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Correlation effects in quantum spin Hall states: a Quantum Monte Carlo study THOMAS C. LANG, MARTIN HOHENADLER, FAKHER F. ASSAAD, Department of Theoretical Physics & Astrophysics, University of Wuerzburg — We consider a quantum spin hall insulator as realized by the Kane-Mele model with spin orbit coupling λ supplemented by a Hubbard U term. On the basis of projective auxiliary field quantum Monte Carlo simulations on lattice sizes up to 12×12 , we map out the magnetic phase diagram. Beyond a critical value of $U > U_c$ the quantum spin Hall insulating state is unstable towards magnetic ordering. At $U < U_c$ we study the spin, charge and single particle dynamics of the helical edge state by retaining the Hubbard interactions only on the edge of a ribbon. As U_c is approached we observe a substantial depletion of low-lying spectral weight in the dynamical charge structure factor, and a robust signature of the helical edge state in the single particle spectral function.

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