Reconstruction and Machine Learning in Neutrino Experiments

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The next-generation of neutrino detectors will provide us with much more detailed information about events in the detector. This is due to several reasons: The increase in size of the detector, the much denser instrumentation, and the advance of the electronics providing more details about the signals. As a result even detectors using a homogenious target volume get a high granularity not only of the instrumentation but also regarding the spatial event distribution. This presents a challenge and an opportunity at the same time.

This is met by increased computing power and novel algorithms, especially in the direction of deep machine learning, giving computer based reconstruction new possibilities. Many of the problems with these new approaches are not specific to a certain detector. For example the training techniques for the networks, the mapping of the detector geometry onto a normal grid, or the handling of defect channels and systematics. Therefore, we would like to exchange expertise with other neutrino detectors and establish an overview of this field.

Thus we invite reconstruction experts from neutrino experiments to present their experiments and their reconstruction efforts. Experiments and topics that we would like to cover:

DUNE and its prototypes, LarSoft Collaboration, T2K & Hyper-Kamiokande, Nova, KM3NeT/Orca, IceCube/Pingue, NEXT, SBND Collaboration, LarIAT, Minerva, MicroBooNE, MiniBooNE, JUNO, SNO/SNO+, KamLAND/ KamLAND-Zen, THEIA, ANNIE, Watchmann, ESSnuSB, Emulsions (Opera), EXO/nExo, Distributed imaging, ...