

A $U(1)$ Theory with Higgs Mechanism of the Toric Code Topological order

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[Chern-Simons theory](#) can perfectly describe a FQHE topological order. A question is whether it can describe a topological order with a discrete gauge group, the simplest case arguably being the toric code topological order. [\[1\]](#) shows that by Higgs mechanism we can break down the gauge group, and therefore a toric code order – a \mathbb{Z}_2 topological order – can be embedded into a $U(1)$ theory.

Sec. 5 in [\[1\]](#)

References

- [1] Subir Sachdev. Topological order, emergent gauge fields, and fermi surface reconstruction. *Reports on Progress in Physics*, 82(1):014001, Nov 2018.