



**PUBLICATIONS GRANTS PATENTS
CONFERENCES PRESENTATIONS
AND STUDENT NEWS**

Publications

M. Xu, M. Lax, and R. R. Alfano, "Anomalous Diffraction of Light with Geometrical Path Statistics of Rays and a Gaussian Ray Approximation," *Optics Letters*, 28, 179 (2003).

M. Yu. Sharonov, A. B. Bykov, S. Owen, V. Petricevic, and R. R. Alfano, "Crystal Growth and Optical Properties of $\text{Cr}^{4+}:\text{Li}_2\text{TiGeO}_6$," *Journal of Applied Physics*, 93, 1044 (2003).

I. Zeylikovich, W. Wang, F. Zeng, J. Ali, B. L. Yu, V. Benischek, and R. R. Alfano, "Mid-IR Transmission Window for Corrosion Detection Beneath Paint," *Electronics Letters*, 39, 39 (2003).

B. L. Yu, A. B. Bykov, T. Qiu, P. P. Ho, R. R. Alfano, and N. Borelli, "Femtosecond Optical Kerr Shutter Using Lead Bismuth-Gallium Oxide Glass," *Optics Communications*, 215, 407 (2003).

S. K. Zhang, W. B. Wang, I. Shtau, F. Yun, L. He, H. Morkoc, X. Zhou, M. Tamargo, and R. R. Alfano, "Backilluminated GaN/AlGaIn Heterojunction Ultraviolet Photodetector with High Internal Gain," *Applied Physics Letters*, 81, 4862 (2002).

M. Xu, W. Cai, M. Lax, and R. R. Alfano, "Photon Migration in Turbid Media Using a Cumulant Approximation to Radiative Transfer," *Physical Review E*, 65 066609-1 (2002).

Patents

R. R. Alfano, and P. P. Ho, "Sub-Surface Imaging Under Paints and Coatings Using Early Light Spectroscopy," #6,495,833 B1 (December 17, 2002).

R. R. Alfano, and Cheng-Hui Liu, "Photon-Mediated Introduction of Biological Materials into Cells and/or Cellular Components," #6,346,101 (February 12, 2002).

\$6 Million NASA Grant for Optical Imaging Center at CCNY

The City College has received a \$6 million grant from the National Aeronautics and Space Administration to establish the Center for Optical Sensing and Imaging (COSI). The new NASA University Research Center will receive \$1.2 million annually over the next five years.

COSI brings together two major research programs at CCNY: the NASA IRA on Tunable Solid State Lasers and Optical Imaging, and the NASA PAIR on Remote Sensing and Environmental/Climate Studies.

The mission of COSI is to develop enabling optical technologies, laser instrumentation and methods for sensing and imaging of the Earth and the environment. It is also designed to recruit and train underrepresented minority students at the high school, undergraduate and graduate levels and encourage them to enter these important fields. COSI students will be involved in research programs that develop and use cutting edge instruments and data analysis techniques that bridge the gap

between science and engineering.

COSI's primary research goals will include:

- ◆ Developing optical techniques and sensors for atmospheric and ocean monitoring;
- ◆ Developing instruments and techniques for imaging targets and transmitting optical signals through clouds, fog, ice and rain;
- ◆ Developing broadly wavelength tunable lasers and highly efficient quantum well detectors for light detection and ranging instruments (LIDAR) and remote sensing applications;
- ◆ Studying optical sensing for research on vegetation, land cover and ocean water temperatures via satellite, aircraft and ground based remote and *in situ* instruments;
- ◆ Developing optical methods for sensing microorganisms in the environment.

Researchers at COSI will collaborate

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Dr. Melvin Lax

Memorial Program for Distinguished Professor Melvin Lax

Distinguished Professor of Physics Melvin Lax of The City College and The City University of New York died on December 8, 2002. He was 80. A member of the faculty since 1971, he taught and conducted theoretical research in condensed matter physics, and on lasers, coherence and fluctuations in classical and quantum systems, and nonlinear interactions of light and sound in solids.

A memorial program for Professor Lax will be held at City College on Friday, May 23 at 1:00 PM in the Marshak Science Building, Room J418N. All are welcome. For more information, contact Joan Meekins at (212) 650-6832.

