

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

Publications

B.L. Yu, F. Zeng, Q. Xing, R.R. Alfano, "Probing Dielectric Relaxation Properties of Liquid CS₂ With Terahertz Time-Domain Spectroscopy," *Applied Physics Letters*, June 30, 2003.

S.K. Zhang, W.B. Wang, F. Yun, L. He, H. Morkoc, X. Zhou, M. Tamargo, R.R. Alfano, "Back-illuminated Ultraviolet Photo-detector Based on GaN/AlGaIn Multiple Quantum Wells," *Applied Physics Letters*, 81, 4628 (2002)

Yuanlong Yang, Edward J. Celmer, Jason A. Koutcher, R.R. Alfano, "DNA and Protein Changes Caused by Disease in Human Breast Tissues Probed by the Kubelka-Munk Spectral Function," *Photochemistry and Photobiology*, 75, 627-632 (2002).

Tapan K. Gayen, A. Katz, Y. Budansky, J.M. Evans, S. Yu, H.E. Savage, S.A. McCormick, R.R. Alfano, "Near-Infrared Welding of Aorta and Skin Tissues Using a Cr⁴⁺:YAG Laser," *Lasers in Surgery: Advanced Characterization, Therapeutics, and Systems XII*, Kenneth E. Bartels, et al., Editors. *Proc. of SPIE* 4609, 212 (2002).

W. Cai, M. Xu, M. Lax, R.R. Alfano, "Diffusion Coefficient Depends on Time, not on Absorption," *Optics Letters*, 27, 731 (2002).

A. Katz, T.K. Gayen, G. Minko, A. Alimova, H.E. Savage, S.A. McCormick, R.R. Alfano, "Noninvasive Fluorescence and Raman Spectroscopic Analysis of Laser Welded Aorta and Skin Tissue," *Optical Biopsy IV*, *Proceedings of SPIE* 4613, 48 (2002).

Yingxin Bai, P.P. Ho, R.R. Alfano, "Intensity-dependent Temporal Laser Pulse Shaping and Propagation in ZnSe," *Optics Communications*, 202, 199-204, (2002).

A. Katz, H.E. Savage, S.P. Schantz, S.A. McCormick, R.R. Alfano, "Noninvasive Native Fluorescence Imaging of Head and Neck Tumors," *Technology in Cancer Research and Treatment*, 1,9, Adenine Press (2002).

Memorial Program in Honor of Melvin Lax

Distinguished Professor of Physics Melvin Lax, a member of the City College faculty since 1971, died last December at the age of 80. On May 23, 2003 a memorial program was held in the Marshak Science Building to honor his memory and celebrate his achievements. Among the speakers were City College President Gregory H. Williams and Distinguished Professor Joseph L. Birman of the Physics Department. The Guest Lecturer was Dr. John J. Hopfield, the Howard A. Prior Professor of the Life Sciences at Princeton University. His topic was "A Physics View of How Brains Work."

Dr. Lax taught and conducted theoretical research in condensed matter physics, as well as on lasers, coherence and fluctuations in classical and quantum systems, and on nonlinear interactions of light and sound in solids. He was renowned as a pioneer in quantum optics, and his research findings underlie many aspects of the design of modern optical communication devices. He won the Willis Lamb Medal of the American Optical Society in 1999 for his work in Quantum Optics.



L to R: Dr. Saul Dursht, Prof. Joseph Birman, Mrs. Judith Lax, Prof. Joan Birman, Dr. Etbel Dursht, and Dr. John Hopfield.

More recently, with Distinguished Professor Robert R. Alfano, Director of the IUSL, he was studying the scattering and transmission of laser light through "turbid" media such as human tissue. One of the objectives of this work is to devise non-invasive optical diagnostic tools for breast cancer.

As an undergraduate at New York University, where he received his bachelor's degree *summa cum laude* in 1942, he was a Charles Hayden scholar. He earned his M.S. and Ph.D. degrees at MIT and conducted research at MIT's underwater sound laboratory. Dr. Lax went on to become Professor of Physics at Syracuse University, and later

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Stuyvesant Students Excel

Stuyvesant High School senior Aleksander Chechkin (holding oversized check at right) was a semifinalist in the prestigious 62nd Annual Intel Science Talent Search. The award was for original research Mr. Chechkin conducted at the CAT/IUSL at The City College. He is pictured with 18 of the 19 semifinalists from Stuyvesant, the high school with the most semifinalists.

