

Advanced Topics in Quantum Information Theory

Exercise 5

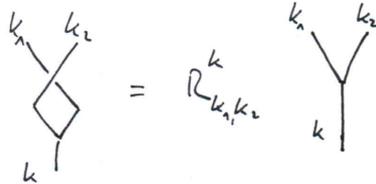
FS 2011
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Exercise 5.1 Toric Code

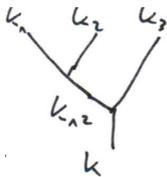
A particle consisting of an electric and a magnetic particle (sitting on the plaquette to the top right of the electric one) is called a ψ -particle. Show that ψ -particles have fermionic statistics.

Exercise 5.2 Braiding of Anyons

The R -matrix tells us what happens when two particles are being exchanged. It is diagonal in the standard basis with eigenvalues $R_{k_1 k_2}^k = \exp(i\theta_{k_1 k_2}^k)$. Graphically, we can express this in the following way.



Consider three anyons and a standard basis vector



and calculate what happens when the second and the third particle are interchanged.