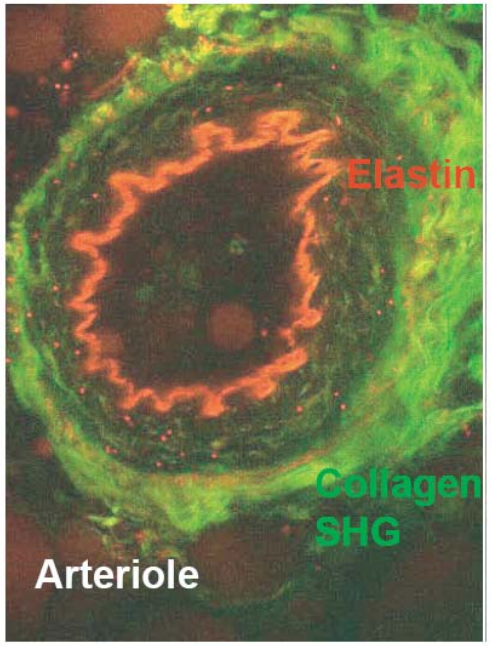
The Institute of OPTICS

Colloquium

University of Rochester

Nonlinear Scanning Microscopies Illuminating the Biophysics of Life



Professor Watt W. Webb
Dept. of Applied Physics, Cornell University
S.B. Eckert Professor in Engineering
BS and ScD MIT

This talk will describe the use of nonlinear optics for in vivo microscopic imaging of our tissues and submicrosecond resolution of the molecular dynamics of our life processes.

3:00-4:00 pm, Monday, March 3, 2008
Sloan Auditorium, Goergen Building
Refreshments provided

Jointly sponsored by Department of Biomedical Engineering

Nonlinear Laser Scanning Microscopies Illuminating the Biophysics of Life

Watt W. Webb
Professor of Applied Physics
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Abstract
We are intrinsically fluorescent, and about ¼ of our proteins are optically non-linear non-centrosymmetric second harmonic generators under bright laser illumination. These excitable optical signals provide effective *in vivo* microscopic imaging of our tissues and submicrosecond resolution of the molecular dynamics of life processes. Some of the relevant photophysics, biophysics and patented medical applications are illustrated.

Biography
Prof. Webb holds a B.S. and Sc.D. from MIT. He joined the Cornell faculty in 1961, served as director of the School of Applied and Engineering Physics from 1983-1989 and is a faculty member of eight graduate Fields. He founded and directed the Developmental Resource for Biophysical Imaging Opto-Electronics, an NIH Biomedical Imaging Center from 1989-2006. Prof. Webb pioneered the techniques of Fluorescence Correlation Spectroscopy (FCS) in 1969 and Multiphoton Microscopy (MPM) in 1990. FCS permits single-molecule detection in solutions at nanomolar concentrations and provides temporal resolution of the dynamic processes that can be signaled by the fluorescence signal. MPM significantly reduces photodamage and minimizes image degradation due to scattering and autofluorescence, and thereby enables high resolution, high signal-to-noise imaging in living cells and deep in turbid tissues *in vivo*. His laboratory at Cornell University continues to extend the frontiers of these technologies, now into the development of multiphoton microscopy medical endoscopy.