

# Anyonic local elements of reality

**Nicetu Tibau Vidal**

Lucia Vilchez Estevez

Clarendon Laboratory, University of Oxford,  
Parks Road, OX1 3PU, Oxford, United Kingdom

[anicet.tibauvidal@physics.ox.ac.uk](mailto:anicet.tibauvidal@physics.ox.ac.uk)

Abstract

We study non-abelian anyon theories from an information theory perspective. Following [1] and [2] we study the notion of subsystem in anyon theories and prove that any anyon theory satisfies the no-signalling principle.

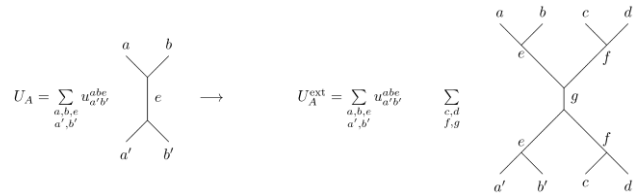
We find the local algebra of observables for any anyon theory. Following [3] we identify the generators of the local algebra of observables as the local elements of reality for anyons: local elements that fully describe the global system.

We comment on the possible uses of our work to find error-correction protocols for anyonic quantum computation.

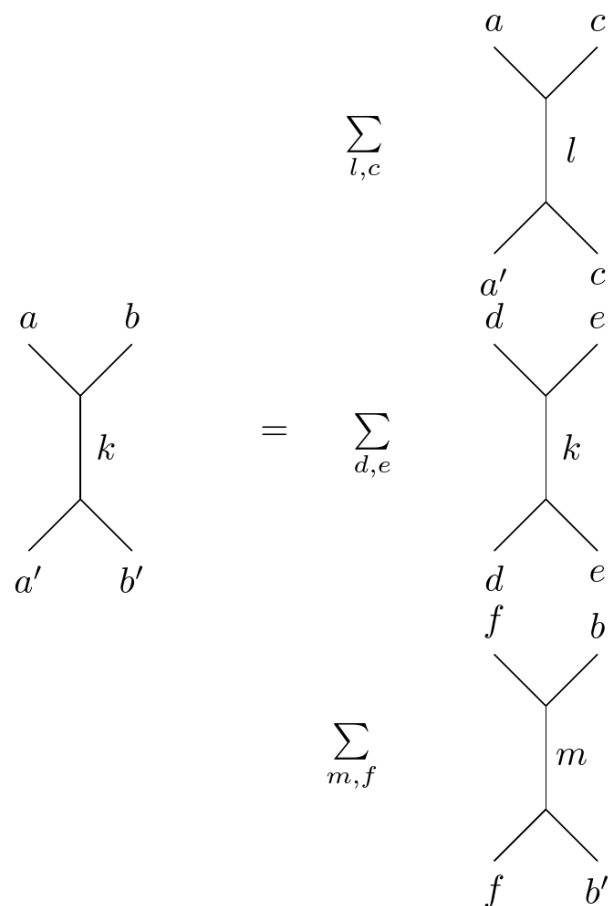
References

- [1] G. Chiribella, *Entropy*, 20(5), 358. (2018)
- [2] P. Bonderson, K. Shtengel, and J. K. Slingerland. *Annals of Physics*, 323(11). (2008) 2709-2755
- [3] P. Raymond Robichaud. arXiv preprint arXiv:1710.01380 (2017)

Figures



**Figure 1:** Local anyonic operators in local subspace (left) and in the global system (right)



**Figure 2:** Decomposition of a global operator as a product of three local operators.