



Graduate Seminar (EEL 6936)
Department of Electrical Engineering
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Electrical & Computer Engineering

Friday, October 30, 2015, 3:45-4:30 p.m.
Engineering Building II (ENB) Room 109

Quantum Communication in the Multi-Photon Regime

Abstract

This talk will summarize the investigations that the author and his colleagues have conducted over the past five years exploring the multi-photon regime in order to capture unconditional security in information transfer. Unconditionally secure information transfer has been the ultimate dream of all cryptographers. However, until recently, it has defied attempts at realization. The BB'84 protocol offered a theoretical basis for unconditionally secure information transfer more than thirty years ago. Quantum key distribution (QKD) instruments which are now available for commercial applications in a limited way are the closest realizations of quantum cryptography. All such instruments are based on the single photon technology using the BB'84 protocol. As is well known, the generation of single photons with predefined periodicity defies a fundamental law of nature. The speed and distance limitations of currently practiced quantum key distribution have resulted in limited applications. A mass scale adoption of quantum cryptography for payloads at the speed of commercial telecommunication over distances of thousands of kilometers without regeneration is not expected anytime soon using the contemporary QKD technology. The multi-photon regime warrants further investigation as a means to explore the strength and limitations of quantum cryptography while weakening the assumption of information being conveyed through the use of randomly occurring single photons. This talk will summarize our recent findings related to the transfer of quantum secure information at payload speeds in the multi-photon regime.

Biography



Pramode Verma is Professor and Director of the Telecommunications Engineering Program in the School of Electrical and Computer Engineering of the University of Oklahoma-Tulsa. He also holds the Williams Chair in Telecommunications Networking. Prior to joining the University of Oklahoma in 1999 as the founder-director of a graduate program in Telecommunications Engineering, Dr. Verma held a variety of professional, managerial and leadership positions in the telecommunications industry at AT&T Bell Laboratories and Lucent Technologies. He is the author/co-author of over 150 journal articles and conference papers, and several books in telecommunications engineering. He is also the co-inventor of eight patents with several patents pending. He regularly serves on NSF panels and has been an External Examiner for Ph.D. theses at the University of Cape Town, South Africa, University of Ottawa, and Carleton University, Ottawa. He has been a keynote speaker at several international conferences and has lectured in several countries. He received

the University of Oklahoma-Tulsa President's Leadership Award for Excellence in Research and Development in 2009. He is a Senior Member of the IEEE and a Senior Fellow of The Information and Telecommunication Education and Research Association. He obtained his Ph.D. in 1970 from the Concordia University in Montreal, Canada, and an MBA from the Wharton School, University of Pennsylvania in 1984.