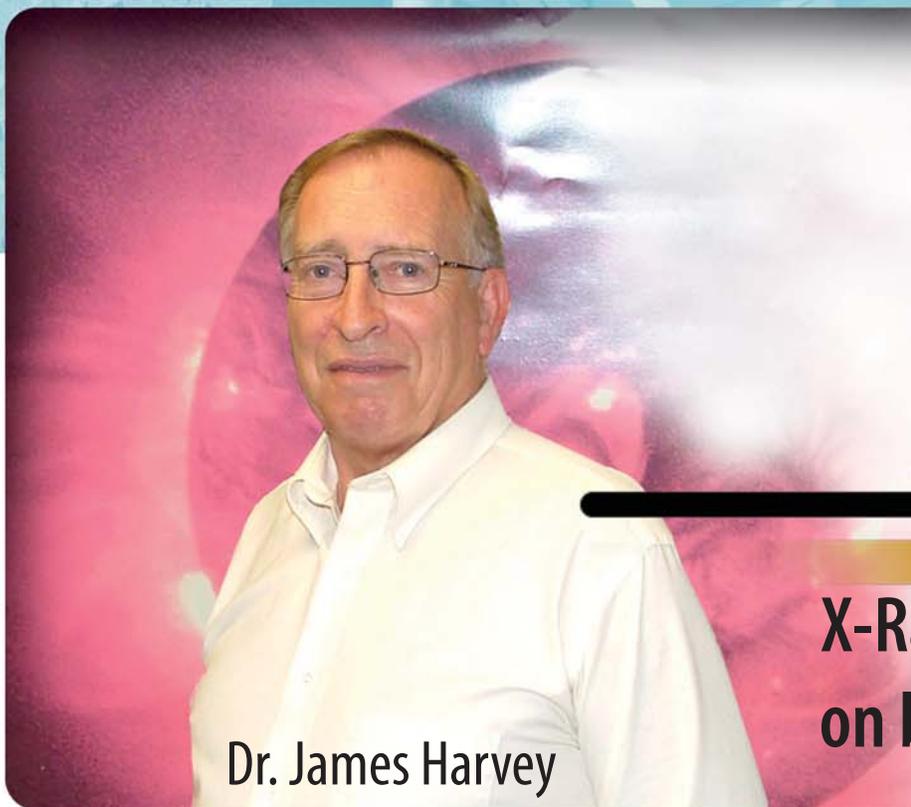


Highlights

Academics • Research • Partnerships



Dr. James Harvey

James Harvey, Associate Professor of Optics, and three graduate students played a major role in the design and analysis of the Solar X-ray Imager (SXI) on board the GOES-N satellite that launched Wednesday, May 24, 2006, from Cape Canaveral Air Force Station.

Two GOES (Geostationary Operational Environmental Satellites) weather satellites are continually stationed in geosynchronous orbits approximately 22,300 miles above the earth's surface. The GOES N-P series of satellites is the next

generation of weather satellites, which will provide NASA and the National Oceanic and Atmospheric Administration (NOAA) with improved capability for monitoring the atmospheric "triggers" for severe weather conditions such as tornadoes, flash floods, hailstorms and hurricanes.

The new SXI instrument on board the GOES-N satellite is an X-ray telescope that will also allow NOAA to monitor and predict "space weather", by producing full solar disc images of the sun at X-ray wavelengths. Space weather is the result

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X-Ray Imager Launched on board NASA Satellite

of solar activity such as sunspots, solar flares and coronal mass ejections—the expulsion of high-energy charged particles from the sun. This space weather can disrupt cell phone and global positioning system (GPS) service, cause blackouts, and damage or destroy instruments on multimillion-dollar communications or military surveillance satellites. The high-energy charged particles can also constitute a health hazard for astronauts on the International Space Station.

Please see **HARVEY**, page 4



Dean's Corner

I recently returned from CLEO where we held a 20th Anniversary CREOL Reunion. OSA helped find a

wonderful venue in the Long Beach Hyatt overlooking the bay. We had wine, food, and best of all our alumni and several of our Industrial Affiliates. Our founding director, MJ Soileau, was there along with many people I hadn't seen for years. I personally had a fantastic time seeing everyone. We took with us a picture history that many people signed, but I suggested then for everyone to send us their photos so we can have a more complete photo history of creol through the years – so please send us a copy of your old (or new) photos!

