

Probing generalized neutrino interactions with the DUNE Near Detector

DUNE is a long-baseline neutrino oscillation experiment that will utilize a high-intensity, wide-band neutrino beam generated at Fermilab and traveling 1300 km to the Sanford Lab in South Dakota. It is a two-detector experiment with a 70 kt Liquid Argon Far Detector at Sanford Lab that will mainly study neutrino oscillations, and a Near Detector (ND) at Fermilab with a main purpose to study the unoscillated neutrino beam. However, the ND taking advantage of the most intense neutrino beam world-wide will be able to conduct a large suite of novel new physics searches. In this work, we explore the prospects of constraining general non standard interactions involving light mediators through elastic neutrino-electron scattering events at the DUNE ND. We furthermore explore the sensitivity in light vector mediators motivated by several Beyond the Standard Model (BSM) models. The present analysis is based on detailed Monte Carlo simulations of the expected DUNE-ND signal taking into account detector resolution effects, realistic backgrounds as well as both On-Axis and Off-Axis neutrino spectra. We show that the high intensity neutrino beam available at Fermilab can place competitive constraints surpassing those of low-energy neutrino searches and direct detection dark matter experiments.

Primary authors: Dr PAPOULIAS, Dimitris; Prof. SAOULIDOU, Niki; MELAS, PANTELEIMON

Presenter: MELAS, PANTELEIMON