

Presentation Title

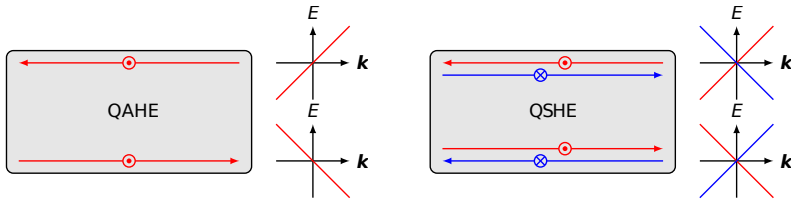
Author · 16. November 2017

Institute · University

Overview

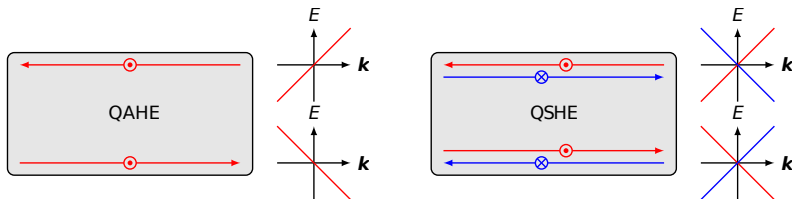
1. Topological phases
2. 1D p-wave superconductor

Topological Phases



Conducting edge channels \longleftrightarrow Non-trivial bandstructure

Topological Phases



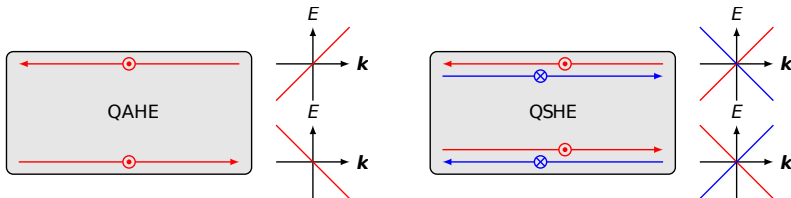
Conducting edge channels \longleftrightarrow Non-trivial bandstructure

QAHE bulk Hamiltonian $\hat{\mathcal{H}}(\mathbf{k}) = \mathbf{g}(\mathbf{k}) \cdot \boldsymbol{\sigma}$

$$\mathbf{g}(k_x, k_y) = (\sin k_x, \sin k_y, \cos k_x + \cos k_y - M)^T$$

Topological Phases

TEX

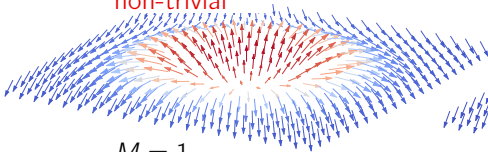


Conducting edge channels \longleftrightarrow Non-trivial bandstructure

QAHE bulk Hamiltonian $\hat{\mathcal{H}}(\mathbf{k}) = \mathbf{g}(\mathbf{k}) \cdot \boldsymbol{\sigma}$

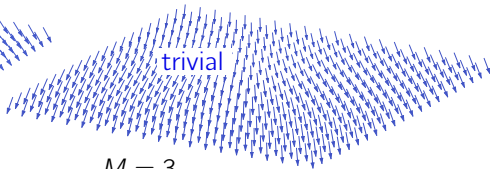
$$\mathbf{g}(k_x, k_y) = (\sin k_x, \sin k_y, \cos k_x + \cos k_y - M)^T$$

non-trivial



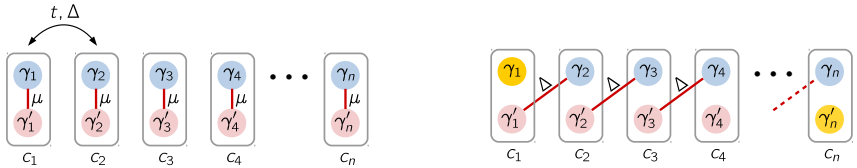
$M = 1$

trivial



$M = 3$

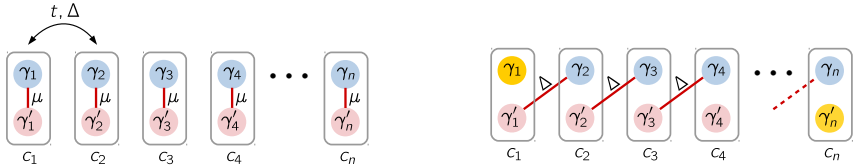
1D p-wave superconductor



Lattice

$$\mathcal{H} = \sum_{i=1}^{n-1} \left[t c_i^\dagger c_{i+1} + \Delta c_i c_{i+1} + \text{H.c.} \right] - \mu \sum_{i=1}^n c_i^\dagger c_i$$

1D p-wave superconductor



Lattice

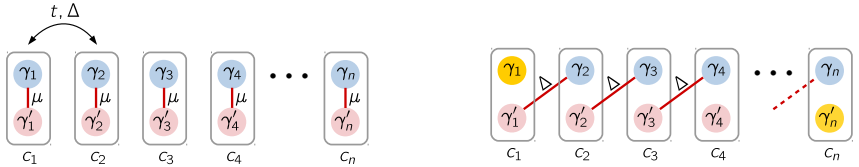
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Majorana
operators

$$\gamma_j = \frac{c_j + c_j^\dagger}{2}$$

$$\gamma'_j = \frac{c_j - c_j^\dagger}{2i}$$

1D p-wave superconductor



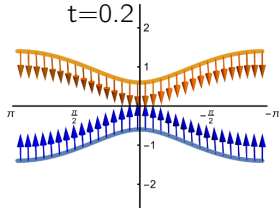
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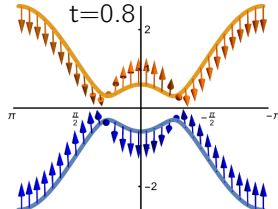
Majorana operators

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Bulk



$$\hat{\mathcal{H}}(k) = (2t \cos k - \mu) \tau_z - 2\Delta \sin k \tau_y$$

$$c_k^\dagger = \begin{pmatrix} c_k^\dagger & c_{-k} \end{pmatrix}$$