

THURSDAY NOVEMBER 19, 2015
11:00 AM, 260 DREESE LABORATORIES

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Quantum Nonlinear Optics: Nonlinear Optics Meets the Quantum World

Abstract: This presentation first reviews the historical development of the field of nonlinear optics, starting from its inception in 1961. It then reviews some of its more recent developments, including especially how nonlinear optics has become a crucial tool for the developing field of quantum technologies. Fundamental quantum processes enabled by nonlinear optics, such as the creation of squeezed and entangled light states, are reviewed. We then illustrate these concepts by means of specific applications, such as the development of secure communication systems based on the quantum states of light.

Bio: Professor Robert W. Boyd was born in Buffalo, New York. He received the B.S. degree in physics from MIT and Ph.D. degree in physics from the University of California at Berkeley. His Ph.D. thesis, supervised by Charles Townes, investigated the use of nonlinear optical techniques in infrared detection for astronomy. Professor Boyd joined the faculty of the University of Rochester in 1977, and in 2001 became the M. Parker Givens Professor of Optics and Professor of Physics. In 2010 he became Professor of Physics and Canada Excellence Research Chair in Quantum Nonlinear Optics at the University of Ottawa. His research interests include “slow” and “fast” light propagation, quantum imaging methods, nonlinear optical interactions, nonlinear optical properties of materials, and the development of photonic devices including photonic biosensors. Professor Boyd has written two books, co-edited two anthologies, published over 400 research papers ($\approx 30,000$ citations, Google H-index 71), and been awarded nine patents. He is the 2009 recipient of the Willis E. Lamb Award for Laser Science and Quantum Optics and the 2014 IEEE Photonics Society Quantum Electronics Award. Prof. Boyd is a fellow of the Society of Photo-Optical Instrumentation Engineers (SPIE), the American Physical Society (APS) and of the Optical Society of America (OSA). He is a past chair of the Division of Laser Science of APS and has been a member of the Board of Directors of OSA. He has also served the chair of the Joint Council on Quantum Electronics (it is joint among APS, OSA and IEEE/PS). Prof. Boyd has served as a member of the Board of Editors of Physical Review Letters and of the Board of Reviewing Editors of Science Magazine.

Hosted by: Daniel Gauthier