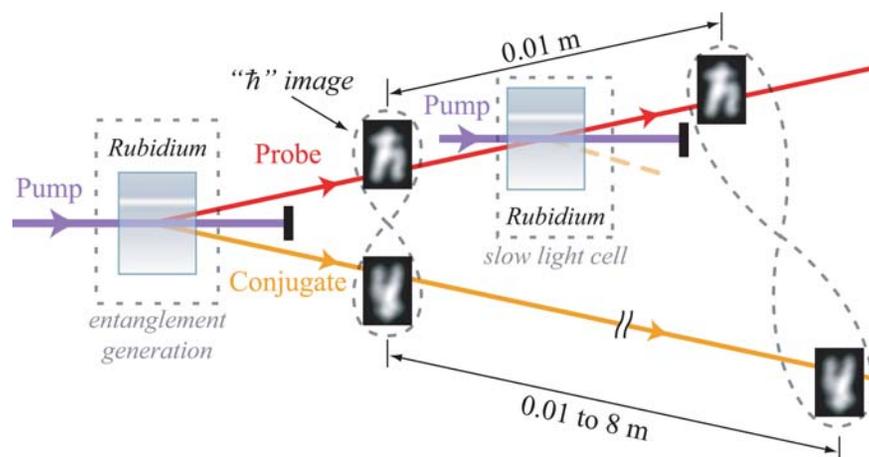


Applications of four-wave mixing: from generation to control of entangled photons



Dr. Alberto Marino

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PhD in Optics, Rochester 2006
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This talk will include a broad introduction to nonlinear optics in alkali vapors, and describe applications by which we produce a quantum cloner and a quantum buffer.

3:00 pm, Monday, September 28, 2009
Sloan Auditorium, Goergen 101
Refreshments provided.

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Abstract

One of the most important resources in quantum optics is entanglement, which is characterized by correlations stronger than allowed classically. As a result, it is the basis of applications such as quantum cryptography, quantum information processing, and quantum teleportation. Due to its fundamental role in quantum information science, the generation and control of entangled states of light are active research areas. In this talk I will show that non-degenerate four-wave mixing (4WM) in rubidium vapor has applications in both of these areas. I will start by giving a general introduction into the topic of generation and characterization of entangled states of light known as twin beams. I will show how it is possible to use 4WM to generate twin beams and will describe the advantages that are obtained with the use of this nonlinear process. I will finish by presenting two applications of 4WM in quantum information: obtaining the best possible copy of a quantum state, i.e. a quantum cloner, and controlling the propagation velocity of the light carrying the entanglement, i.e. a quantum buffer.

Biography

Alberto Marino is currently a Research Associate at the Joint Quantum Institute (NIST/University of Maryland), where his current research is in the field of quantum optics, with particular emphasis on the generation of quantum states of light and its application to quantum information science. Dr. Marino obtained a B.S. in Engineering Physics with specialization in optics and electronic systems from ITESM (Instituto Tecnológico y de Estudios Superiores de Monterrey) in Monterrey, Mexico, in December 1998. In May 1999 he obtained a diploma in robotics from ITESM. He began graduate studies at the Institute of Optics at the University of Rochester in August 1999 and earned an M.S. degree in optics in October 2002 and a Ph.D. in Optics in October 2006. His doctoral research in quantum optics and atomic physics was supervised by Professor Carlos R. Stroud, Jr.