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Quantum Monte Carlo simulations on interaction effects in the 2D Kane-Mele-Hubbard model DONG ZHENG, The Department of Physics, Tsinghua University, CONGJUN WU, GUANG-MING ZHANG, The Department of Physics, University of California, San Diego — Interaction effects in topological insulators remain an open question. We have proved that the determinant quantum Monte-Carlo simulation on the two dimensional Kane-Mele model augmented by the Hubbard interaction is free of the sign-problem. Consequentially, the interplay between band topology and strong interaction can be studied at a high numeric precision. The process how the topological band insulator evolves into the antiferromagnetic Mott insulator as increasing interaction strength is studied by calculating both the bulk and edge electronic properties. The possibility of an exotic topological Mott-insulator is examined.

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