

Title: A second-quantized Shannon theory

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Abstract: <p>In quantum Shannon theory, the way information is encoded and decoded takes advantage of the laws of quantum mechanics, while the way communication channels are interlinked is assumed to be classical. In this talk, I will relax the assumption that quantum channels are combined classically, and I will show that, in certain situations, combining quantum channels in an indefinite causal order allows us to achieve tasks that are impossible in conventional quantum Shannon theory. Specifically, I will show a phenomenon of causal activation, whereby two identical copies of a completely depolarizing channel become able to transmit information when they are combined in a quantum superposition of two alternative orders. This finding runs counter to the intuition that if two communication channels are identical, using them in different orders should not make any difference.</p>

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