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Importance and applications of infinite dimensional non-orthogonal quantum state

Osamu Hirota
Tamagawa University, Japan

Non-orthogonal quantum states in infinite dimensional space are playing a special role in foundation of quantum mechanics. The Gaussian state is a typical example of such a state that was considered at beginning of history of quantum theory. The explicit importance of Gaussian quantum states such as coherent state was certified by R Glauber, ECG Sudarshan et al. in quantum optics for understanding a nature of laser. More progress has been given by H P Yuen who discovered a special property of generalized coherent state known as squeezed state and a method to verify them experimentally. Then current interest goes to entanglement of non-orthogonal quantum state such as two-mode squeezed state and quasi-Bell entangled coherent state. On the other hand, a problem of discrimination of non-orthogonal quantum states through quantum measurement that was pioneered by C W Helstrom is also a foundation of quantum physics. Its basic criteria are Bayes, Neyman-Peason, and Minimax which play different roles. In this talk, I present a historical survey of importance of non-orthogonal quantum state, and progress of quantum state discrimination. Also I introduce potential applications of theoretical achievements on non-orthogonal quantum state such as Quantum Methodology and Quantum Enigma Cipher based on recent experimental progress.

Biography

Osamu Hirota has received his PhD in 1979 from Tokyo Institute of Technology (Japan). He is Director of the Quantum ICT Research Institute of Tamagawa University and is one of the pioneers of Quantum Information Science. He has established International Conference on Quantum Communication, Measurement and Computing (QCMC) in 1990. He has published more than 100 papers, in particular on quantum state discrimination theory and entangled coherent state.

hirota@lab.tamagawa.ac.jp

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