The Abdus Salam International Centre for Theoretical Physics

Conference on Long-Range Interacting Many-Body Systems: from Atomic to Astrophysical Scales (25 - 29 July 2016)

Venue: ICTP Leonardo da Vinci Building - Budinich Lecture Hall
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Title:
Quantum catastrophes in the dynamics of cold atom systems with long range interactions

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Abstract:

Catastrophes have been extensively studied in optics where they are known as caustics and occur all around us in the form of natural focusing, e.g. as rainbows, the bright lines on the bottom of swimming pools, and as rogue waves at sea. They are the places where the geometric theory of light predicts an infinite intensity and wave theory (which introduces the concept of phase and interference) must be used to get a finite answer. Can these structures also occur in quantum mechanics? I will show that they can using a number of examples drawn from the field of cold atoms with long-range interactions. These include the Hamiltonian Meanfield Model and the transverse field Ising model with long-range interactions.