

Joint CQSE and CASTS Seminar

Weekly Seminar
Dec. 9, 2016 (Friday)

TIME Dec. 9, 2016, 14:30 ~ 15:30
TITLE Quantifying Quantum Processes: from quantum information processing to dynamics of open quantum systems
SPEAKER Prof. Che-Ming Li
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PLACE Rm716, CCMS & New Physics Building, NTU

Abstract

A physical process is composed of interrelated actions that interact to make a physical system achieve a specific state. Here, we introduce a concept of classical processes to devise experimentally feasible methods for characterizing and quantifying quantum processes, independent of the states of the physical system. This framework enables us to examine the fundamental processes postulated in quantum mechanics. Furthermore, using several physical scenarios, including task-orientated processes for quantum information, post-selected measurements on photons, and general dynamics of open quantum systems, we illustrate that these quantifiers not only provide criteria for ruling out any classical processes of mimicking quantum computation, quantum communication, entangled-photon generation, and quantum transport, but also reveal strict conditions for measuring non-Markovianity of dynamics in open quantum systems. Such state-independent approach to describing non-classicality provides a new insight into generic quantum processes and potential applications to quantum information tasks and experiments.

