CCT Colloquium Series

Quantum Technologies --- The Second Quantum Revolution!

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Abstract:
We are currently in the midst of a second quantum revolution. The first quantum revolution gave us new rules that govern physical reality. The second quantum revolution will take these rules and use them to develop new technologies. In this review we discuss the principles upon which quantum technology is based and the tools required to develop it. We discuss a number of examples of research programs that could deliver quantum technologies in coming decades including; quantum information technology, quantum electromechanical systems, coherent quantum electronics, quantum optics, and coherent matter technology. Applications are to vastly improved quantum computers, quantum communications, quantum sensors, and quantum enhanced global and planetary positioning systems.

Speaker's Bio:
Professor Jonathan P. Dowling is the Hearne Professor of Theoretical Physics and Co-Director of the Hearne Institute for Theoretical Physics, in the Department of Physics and Astronomy at Louisiana State University. He earned his BS Physics with honors from the University of Texas at Austin, his MS Applied Mathematics and MS Physics from the University of Colorado at Boulder, and his PhD Mathematical Physics from the University of Colorado at Boulder. His principal areas of research concern quantum science and technologies, including: quantum electrodynamics, quantum optics, quantum information theory, photonic band-gap materials, and foundations of quantum mechanics. Current research work focuses on linear optical approaches to quantum information processing, metrology, and imaging; cavity quantum electrodynamics; and photonic band-gap structures for thermal emissivity control. * While working for Army Aviation & Missile Command from 1990 through 1998, Professor Dowling served on numerous Department of Defense (DoD) Review Boards and Organizational Committees; in particular for the Army Research Office (ARO), the Defense Advanced Projects Research Agency (DARPA), and the National Security Agency (NSA). He helped organize the first International Workshops on Photonic Band-Gap Materials (Park City, Utah, 1991), Quantum Cryptography and Computing (Tucson, Arizona, 1995), and The Atom Laser (Tucson, Arizona, 1997); all sponsored by the DoD. He regularly served as Technical Advisor and Reviewer for the DoD in the research areas of Quantum Optics; Coherent Quantum Electronics; Photonic Band-Gap Materials; Quantum Computing and Information Technology; Atomic, Molecular, and Optical Physics; and General Relativity. He also reviewed hundreds of research papers in these fields for Professional Journals, and currently serves on the Editorial Board for the journal, Concepts of Physics, and was formerly on the board of the Journal of the European Optical Society, Journal of Optics A, and also formerly on the board of the American Physical Society, Physical Review A.

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