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Noise Filtering and Signal Processing in the ProtoDUNE-SP LArTPC

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ProtoDUNE-SP, the prototype of the single-phase DUNE far detector, was constructed and operated at the CERN Neutrino Platform with total liquid argon (LAr) mass of 0.77 kt and using full-scale components of the design for DUNE. The physics program of protoDUNE-SP aims to understand and control the systematic uncertainties for future oscillation measurements at DUNE, the charged-particle beam test allows to measure the detector calorimetric response for hadronic and electromagnetic showers, to study secondary particle production and argon-hadron cross sections, to evaluate and improve particle identification mechanisms and validate Monte Carlo simulations. In a liquid argon time-projection chamber(LArTPC) ionization electrons from a charged-particle track drift towards the wire planes, the induced current in the wire is read out and digitized by low-noise electronics. In this talk, we present the noise filtering and the signal processing techniques in protoDUNE-SP by which the digitized raw waveform is processed to recover the original ionization signal in charge and time.

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