There is a new look of the campus around the CREOL building. I'm looking out my window at some new landscaping that includes 15' palm trees planted in front of and around our building (but I'm a bit worried that they will hide our wonderful sculptured artificial rainbow!). You can see some of the new landscaping at <http://www.optics.ucf.edu/about/NewsDetail.asp?NewsID=108>. When I walk to our second floor balcony, I see the foundation and much of the concrete structural elements to our building addition nearly complete, but it won't be ready for occupancy until ~Dec 1. And, you can now enter the building from the front door! (for a while that became difficult with all the construction). The place looked quite good on Affiliates' Day on April 21. And those who were able to join us for our annual "Spring Thing" at MJ Soileau's house on Lake Jessup had a great time with the various victuals and libations – pig-gator-chicken-sausage – and music by The Quantum Beats. It was great FUN! Be sure to put the Friday

and Saturday after Easter next year on your calendar – 13 and 14 April – for IA Day and Spring Thing 2007.

Research is going well, students are finding good jobs, and funding is doing well. The government recently announced the latest round of MURI's (Multi-disciplinary University Research Initiatives) and UCF received >10% of all those awarded in the US (tied with Caltech for the most awards)! Two of them were in CREOL, one with Martin Richardson and one with me, David Hagan and Pieter Kik. These are in addition to the current MURI run by Martin Richardson and one that just ended its 5-year term headed by



OSA President, Eric VanStryland presents Senator Christopher Bond of Missouri with "Champion of Optics" recognition.

George Stegeman on "Solitonic Gateless Computing". Also, Martin Richardson and I are involved with two other MURI's led at other universities. MURI's run at ~\$1M per year for up to 5 years. The research topics covered by the UCF MURI's are "Ultrafast Laser Interaction Processes For LIBS and Other Sensing Technologies" (UCF - MR), "Ultrafast Switching for Optical Imaging" (UCF - EVS), and for the MURI's led by other universities: "Negative Index Materials" (EVS) and "High Power Fiber Lasers" (MR). Martin Richardson has also been awarded \$674,000 for X-Ray Optics Technology from the Department of Energy; and Glenn Boreman of CREOL

and Dr. Kevin Coffey of AMPAC are receiving a \$309,600 award from the Defense University Research Instrumentation Program (DURIP), which supports the purchase of research instrumentation.

These are just some of the most recent CREOL and FPCE awards with >\$16M per year of support from government and industry. We thank ALL of our benefactors. And we have received considerable philanthropic support for our building addition, which gets matched 1-to-1 by the State. This totals so far to \$184,350, which includes \$30,150 from CREOL faculty and staff donations. This greatly helps create the state-of-the-art facilities needed for our student's research and education. THANKS! And if you would like to be a contributor to our facilities program, please contact us or go to our website at <http://www.optics.ucf.edu/about/NewBuilding.htm>.

In addition we keep our alumni and affiliates informed by publishing this Highlights along with our monthly e-Highlights. We also want your feedback on the usefulness of these publications. And if you want to see issues of Highlights from the early days... go to <http://www.optics.ucf.edu/about/highlights/>, where you can see, for example, Jim Pearson in the first issue; Winter 1990, page 5!

We were pleased to be the "host" College for a visit to UCF from Florida Governor Jeb Bush on May 30. You can read more about this on page 6 of this issue. Florida, and particularly Central Florida, is where great things are happening! Which is just one reason why UCF says, "UCF Stands for Opportunity".

Finally let me just mention the fun I am having as President of the OSA this year. I recently went to the OSA

Please see DEAN'S CORNER, page 5

Affiliates Day 2006

This year our annual Industrial Affiliates Day event was held April 21, as usual at the end of the week of SPIE's Defense and Security Symposium in Orlando. Although titled "Industrial Affiliates Day", the entire optics and photonics community is invited and welcomed to join us for this full day of presentations, lab tours, and posters designed to highlight some new and exciting developments in optics and photonics and showcase the research at CREOL & FPCE, The College of Optics & Photonics. This year, over 250 registrants participated, from Affiliates member companies, other companies, special invited guests, and UCF.

