Anyon Computation and Kitaev Models

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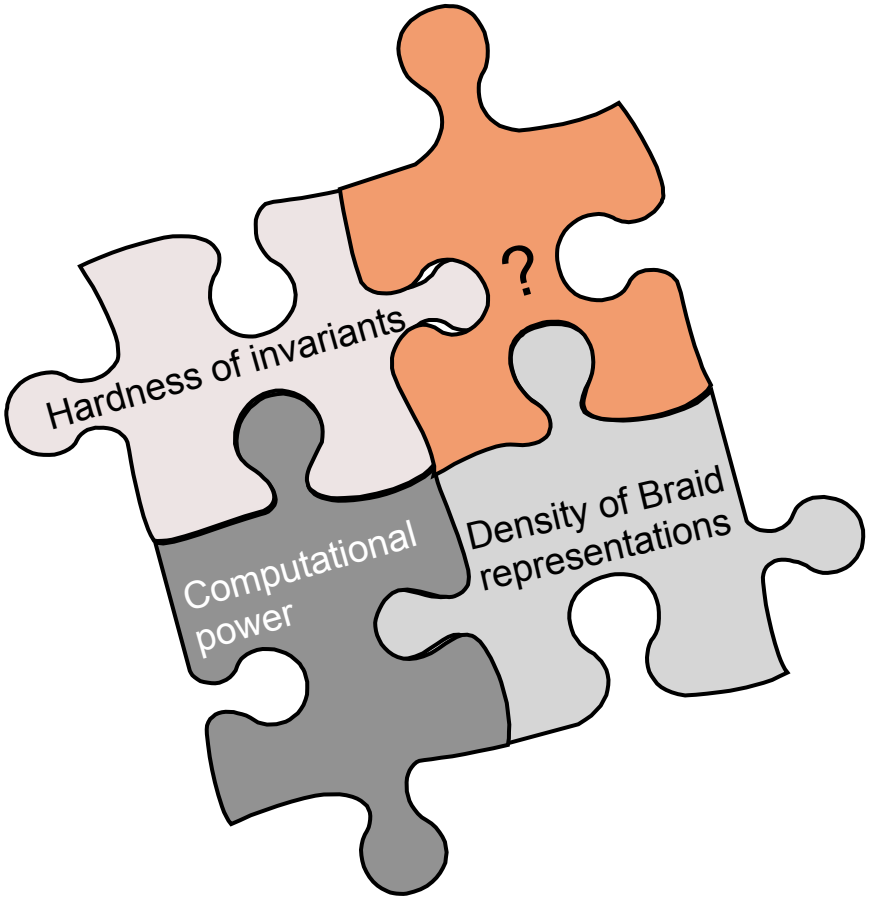
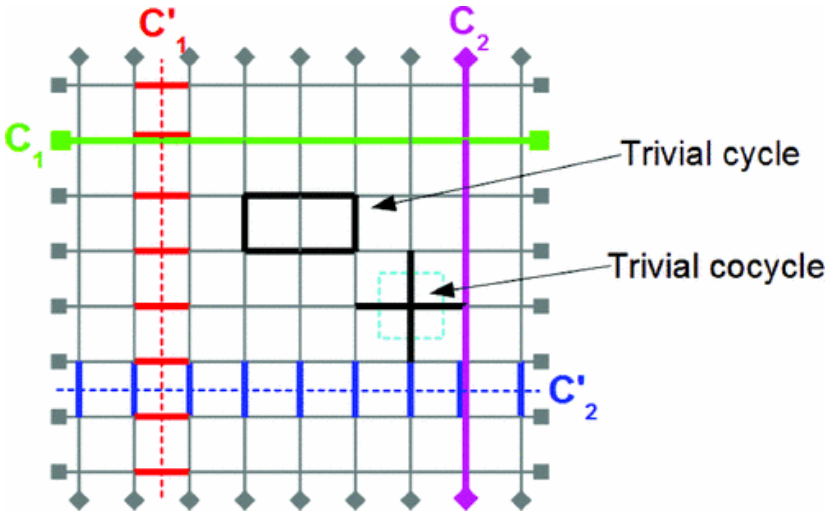
Computational Aspects of Anyons

- Fault-tolerant quantum computation by anyons - Kitaev
- Jones polynomial
  - $U_q(sl(2))$ anyons
  - Dense in U(N)
- Rowell's conjecture
- Provide intermediate models with error correction
- Other anyons
  - Ising anyons
  - D(G) anyons



Error Correcting Properties

- Toric code and its generalizations such as surface codes
- Computation in surface codes happens by braiding defects
- For universal quantum computation, one needs magic state distillation
- Other codes such as color codes, quantum double codes, Turaev-Viro codes, hyperbolic surface codes etc
- Topological quantum memory



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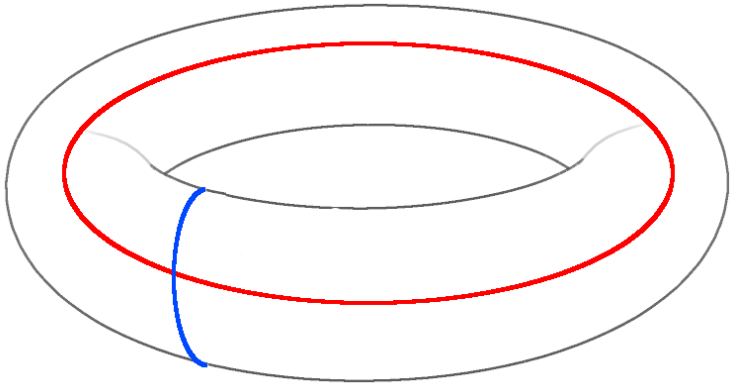

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Condensed Matter and Field Theory

- Related to condensed matter - topological order, Hamiltonian complexity
- Toric code exhibits topological order. In general, if one uses other groups, one can get Kitaev models
- These have been generalized to Levin-Wen models and they are related to Barrett-Westbury invariants
- TQFTs and CFTs
- Fractional Quantum Hall Effect

Figure 1 from Ahmet Tuna Bolukbasi and Jiri Vala
2012 New J. Phys. 14 045007