



Poster session 3 – Wednesday 6 July

P3.005 A pressurized Argon Gas TPC as Near Detector for DUNE

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DUNE is an international effort to build a next-generation long-baseline oscillation experiment between Fermilab (Illinois), where a new neutrino beamline will be built, and a 40-kt liquid argon far detector located at the Sanford Underground Research Facility (South Dakota), about 1300 km away. A near detector will be installed several hundred meters downstream of the neutrino production point with the primary role of constraining the systematic uncertainties in the DUNE oscillation measurements by characterising the energy spectrum and composition of the neutrino beam as well as performing precision measurements of neutrino cross sections. Several technologies are being considered for the DUNE near detector; among them, a pressurized argon gas time projection chamber (GARtPC). Such a detector, thanks to the low density and low detection thresholds of the active target, would allow the detailed measurement of nuclear effects at the interaction vertex using the same material of that of the far detector. The technology also enables efficient particle identification and the measurement of the momenta and charge of outgoing particles using a magnetic field. The poster will present the status of the design studies and the anticipated physics potential of the GARtPC.