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Sterile Neutrino search with atmospherics in DUNE

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The Deep Underground Neutrino Experiment (DUNE) is a next generation neutrino oscillation experiment that aims to provide insight towards the main outstanding questions in neutrino physics like mass hierarchy and investigating the potential existence of CP violation. It will make use of a suite of large liquid argon (LAr) time projection chambers, 1.5 km deep underground and located 1300 kilometers from the Fermilab LBNF beamline in the US.
Neutrinos are one of the best probes towards physics beyond the Standard Model. A highly sought-after hypothesis is the existence of one or more "sterile" neutrinos, which could be possible candidates for dark matter. The DUNE experiment will present a good opportunity to further expand this search, thanks to its expected excellent event reconstruction capabilities.
This initial study provides a largely phenomenological but realistic estimation of the DUNE Far Detector's sensitivity to detect sterile neutrinos using data from atmospheric events. A detailed exploration of the dependance on detector and analysis parameters, such as reconstruction efficiencies, has been performed. Upgoing atmospheric neutrino events will provide sufficient statistics and allow exploration of a wider range of L/E than beam data assuming an exposure of 10 kt/year. Results are presented from an Asimov data minimum log-likelihood fit considering a "3+1" model and including a realistic parameterization of detector reconstruction uncertainties.
Work is on-going towards a full simulation study within the framework allowing joint fits with other oscillation analyses.

Poster prize

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