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Multi-channel analyses for future neutrino oscillation experiments.

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Neutrino physics is entering the liquid argon era, and these experiments offer large statistics with excellent reconstruction abilities. The wealth of information available opens new opportunities to break degeneracies between different sources of systematic uncertainty by simultaneously fitting samples selected for different final state topologies. At near detectors, use of many such samples can pin down specific interaction model and flux uncertainties, while for far detectors smaller numbers of fitted topologies can be used to separate event types with better and worse neutrino energy resolution, optimising oscillation sensitivity. Neutrino physics is entering the liquid argon era, and these experiments offer large statistics with excellent reconstruction abilities. The wealth of information available opens new opportunities to break degeneracies between different sources of systematic uncertainty by simultaneously fitting samples selected for different final state topologies. At near detectors, use of many such samples can pin down specific interaction model and flux uncertainties, while for far detectors smaller numbers of fitted topologies can be used to separate event types with better and worse neutrino energy resolution, optimising oscillation sensitivity.

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