This year's program theme was "Optics & Photonics for Space-Based and Medical Applications", and was also the opportunity to begin the celebration of the 20th anniversary of the founding of CREOL. As part of this celebration, Dr. MJ Soileau, Founding Director of CREOL and now the Vice-President for Research at UCF, and Dr. Eric Van Stryland, Dean of CREOL & FPCE, The College of Optics and Photonics, gave a tag-team talk on the genesis and early days of CREOL leading up to its current international status. The presentation and some great pictures of the early days can be viewed, along with the presentations outlined below, at <http://www.optics.ucf.edu/people/affiliates/AffiliatesDay2006/>.

Dr. Philip Stahl, Sr. Optical Physicist at the NASA Marshall Space Flight Center, led off the invited talk portion of the technical program with a presentation on "Optical Technology Needs for Future Space Telescopes" that outlined some of NASA's plans for space-borne science telescopes and some of the technology challenges in their design and fabrication.

Dr. James Harvey, Associate Professor of Optics & ECE at The College of Optics and Photonics, gave an interesting talk on "Solar Physics, Space Weather, and Wide-field X-ray

Telescopes" in which he briefly reviewed some aspects of solar physics and space weather as background for a discussion of a new class of wide-field grazing incidence X-ray telescopes developed at CREOL specifically for the Solar X-Ray Imager (SXI) that was launched on the NOAA GOES-N satellite (see Cover).

The medical applications topic was introduced with a presentation by Dr. Watt Webb, Samuel B. Eckert Professor in Engineering; Prof of Applied Physics and Dir. of Developmental Resource for Biophysical Imaging Opto-electronics at Cornell University. Dr. Webb gave an enlightening presentation: "Ultrafast Nonlinear Optical Microscopy Illuminates the Biophysics of Life".

The morning technical sessions concluded with a talk by Dr. Jannick Rolland, Assoc. Professor of Optics, at The College of Optics and Photonics, on her research on "In Situ 3D Visualization with Deployable and Head-worn Displays".

The final invited talk led off the afternoon program, and was given by Dr. Kevin Belfield, Chair, UCF Chemistry Dept, who spoke on "Multiphoton Biomedical Imaging and Photodynamic Therapy: Agents & Applications".

Following the invited presentations, the afternoon program provided an opportunity to learn about the research activities at CREOL & FPCE, The College of Optics & Photonics and tour the facilities in the CREOL building. Eric Van Stryland, Dean of the College, provided an overview of all the research at the College, and Erwan Baleine, winner of the CREOL Student of the Year Award and a graduate student working with Dr. Aristide

Dogariu, gave a presentation on his research entitled "Variable coherence scattering microscopy". The afternoon was rounded out by graduate student research poster presentations, and tours of the laboratory facilities, expertly organized as usual by the CREOL Association of Optics Students - CAOS. Fifteen Industrial Affiliates had tabletop

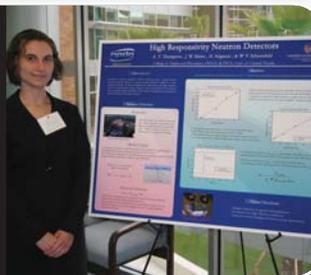
Erwan Baleine

STUDENT OF THE YEAR 2006



Amy Thompson

1st Place Poster Presentation.



exhibits of their company's products.

The day concluded with a reception and the presentation of the Best Poster award going to Amy Thompson, a student of Dr. Winston Schoenfeld, for her poster on "High Responsivity GaAs Neutron Detectors."

Those who have attended previous Industrial Affiliates Day events know that, as enjoyable as IA Day is, the next-day's event is also a must-attend:

The Spring Thing, hosted by MJ and Cheryl Soileau at their home on Lake Jesup that they have dubbed "Soggy Acres". For those who missed either of these great events, be sure to get IA

Please see AFFILIATES DAY, page 4

AFFILIATES DAY from pg. 3

Day 2007 and The Spring Thing on your calendar for next April 13 and 14! The festivities included great food, great fellowship, and other fun activities including:

- Grain products (solid and liquid!) and Cajun Cuisine cooked in grand style by Cajun Master Chefs: Gator, Pig, Chicken (tastes just like gator), miscellaneous good (and some healthy) stuff

- Eating, drinking and being merry!

