DALHOUSIE MATHEMATICS COLLOQUIUM

Thursday March 15, 2:30 pm, Chase 319

Speaker: Kohei Kishida
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Probability and Topology of Quantum Non-Locality and Contextuality

Non-locality and contextuality are paradoxical phenomena in quantum physics that are of foundational and potentially great practical significance: While non-locality is known to be fundamental to quantum communication, the more general phenomenon of contextuality may provide a key resource for quantum computation, as suggested by recent studies. This has motivated several approaches to the high-level expression of non-locality and contextuality that can be independent of the concrete formalism of quantum mechanics.

Starting with a review of the paradoxical probabilistic behavior of non-locality, this talk lays out some formalisms that express non-locality and contextuality. In particular, the topological approach makes it clear that contextuality is isomorphic to various phenomena in other disciplines. We show two results, one on the relationship between probabilistic and qualitative versions of contextuality, and the other on how to use a topological idea to demonstrate (qualitative) contextuality.

This talk is based on several joint works with Samson Abramsky, Rui Soares Barbosa, Ray Lal and Shane Mansfield.