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Quantum photonics, an authentic concept for attosecond optics

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Quantum Photonics (QP), or fifth theory of light, delivers a "Real", instead of "Virtual" description of optical phenomena. It certainly encompasses previous four optical theories (Ray, Scalar Wave, Electromagnetic wave and Photon Optics) according to Correspondence Principle. It, not only emphasizes on Mathematical viewpoints in Quantum Mechanics, but also emphasizes on Intuitive Physics, about what's really happening in Atomic scale – atto-second world. QP viewpoints are according to Bohmian Mechanics (late David Bohm's Theory), which can now explain in details about hidden variables both in classic and relativistic mechanics. Here, we introduce four main postulates of QP- First: Knowledge of the real shape of each molecule in a real Target Material (TM) using Schrodinger equation to estimate physical molecular shapes in a target material; Second: Knowledge of the physical shape of crystal- lattice structure in a real TM using X-ray diffraction interferometry and laboratory measurements to determine the lattice shape in a TM; Third: Knowledge of the rate of Short Range Inter-atomic Forces (SRIF) between molecules in a real TM and inter-atomic forces should be estimated mathematically using Coulomb's law, ionic, covalence or Vandervals bondings for a specified lattice shape in a TM; Fourth: Space - Time domains analysis and simulation of electron – photon interaction, when photons travel inside of a real TM. MonteCarlo statistical dynamic method, is a good example for a powerful time-domain analysis and simulation of photon- electron interaction in a TM. According to Fifth theory of light: (QP), Fermat Principle is proved. Snell-Descart law, Dispersion and Polarization phenomena can intuitively be described in attosecond time scale. Phase matching condition in Second Harmonic Generation (SHG) and Laser Induced Breakdown (LIB) effects are some other examples explained in attosecond regime, by Quantum Photonics.

Biography

Hassan Kaatuzian has received his BSc and MSc degrees in Electrical Engineering from the Sharif University of Technology, Tehran, Iran, in 1986 and 1988, respectively. He has completed his PhD degree in Electrical Engineering from the Amirkabir University of Technology (AUT), Tehran, Iran, in 1994. He was the first PhD graduated student in Iran in solid-state electronics. He is working as a full Professor since 2015 and the Director of Photonics Research Laboratory since 2001 with the AUT Electrical Engineering Department. He was an Associate Professor and Assistant Professor at AUT in 2007 and 1997 respectively and R&D Manager in TAKTA Electronics Company from 1997 to 2000. He has professional experience in executing more than 50 technical projects at the Sharif and Amirkabir Universities of Technology, ITRC, IRIB, and Aerospace organizations in Iran, since 1984. He has more than 10 letters of appreciation from scientific, research and industrial centers. He has authored about 200 journal and conference technical original papers (in English), and translated the same amount of scientific papers (from English or French into Persian). He has also translated two technical books and compiled six other books in Photonics, Electronics and Semiconductor Devices Fabrication. He was a member of IEEE (USA), BIS (UK), CNRS (France), and Iranian Informatics, Physics and Computer Societies.

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