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Automated Reconstruction, Signal Processing and Particle Identification in DUNE (15' + 5')

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Liquid Argon TPC (LArTPC) technology is increasingly prevalent in large-scale detectors designed to observe neutrino scattering events induced by accelerators or by natural sources. LArTPCs consist of a very high fraction of active detector material with spatial resolutions on the order of a few millimeters.
Three-dimensional interactions are imaged in multiple two-dimensional views by the process of projection onto planes of wires. The goal of automated reconstruction is to correctly classify each neutrino scattering event by the flavor of the incoming neutrino, to separate charged-current events from neutral-current and other backgrounds, and to measure the energies of the incoming neutrinos. Detection of neutrinos from supernova bursts and also seaching for nucleon decay are important uses of automated reconstruction algorithms. Because the amount of spatial detail is high and the amount of scattering is high, this reconstruction presents many challenges that are now being investigated with sophisticated techniques.
Signal processing, track and shower identification, particle identification, and event classification by a variety of innovative algorithms are reviewed.

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