

Physics Colloquium

Michigan Technological University

Thursday, October 1, 2009

4:00 pm

Room 139 Fisher Hall

Quantum Interferometry and Coherence: from Quantum Eraser to Sub-wavelength Lithography



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Abstract: In this talk we discuss the novel applications of quantum interferometry and coherence. Such techniques have found important applications in both fundamental and applied sciences. On the one hand, quantum eraser sheds new light on the foundations of quantum mechanics and on the other, the techniques based on quantum interference lie at the foundations of quantum microscopy and quantum imaging. As an example, a fundamental limit to optical resolution in optical lithography arises from the wave nature of light. The Rayleigh criterion limits the feature size of interfering beams to half the wavelength of light. We show how we can improve upon this "fundamental" limit using novel techniques based on quantum coherence.

Biography: Prof. Zubairy's major research interest lies in the fields of quantum optics and laser physics and he has published over 250 papers on a wide variety of topics. He is the co-author of two books, one on Quantum Optics and the other on Quantum Computing Devices. Prof. Zubairy received his Ph.D. from the University of Rochester. In 2000 he joined Texas A&M University where he is presently a Professor of Physics and Associate Director of the Institute of Quantum Studies. Prof. Zubairy is a Fellow of the American Physical Society and the Optical Society of America and a Fellow of the Pakistan Academy of Sciences. He has received many awards including the Humboldt Research Prize, the Orders of Hilal-e-Imtiaz and Sitara-e-Imtiaz in his native country Pakistan, the Abdus Salam Prize for Physics and the International Khwarizmi Award.