Joint CQSE and CASTS Seminar

Weekly Seminar
Dec. 23, 2011 (Friday)

TIME Dec. 23, 14:30 ~ 15:30
TITLE Nonlocality, Locality, Entanglement, and Fidelity: Quantum Teleportation in a Relativistic Open System
SPEAKER Prof. Shih-Yuin Lin
Department of Physics,
National Changhua University of Education
PLACE Rm716, CCMS & New Physics Building, NTU

Abstract

We study quauntum teleportation of continuous variables in a relativistic system with the point-like Unruh-DeWitt(UD) detectors coupled to a common quantum field initially in the Minkowski vacuum. An unknown coherent state of an Unruh-DeWitt detector is teleported from one inertial agent (Alice) to an almost uniformly accelerated agent (Rob), using a UD detector-pair initially entangled and shared by these two agents. The best averaged physical fidelity of quantum teleportation, which is independent of the observer's frame, always drops below the best fidelity of classical teleportation before the UD detector-pair becomes disentangled with the measure of entanglement evaluated around the future lightcone of the joint measurement by Alice. The distortion of the quantum state of the detector pair from the initial state can suppress the fidelity significantly even when the UD detector pair is still strongly entangled around the lightcone. We point out that the dynamics of entanglement of the UD detector-pair evaluated in Minkowski frame or in quasi-Rindler frame are not quite relevant to the physical fidelity of quantum teleportation in our setup.