Notes about Periodic table for topological insulators and superconductors

Taper

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Abstract

As title suggests.

Contents

From the start: for **Gapped free-fermion** system, he mentions the classification hitherto available. See Table 1.

Robustness in classification

> ..., the topological numbers are insensitive to disorder and can even be defined without the spectral gap assumption, provided the eigenstates are localized.

Equivalence of Hamiltonian

> ... Two Hamiltonians belong to the same phase if they can be continuously transformed one to the other while maintaining the energy gap or localization; we will elaborate on that later.

1 Anchor

References

[1] Alexei Kitaev. Periodic table for topological insulators and superconductors.

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Table 1: Classification

Symmetry	*Spatial Dimension*	*Result*	*Other Keywords*
T	0	An intger: the number of particle-occupied Kramers doublet states	
T	1	None	
T	2	$\mathbb{Z}_2$	
T	3	$\mathbb{Z}_2$	$3D$ crystals have additional $3\mathbb{Z}_2$ invariant⇒ "weak topological insulators
Q(?)	2	Characterized by μ in units of e^2/h	TKNN
Q(?)	even d	Topological invariant (k-th Chern number)	
Q(?)	0	number of single-particle states with negative energy ($E < E_F = 0$), which are filled with electrons.	
T& Q			
No T & No Q	0	$\mathbb{Z}_2$	
No T & No Q	1	$\mathbb{Z}_2$	"majorana chain"
No T & No Q	2	Topological number is integer.	Even-odd effects.