad de Medellín)

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