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AI and Machine Learning for Neutrino Physics

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Neutrino experiments around the world are entering a regime where statistical uncertainties are no longer dominant, placing new emphasis on controlling systematics. Alongside advances in detector technology, this shift demands unprecedented precision in detector modeling, simulation, event reconstruction, analysis, and experimental design and operations. Future techniques must be rapid, scalable, and capable of addressing high-dimensional data by extracting maximal information from complex event topologies while mitigating mismodeling effects. This talk surveys the key challenges facing neutrino physics and highlights emerging AI/ML approaches that offer promising solutions.

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