ALEX KAZACHEK, University of Waterloo
Quantum Channel Capacities and Additivity Conjectures

Quantum channels are a model for communicating information via the transmission of quantum states. The propensity for such a channel to send information is known as its capacity, taking several different forms depending on operational constraints. Unlike classical channels, computing such capacities is both computationally and mathematically intractable due to a phenomenon known as non-additivity. As a result, taming and bounding their capacities involves the interplay of sophisticated mathematics such as asymptotic geometric analysis, creating quantum analogues of information-theoretic notions, as well as heuristic and numerical work with low-dimensional counterexamples. I will review the history of the field and its central concepts, as well as present the modern techniques for tackling additivity problems such as log-singularity arguments and degradability. Moreover, I will briefly discuss how channels in their abstract may be connected to prior work of mine with T. Barron on coherent states in Kähler quantization.