Breakthrough by IUSL Alumnus

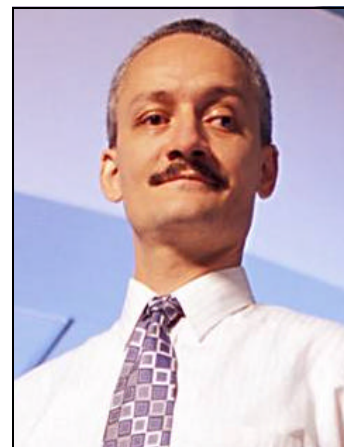
Dr. Peter J. Delfyett, Jr., a 1981 engineering graduate of CCNY who is a laser scientist at the University of Central Florida, has developed a clock that could rival the accuracy of atomic clocks that are many times larger. According to an article in "Science Times" of *The New York Times*, Dr. Delfyett's design "potentially could nestle on the head of a pin." Atomic clocks, on the other hand, range from shoebox-size (for use in satellites) to boxcar-size (for global timekeeping).

The heart of his optical clock is a standard inexpensive semiconductor laser like those used in CD-ROM drives and DVD players. "It's now at the point where companies could consider including it in real-world technologies," he said.

The technology he uses to transform the lasers into extremely sophisticated clocks came out of research on

improving fiber-optic communications, which use laser light to carry data.

Dr. Delfyett's Ph.D. thesis was supervised by Distinguished Professor of Science and Engineering Robert R. Alfano, Director of CCNY's IUSL. In 1997 he was among the recipients of the first annual Presidential Early Career Awards for Scientists and Engineers from President Clinton. Dr. Delfyett received the Black Engineer of the Year Award in 1993.



Dr. Peter J. Delfyett, Jr.

IUSL Presentations at SPIE Conference

IUSL researchers participated in the International Society for Optical Engineering's conference on Optical Tomography and Spectroscopy of Tissue V, held in San Jose, California, from January 25 - 31, 2003.

On January 26th, IUSL members M. Alrubaiee, S. K. Gayen, and R. R. Alfano, together with J. A. Koutcher of Memorial Sloan-Kettering Cancer Center, presented a paper on "Cancerous and Normal Human Tissues Investigated by Near-Infrared

Time-Resolved and Spectroscopic Imaging Techniques." The presentation was given by Mohammad Alrubaiee, an IUSL Ph.D. student.

On January 28th, W. Cai, M. Xu, and R. R. Alfano presented a paper entitled "Fast 3D Hybrid-Dual Fourier Tomography Using a Radiative Transfer Forward Model." In addition, Drs. Wei Cai and Alvin Katz of IUSL served as Session Chairs on January 26th and January 28th, respectively.

IUSL Ph.D. Student Published in *Optics Letters*

Xiaohui Ni, a Ph.D. student at the IUSL, is an author of the publication "Time-Resolved Polarization to Extract Coded Information from Early Ballistic and Snake signals Through Turbid Media," which was published in *Optics Letters*, 28, 343 (2003). The other authors are Qirong Xing, Dr. Wei Cai and Professor Robert R. Alfano of the IUSL.

The paper describes the use of time resolved polarization to extract coded information buried within the multiple scattering profiles from the early ballistic and snake components as they pass through turbid media. By polarization analysis the depolarized diffusive component and the natural light background are significantly reduced to enhance the signal-to-noise ratio of a coded pulse train. This procedure has the potential to improve optical wireless communication in cloudy environments.

Compact Photonic Explorers

Professor Robert R. Alfano delivered a paper on Compact Photonic Explorers at a conference held at the Infotonics Technology Center in Canandaigua, NY on May 6-7.

He offered an overview of the CPE project, which involves the development of smart spectroscopic diagnostic devices that are capable of detecting spectral signatures and images in the human body. The devices may have significant industrial applications as well.

"CPE technology has the potential to offer doctors a potent tool in non-invasive diagnosis," he said.

NASA Grant *Continued from page 1*

closely with scientists at other NASA Centers, including the Goddard Institute for Space Studies, the Langley Research Center, the Glenn Research Center and the Goddard Space Flight Center.

Dr. Robert R. Alfano, Distinguished Professor of Science and Engineering, is Director of COSI. Dr. Samir Ahmed, Herbert Kayser Professor of Electrical Engineering, is Deputy Director.