The Abdus Salam
International Centre for Theoretical Physics

Workshop on
NEW TRENDS IN QUANTUM DYNAMICS AND ENTANGLEMENT
21 - 25 February 2011

Putting the Quantum and Classical Embedding Problems to Rest: A Quantum Information Perspective on Open Quantum Systems

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Abstract:

The behaviour of any physical system is governed by its underlying dynamical equations - the differential equations describing how the system evolves with time - and much of the physics is concerned with discovering these dynamical equations and understanding their consequences. In the end, any such dynamical law is identified by making measurements at different times, and computing the dynamical equations consistent with the acquired data. In this talk, we give complexity-theoretic solutions to both the quantum and the classical embedding problems for classical and quantum channels. The classical instance is a longstanding open problem in probability theory, dating from 1937; this work finally lays it to rest. (Joint work with T. Cubitt, M.M. Wolf, J.I. Cirac)

(1)arXiv:1005.0005.
(2)arXiv:0908.2128.
(3)Phys.Rev.Lett.101, 150402 (2008)