



Contribution ID : 89

Type : presentation (QT PhD program student)

(Causal)-Activation of Complex Entanglement Structures in Quantum Networks

venerdì 2 settembre 2022 18:55 (15)

Entanglement represents “the” key resource for several applications of quantum information processing, ranging from quantum communications to distributed quantum computing. Despite its fundamental importance, deterministic generation of maximally entangled qubits represents an on-going open problem. Here, we design a novel generation scheme exhibiting two attractive features, namely, i) deterministically generating different classes – namely, GHZ-like, W-like and graph states – of genuinely multipartite entangled states, ii) without requiring any direct interaction between the qubits. Indeed, the only necessary condition is the possibility of coherently controlling – according to the indefinite causal order framework – the causal order among the unitaries acting on the qubits. Through the paper, we analyze and derive the conditions on the unitaries for deterministic generation, and we provide examples for unitaries practical implementation. We conclude the paper by discussing the scalability of the proposed scheme to higher dimensional GME states and by introducing some possible applications of the proposal for quantum networks. In particular, distributed entanglement generation of graph states in quantum networks based on indefinite causal ordering will be highlighted.

Primary author(s) : Dr. CACCIAPUOTI, Angela Sara; Dr. CALEFFI, Marcello; Mr. KOUDIA, Seid

Presenter(s) : Mr. KOUDIA, Seid

Session Classification : Students Talks 3