Towards Categorical Quantum Concurrency Theory

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Abstract

Quantum computing inherently has concurrent aspects. Even with only local operations, qubits can influence each other. This ability leads to genuinely new quantum communication protocols, but also raises even thornier questions of causality than in classical concurrent computing. Monoidal categories and their string diagrams form a convenient and popular language for quantum computing. After an introduction to quantum concurrency, I will discuss the framework of tensor topology, which aims to analyse the interaction of several agents in monoidal categories, using notions from sheaf theory and ordered locales.

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