Celebrating the Choi-Jamiołkowski Isomorphism



Celebrating the Choi-Jamiołkowski Isomorphism Online Event March 1-2, 2023 (Endorsed by the National Center for Quantum Informatics (KCIK), Gdańsk) (KCIK)

Contribution ID: 4

Type: not specified

Higher-order quantum processes and quantum causal structures

Wednesday, 1 March 2023 15:45 (30 minutes)

One of the most profound insights of the Choi-Jamio lkowski isomorphism is that quantum processes can be treated as quantum states. Following this idea, it is natural to consider a kind of super-processes that transform quantum processes into quantum processes, in a similar way as ordinary processes transform quantum states into quantum states. This construction can be iterated recursively, generating an infinite hierarchy of processes of increasingly higher orders. Physically, this hierarchy corresponds to an extension of the framework of quantum circuits, including the ordinary acyclic circuits considered in quantum computing, as well as a new type of quantum circuits with cycles. In this talk I will present the main notions in the study of higher order quantum processes, discussing their application to quantum information and their connection with the study of causal structure in quantum mechanics.

Primary author: CHIRIBELLA, Giulio (QICI Quantum Information and Computation Initiative, Department of Computer Science, The University of Hong Kong, Pokfulam Road, Hong Kong)

Presenter: CHIRIBELLA, Giulio (QICI Quantum Information and Computation Initiative, Department of Computer Science, The University of Hong Kong, Pokfulam Road, Hong Kong)