Abstract Submitted
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Strongly correlated fermions on frustrated lattices FRANK POLLMANN, Max Planck Institute for the Physics of Complex Systems, KIRILL SHTENGEL, UC Riverside, JOSEPH BETOURAS, SUPA, University of St. Andrews, ERICH RUNGE, TU Ilmenau, PETER FULDE, Max Planck Institute for the Physics of Complex Systems — Systems with frustrated interactions are generally characterized by a high density of low–lying excitations which leads to a high susceptibility and thus interesting physical effects. We study a novel class of strongly correlated fermions on frustrated lattices which allows for excitations which carry fractional charges [1]. For a systematic study, we firstly consider a model of spinless fermions on a geometrically frustrated planar pyrochlore (checkerboard) lattice. An effective Hamiltonian is derived for the strongly correlated limit which describes the low–lying excitations. We solve the fermionic sign problem for the latter Hamiltonian and thus make it possible to apply quantum Monte Carlo methods [3]. The ground state is shown to be charged ordered and fractional charges are linearly confined. Secondly, we consider a model of spinful fermions on the kagome lattice and study the interplay between charge – and spin – degrees of freedom. [1] P. Fulde, K. Penc, and N. Shannon, Annalen der Physik **11**, 892 (2002) [2] E. Runge and P. Fulde, Phys. Rev. B **70**, 245113 (2004) [3] F. Pollmann, J. J. Betouras, K. Shtengel, and P. Fulde, Phys. Rev. Lett. **97**, 170407 (2006)

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