Quantum Nanotechnology:The Meeting Points of Quantum Mechanics and Nanotechnology

Nanotechnology is based on manipulations of individual atoms and molecules to build complex atomic structures. Rapid progress of nanotechnology requires developing novel theoretical methods to explain complicated experimental results and predict new functions of nanodevices. Thus, for the last decade, one of the challenging works of quantum mechanics is to understand the electron, spin, atom and molecules transport phenomena in molecular devices. Quantum mechanics transcends and supplants classical mechanics at the atomic and subatomic levels. It provides the underlying framework for many subfields of physics, chemistry and materials science, including condensed matter physics, atomic physics, molecular physics, quantum chemistry, particle physics, and nuclear physics. It is the only way we can understand the structure of materials, from the semiconductors in our computers to the metal in our automobiles. It is also the scaffolding supporting much of nanoscience and nanotechnology. Quantum nanotechnology is a broad concept that deals with a manipulation of individual quantum states of atoms and molecules. Quantum nanotechnology differs from nanotechnology as a quantum computer differs from a classical molecular computer. The nanotechnology deals with a manipulation of quantum states in bulk rather than individually. In this talk, we define the main notions of quantum nanotechnology and its application of quantum mechanics in nanotechnology

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