

Joint CQSE and CASTS Seminar

Weekly Seminar
Nov. 30, 2012 (Friday)

TIME Nov. 30, 14:30 ~ 15:30
TITLE Witnessing Quantum Coherence
SPEAKER Prof. Che-Ming Li
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PLACE Rm716, CCMS & New Physics Building, NTU

Abstract

Quantum coherence is one of the primary non-classical features of quantum systems. While protocols such as the Leggett-Garg inequality (LGI) and quantum tomography can be used to test for the existence of quantum coherence and dynamics in a given system, unambiguously detecting inherent "quantumness" still faces serious obstacles in terms of experimental feasibility and efficiency, particularly in complex systems. Here we introduce two "quantum witnesses" to efficiently verify quantum coherence and dynamics in the time domain, without the expense and burden of non-invasive measurements or full tomographic processes. Using several physical examples, including quantum transport in solid-state nanostructures and in biological organisms, we show that these quantum witnesses are robust and have a much finer resolution in their detection window than the LGI has. These robust quantum indicators may assist in reducing the experimental overhead in unambiguously verifying quantum coherence in complex systems.

