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On the coexistence of Landau levels and superconductivity

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Stellingen

behorende bij het proefschrift

On the coexistence of Landau levels and superconductivity

1. A Landau level can coexist with superconductivity if the quasiparticle excitations have chiral symmetry.

   Chapter 2

2. A Weyl superconductor in the vortex phase allows access to the universal chiral magnetic effect in equilibrium.

   Chapter 4

3. Majorana fermions trapped in a vortex core will escape if a sufficiently large current is passed through the superconductor.

   Chapter 5

4. The non-local Stacey Hamiltonian of Dirac fermions on a lattice has a locally conserved current.

   Chapter 6

5. Although the low-energy Hamiltonian of a Fu-Kane heterostructure reduces to that of a chiral p-wave superconductor, this correspondence breaks down near the boundary with a magnetic insulator.

6. The statement that the Agmon distance of the localization landscape predicts asymptotic decay of the wave functions [Commun. Partial. Differ. Equ. **44**, 1186 (2019)] is only true in the limit that the effective potential of the landscape equals the microscopic potential.

7. The Harrow-Hassidim-Lloyd algorithm can be used to perform quantum phase estimation efficiently for a generalized eigenvalue problem $Av = \lambda Bv$, if A and B are sparse matrices. This provides an alternative to the algorithm of Parker and Joseph [Phys. Rev. A **102**, 022422 (2020)], which requires that $B^{-1/2}$ is sparse.

8. Although one cannot reconstruct the disorder potential of a random Hamiltonian from the eigenvalues, one can reconstruct the energy dependent localization length.

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