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Machine Learning for the Many-Body Problem ROGER MELKO, University of Waterloo / Perimeter Institute — The machine learning (ML) community has developed computational techniques with remarkable abilities to recognize, classify, and characterize complex sets of data. In this talk, we review recent applications of ML to classical and quantum many-body problems in condensed matter physics. Using architectures for supervised learning, such as fully-connected, deep, and convolutional neural networks, we demonstrate how ML can be used to identify phases and phase transitions in a variety of condensed matter Hamiltonians, including those with topological order. We also discuss how unsupervised learning, implemented through a restricted Boltzmann machine, is capable of faithfully modeling thermodynamic observables in a variety of systems. The combination of modern ML methods coupled with conventional Monte Carlo simulations promises to lead to new generations of hybrid computational techniques, with broad consequences for our theoretical understanding of condensed matter.

Roger Melko
University of Waterloo / Perimeter Institute

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