Contribution ID: **93** Type: **Poster**

Developing the Reconstruction of a Magnetised Gaseous Argon TPC for the DUNE Near Detector

Tuesday, 18 June 2024 17:30 (2 hours)

The Deep Underground Neutrino Experiment (DUNE) is a next-generation neutrino experiment that will consist of a near detector (ND) complex placed at Fermilab, several hundred meters downstream of the neutrino production point, and a larger far detector (FD) to be built in the Sanford Underground Research Facility (SURF), approximately 1300 km away. DUNE will record neutrino interactions from an accelerator-produced beam (the LBNF multi-megawatt wide-band neutrino beam planned for Fermilab) arriving at predictable times, but will also aim to detect rare events such as supernova neutrinos, potential nucleon decays and other beyond the Standard Model phenomena. The main role of the DUNE ND is constraining the systematic uncertainties in the neutrino oscillation measurements by characterising the energy spectrum and composition of the neutrino beam, as well as performing precision measurements of neutrino cross sections. The plan for DUNE is to be built using a staged approach with two main phases. While the Phase I ND complex is sufficient for early physics goals, a Phase II upgrade is planned in order to reach the designed sensitivity for the neutrino oscillation physics. The upgraded Phase II ND will feature ND-GAr, a magnetised high-pressure gaseous argon TPC surrounded by an electromagnetic calorimeter (ECal) and a muon tagger. The gaseous argon provides low detection thresholds, which would allow detailed measurements of nuclear effects at the interaction vertex using the same material as the FD. Additionally, the magnetic field and the ECal would enable efficient particle identification (PID) and momentum and charge reconstruction. GArSoft is the simulation and reconstruction software package developed for ND-GAr. The development of this software is crucial for the task of delivering a physics-driven detector design, as it allows us to understand the impact that design changes have on the physics. This poster will present an overview of the ND-GAr concept, the ongoing efforts on the simulation and reconstruction software and the PID capabilities of the detector.

Poster prize

Yes

Given name

Francisco

Surname

Martínez López

First affiliation

Queen Mary University of London

Second affiliation

Institutional email

f.martinezlopez@qmul.ac.uk

Gender

Male

Collaboration (if any)

DUNE

Primary author: MARTÍNEZ LÓPEZ, Francisco (Queen Mary University of London)

Presenter: MARTÍNEZ LÓPEZ, Francisco (Queen Mary University of London)

Session Classification: Poster session and reception 1

Track Classification: New technologies for neutrino physics