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# Deep learning the quantum phase transitions of disordered topological matters

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## Abstract

Three-dimensional random electron systems undergo quantum phase transitions and show rich phase diagrams. Examples of the phases are the band gap insulator, Anderson insulator, strong and weak topological insulators, Weyl semimetal, and diffusive metal. We use an image recognition algorithm based on a multilayered convolutional neural network to identify which phase the eigenfunction belongs to. The Wilson–Dirac model for topological insulators, and the layered Chern insulator model for Weyl semimetal are studied. The situation where the standard transfer matrix approach is not applicable is also treated by this method.

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