# Charge Order, Quasicrystals, and the Quantum Hall Effect

#### Felix Flicker Bristol University

F. Flicker and J. van Wezel, *Quasiperiodicity and 2D Topology in 1D Charge Ordered Materials* arXiv: 1408.4735

I. Commensurate Charge Order

II. Quasicrystals

III. Incommensurate Charge Order

I. Commensurate Charge Order

II. Quasicrystals

III. Incommensurate Charge Order

- I. Commensurate Charge Order
- II. Quasicrystals
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### Tenfold Way

Symmetry				Dimension							
AZ	Т	С	S	1	2	3	4	5	6	7	8
А	0	0	0	0	Z	0	Z	0	Z	0	Z
AIII	0	0	1	Z	0	Z	0	Z	0	Z	0
AI	1	0	0	0	0	0	Z	0	$\mathbb{Z}_2$	$\mathbb{Z}_2$	Z
BDI	1	1	1	Z	0	0	0	Z	0	$\mathbb{Z}_2$	$\mathbb{Z}_2$
D	0	1	0	$\mathbb{Z}_2$	Z	0	0	0	Z	0	$\mathbb{Z}_2$
DIII	-1	1	1	$\mathbb{Z}_2$	$\mathbb{Z}_2$	$\mathbb{Z}$	0	0	0	Z	0
All	-1	0	0	0	$\mathbb{Z}_2$	$\mathbb{Z}_2$	Z	0	0	0	Ζ
CII	-1	-1	1	Z	0	$\mathbb{Z}_2$	$\mathbb{Z}_2$	Z	0	0	0
С	0	-1	0	0	$\mathbb{Z}$	0	$\mathbb{Z}_2$	$\mathbb{Z}_2$	Z	0	0
CI	1	-1	1	0	0	Z	0	$\mathbb{Z}_2$	$\mathbb{Z}_2$	Z	0

S. Ryu et al., New J. Phys. 12, 065010 (2010)

J. Baez, The Ten-Fold Way (part 1), n-Category Cafe (blog)







- CDWs provide a simple physical model for topological pumping, quantum Hall effect, 1D quasicrystals, *etc.*
- CDWs naturally occuring physical systems
- Quasicrystals are only *mathematically* higher-dimensional crystals

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## Thanks for your time



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