Quantum Computing Seminar

Motivating Categorical Quantum Mechanics

By

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Abstract: Circuit diagrams, such as those that implement quantum protocols have long been a useful tool in the field of quantum information and computation. Such diagrams, in fact, have a marked similarity to string diagrams appearing in category theory, an analogy that was made precise by the seminal work of Abramsky and Coecke [1]. Here we illustrate the naturalness of the categorical setting for describing quantum protocols using the example of quantum teleportation [1, §2.1] and motivate the kind of structures that will be needed to faithfully realize such quantum processes. Key notions in quantum theory, such as state, transformation, and measurement will be stated in a fully categorical language [1, §6] whose precise meaning will be unpacked in subsequent talks.

References:

1. Abramsky, Samson, and Bob Coecke. “Categorical quantum mechanics.” Handbook of quantum logic and quantum structures 2 (2009): 261-325. Section 2.
2. Heunen, Chris, and Jamie Vicary. Categories for Quantum Theory: an introduction. Oxford University Press, 2019. Chapter 0.

Date: Friday, February 9, 2024
Time: 14:00-15:30
Place: SA141 - Mathematics Seminar Room & ZOOM

To request the event link, please send a message to selman.ipek@bilkent.edu.tr