Quantum Computing Seminar

Symmetric Monoidal Categories (III)

By

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Abstract: In a symmetric monoidal category, the set of maps from the monoidal unit to itself inherits additional structure. These scalars in the category are inspired by, for instance, the isomorphism between linear maps from C (complex numbers) to itself and the field C. However, the additive structure and the notion of traces which are key to the computation of quantum probabilities require some development. In this talk, we describe biproducts and distributivity in (symmetric monoidal) category, and the concomitant structures induced on scalars in a symmetric monoidal category (Primary reference: [1, §5], secondary references: [2,§2.2.3]). We introduce categorical definitions of traces and partial traces, the latter familiar in quantum information theory as a procedure for obtaining information about a subsystem (Primary reference: [2, §4.6, §5.1], secondary reference: [1, §2.1, §2.2], [3]).

References:
1. Abramsky, Samson, and Bob Coecke. Categorical quantum mechanics. Handbook of quantum logicand quantum structures 2 (2009): 261-325.
2. Heunen, Chris, and Jamie Vicary. Categories for Quantum Theory: an introduction. Oxford University Press, 2019.
3. Andre Joyal, Ross Street, and Dominic Verity. Traced Monoidal Categories. (doi:10.1017/S0305004100074338).

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Time: 14:00
Place: SA141 - Mathematics Seminar Room & ZOOM

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