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Machine Learning Phases of Strongly Correlated Fermions KELVIN CHNG, San Jose State University, JUAN CARRASQUILLA, ROGER MELKO, Perimeter Institute for Theoretical Physics, EHSAN KHATAMI, San Jose State University — Machine learning offers an unprecedented perspective for the problem of classifying phases in condensed matter physics. We employ neural network machine learning techniques to distinguish finite-temperature phases of the strongly-correlated fermions on cubic lattices [1]. We show that a three-dimensional convolutional network trained on auxiliary field configurations produced by quantum Monte Carlo simulations of the Hubbard model can correctly predict the magnetic phase diagram of the model at the average density of one (half filling). We then use the network, trained at half filling, to explore the trend in the transition temperature as the system is doped away from half filling. This transfer learning approach predicts that the instability to the magnetic phase extends to this region, albeit with a transition temperature that falls rapidly as a function of doping. Our results pave the way for other machine learning applications in correlated quantum many-body systems. [1] K. Ch'ng, J. Carrasquilla, R. G. Melko, E. Khatami, cond-mat/arXiv:1609.02552

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