QPhysics AT QUEENS COLLEGE

Colloquium Notice

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Fast Light and Quantum Entanglement

Quantum states of light have been shown to provide improvements in a variety of systems, resulting in provably secure communication, sub-shot noise interferometry, and computation schemes that scale better with resources than when using classical means. A key aspect of these entangled and squeezed states of light is that they exhibit correlations that are stronger than allowed classically. Due to the important role entanglement plays in the field of quantum optics, numerous investigations into its fundamental behavior have taken place. For example, how entanglement evolves when propagating through a slow light medium, in which the group velocity of light is less than the speed of light in vacuum, c, have been conducted in the past. We seek to investigate how quantum correlations and entanglement behave when propagating through a medium exhibiting anomalous dispersion. In such a medium, optical pulses may propagate with group velocities that are larger than c, or even negative. In this talk I will show that by using a nondegenerate four-wave mixing (4WM) process in warm rubidium vapor, which may be used to generate squeezed and entangled states of light, it is possible to generate pulses with record negative group velocities. Additionally, I will discuss recent results involving the combination of fast light and quantum entanglement. Finally, I will present ongoing research involving secure quantum key distribution and phase-sensitive image amplification, and conclude with a discussion of future research directions involving the versatile 4WM system.

Monday
March 18, 2013
Starts at 12:15 PM
Coffee at 12:00 PM
Physics Conference Room, SB B326