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## Learning about the Hubbard Model

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The Hubbard model is a foundational model of condensed matter physics. Formulated on a honeycomb lattice it provides a crude model for graphene; on a square lattice it may model high-Tc superconductors. I will present first-principles numerical results characterizing the quantum phase transition of the Hubbard model on a honeycomb lattice between a Dirac semimetal to an antiferromagnetic Mott insulator, and then present some results away from half-filling, where the model develops a sign problem.

Phase transition:

2005.11112 Phys.Rev.B 102 (2020) 24, 245105

2105.06936 Phys.Rev.B 104 (2021) 15, 155142

Sign problem:

2006.11221 Phys.Rev.B 103 (2021) 12, 125153

2203.00390 Phys.Rev.B 106 (2022) 12, 125139

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