The Abdus Salam
International Centre for Theoretical Physics

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

The Observables of a Dissipative Quantum System and the Transition from Quantum to Classical

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Abstract:

One of the most distinctive traits of quantum mechanics is the non-commutativity of some of its observables. If a commutator vanishes, the associated observables can be simultaneously measured and can be considered "classical" with respect to each other. The system is classical when all its observables commute. The transition from quantum to classical is a fascinating theme of investigation and many interesting approaches have been proposed in order to give a consistent definition of classicality in terms of the commutativity features of the observables. We introduce a product between the observables of a dissipative quantum system, that leads to a contracted algebra. As time goes by, it becomes more difficult to measure those observables that are more affected by the dissipative dynamics.
The general ideas are corroborated by a few explicit examples.