See complete story on page 2.

Science Talent Search

Stuyvesant High School student Aleksander Chechkin was a semifinalist in the 62nd Annual Intel Science Talent Search (STS). The prestigious award is based upon original research Mr. Chechkin conducted at the Center for Advanced Technology/Institute for Ultrafast Spectroscopy and Lasers (CAT/IUSL) at The City College.

His paper, "Internal Rotational Spectrum of the Tryptophan Molecule Using Laser Terahertz Pulse Spectroscopy," reports the first known observation of seven rotational-rocking levels for the molecule.

Mr. Chechkin expressed his appreciation to Distinguished Professor of Science and Engineering Robert R. Alfano, Director of the CAT/IUSL, along with CAT researchers Baolong Yu and Massood Siddique for their assistance on his project.

"We are extremely proud of Mr. Chechkin's accomplishment," Dr. Alfano said. "It reflects both the high level

of research at CAT/IUSL and our outreach to students in New York City's high schools in order to enhance and strengthen science and mathematics programs." Mr. Chechkin will be attending Caltech in the fall.

The Intel STS recognizes America's brightest students and their schools for excellence in science and mathematics. Students were judged on their individual research ability, scientific originality and creative thinking. All Intel STS entries were reviewed by a distinguished panel of scientists from a variety of disciplines. Dr. Andrew Yeager of the University of Pittsburgh School of Medicine was the judging Chairman.

Each of the semifinalists received \$1,000 in recognition of their scientific achievements while their schools received \$1,000 per semifinalist to support their science and math programs. Intel awarded a total of \$600,000 to 300 semifinalists, all high school seniors, who were selected from 1,581 applicants from 47 states, the Virgin Islands and Washington, D.C.

New York City's Stuyvesant High School had the most semi-finalists with 19.

Enhancing Telecommunications Applications

An IUSL research project at CCNY, directed by Dr. Alexey Bykov, seeks to develop a series of new solid state laser materials based on tetravalent chromium (Cr^{4+}) as the laser active ion in various low field dielectric crystal hosts, and to study their spectroscopic and laser properties in the 1000-1600 nm region. Entitled "Synthesis and Crystal Growth of Materials for Near Infrared Laser Applications," the effort is directed on Cr^{4+} glass and glass-ceramics preparation and offers the potential to develop new materials for enhanced telecommunication applications.

The research is focused on synthe-

sis and crystal growth of silicates and germinates which belong to the olivine structure family. A major accomplishment was the development of a new laser, $\text{Cr}^{4+}:\text{Ca}_2\text{GeO}_4$, named CUNY-ITE, which is tunable in the 1,300-1,500 nm wavelength range. The crystals of $\text{Cr}^{4+}:\text{Ca}_2\text{GeO}_4$ were grown by the Czochralski technique using newly acquired crystal growth apparatus with a computer controlled diameter control system. In an effort to extend tunability and increase the efficiency of CUNYITE, spectroscopy properties $\text{Cr}^{4+}:\text{Ca}_2\text{GeO}_4$ co-doped with rare earth elements, Yb and Er, are being studied.

Penetrating the Fog of Battle

IUSL researchers are exploring the development of optical imaging methods for military applications under simulated battlefield conditions such as smoke, fog and underwater via ultrafast lasers and streak camera detection schemes. They are also exploring laser wireless optical com-

munication using a pulse coded data stream through free-space as well as turbid media. Entitled "Optical Imaging through Scattering Media for Military Targets," the project is being conducted by Xiaohui Ni, Dr. Manuel E. Zevallos, Dr. Wei Cai, Qirong Xing and Dr. Bidyut Das.

Lax Memorial *Continued from page 1*

joined Bell Telephone Laboratories, where he headed the theoretical physics research department from 1962-64.

He was a member of the National Academy of Sciences and a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science and the American Physical Society.

In his remarks at the memorial program, City College President Gregory H. Williams said of Professor Lax: "His groundbreaking research and scholarship were complemented by his excellence as a teacher. He was known for being generous with his time to his students, who remember him with warmth, affection and gratitude. During the past three decades he played a major role in bringing the City College physics department national and international recognition. Melvin Lax will be missed as an outstanding teacher and scholar, and as a kind and caring human being. On behalf of The City College Community, I wish to extend my sympathy to his family, friends and colleagues."