# MALVIN C. TEICH 'Multi-photon and entangled-photon imaging and lithography'

July 31, 2007

Seminar, July 31st, 12:00. Seminar Room

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**Nonlinear optics, which governs the interaction of light with various media, offers a whole raft of useful applications in photonics, including multiphoton microscopy and multiphoton lithography. It also provides the engineer with a remarkable range of opportunities for generating light with interesting, novel, and useful properties. As a particular example, entangled-photon beams generated via spontaneous optical parametric down-conversion**

exhibit unique quantum-correlation features, and coherence properties, that are of interest in a number of contexts, including imaging. Photons are emitted in pairs in an entangled quantum state, forming twin beams. Such light has found use, for example, in quantum optical coherence tomography, an imaging technique that permits an object to be examined in section. Quantum entanglement endows this approach with the remarkable property that it is insensitive to the dispersion inherent in the object, thereby permitting sectioning to be achieved at higher resolution, and greater depths, than can otherwise be achieved. Although based on an esoteric feature of quantum mechanics, this technique is expected to have useful applications in biology and medicine. We discuss a number of techniques in which multiphoton and entangled-photon interactions offer advantages.

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