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Induction signal characterization in the vertical drift TPC for the DUNE project

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Deep Underground Neutrino Experiment (DUNE) is a next generation long-baseline neutrino experiment in the United States.

Its main goal is to make precise measurements of neutrino oscillation parameters and to discover the neutrino mass ordering and CP violation phase in the leptonic sector.

The experiment is made of two elements: the near detector close to neutrino beam source and the far detector 1 300 km away. The latter will consist of 4 giant Liquid Argon TPC modules, one of which will use the new vertical drift technology. In this design, the anode is a stack of two perforated printed circuit board to detect the ionization electrons produced by the interaction of the charged particles with the liquid argon. The signal induced on the anode allows to measure the electric charge. Understanding the signal formation on the anode is therefore very important to improve the energy reconstruction of DUNE.

In this presentation, I will show the numerical simulations I have developed to study the signal formation on the anode. The dependencies of the signal strength and shape as a function of the track angle will be also shown. The simulations will be compared to the data collected in 2023 with the Vertical Drift demonstrator at CERN.

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