PADERBORN UNIVERSITY

Institut für Mathematik

Distinguished Lecture

Joint Seminar Complex Quantum Systems and Probabtility Theory

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A Theory of Quantum Jumps

In this talk I describe a novel Law of Dynamics for non-relativistic Quantum Mechanics (QM). The time evolution of individual physical systems consisting of charged matter interacting with the quantized electromagnetic field, e.g., electrons in the shell of an atom coupled to the radiation field, is non-linear, dissipative and stochastic, featuring isolated random events, called “quantum jumps." – We must search for the equations describing it! Explicit equations describing the evolution of such systems can be found in the limit where the velocity of light tends to infinity. They involve a new type of stochastic process, which I call “quantum Poisson jump process”. In this talk, I introduce this process, present some of its mathematical properties and sketch some applications to the quantum theory of fluorescence of atoms.

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