- Band Music provided by the Quantum Beats, aka Peter Delfyett, Glenn Boreman, and Jim Ross.

- Gator stalking on Lake Jesup (led by Capt. Soileau in his cruising craft)

- See the pictures via links from <http://www.optics.ucf.edu/people/affiliates/AffiliatesDay2006/>



IA Day Morning Session



Dr. Winston Schoenfeld conducts lab presentation for IA Day

HARVEY from Cover

Harvey and former student Patrick Thompson, developed a new family of high resolution, wide-angle, grazing incidence X-ray telescope designs which are capable of producing an 80% increase (over the Wolter Type I NASA/NOAA baseline design) in the number of spatial resolution elements on the solar disc. This alternative optical design, developed while working on a subcontract from the Lockheed Martin Solar and Astrophysical Laboratory (LMSAL), was adopted by NOAA in December of 1998.

Four flight models and a spare of the precision X-ray mirrors were fabricated to the Harvey-Thompson optical design by Goodrich Optical and Space Systems, Inc. in Danbury, CT, and integrated into the SXI telescopes by LMSAL (prime contractor for the SXI instrument) in Palo Alto, CA. Professor Harvey and graduate students Martina Atanassova and Andrey Krywonos continued to provide technical support to LMSAL in the area of detailed image analysis as each mirror was being fabricated. This analysis included the effects of diffraction, geometrical aberrations, optical fabrication errors (both figure errors and surface scatter effects), and the mosaic detector array.

Thompson and Atanassova both did their PhD research on the SXI project. Thompson is now working at Johns Hopkins University's Applied Physics Laboratory. Atanassova is completing her post-doctoral work in Belgium.

The GOES-N satellite has been ready for about a year, but the launch was delayed several times. Happily the launch on a Boeing Delta IV Rocket on May 24th was a huge success.

Contributors: James Harvey and Zeniada Gonzalez Katala, UCF News and Information



Spring Thing: "PIGasus", roast pork being prepared



Spring Thing: The Quantum Beats



Spring Thing: Departing for a boat ride.

Research Focus: Florencio E. Hernández



Hernández

Professor Florencio E. Hernández, Assistant Professor of Optics and Chemistry, has recently developed a truly non-invasive glucose sensor that can detect glucose levels in blood by monitoring its concentration in tears using gold nanoparticles. This novel, simple and inexpensive optical method is sensitive enough to detect low glucose concentration in healthy patients. Professor Hernández sees this breakthrough method as a tool for researchers and patients.

Diabetes is a disease defined as a condition caused when the body is unable to use insulin to process the glucose (sugar) in blood. Therefore, the level of glucose in blood is too high for normal health functioning. This condition affects heart, kidneys,

Non-Invasive Glucose Sensor by use of Gold Nanoparticles

nerves, eyes, etc. An estimated 20.8 million people in the United States (7 percent of the population) have diabetes, a serious, lifelong condition. This disease represents the sixth-leading cause of death in USA. At an early stage, prevention of diabetes-related complications can be accomplished through tight control of glucose levels in the blood. At present, people monitor their glucose concentration by blood sampling on a daily basis: by finger pricking with a lancet or needle. This is a painful methodology that many patients don't want to practice frequently. The lack of a highly sensitive, non-invasive glucose sensor has motivated the scientific community to combine efforts to fill the existent gap in this field. In the last decades many different glucose sensors have been developed based on near infrared spectroscopy, optical rotation, colorimetric and fluorescence detection; however, none of them are really non-invasive.

Combining knowledge in chemistry and nanoscience, Hernández has developed a truly non invasive glucose

sensor. Based on the Tollen's test, he generates gold nanospheres in solution using glucose. The number of gold nanospheres generated in solution increases directly proportional with the glucose concentration. Therefore, the higher the glucose concentration, the higher the number of nanoparticles generated, thus the higher the extinction efficiency of the solution. The linear dependence of the extinction efficiency of the gold nanoparticles solution with glucose concentration makes of this new sensor suitable for direct applications in biomedical sensing. Hernández measures the absorbance spectrum with a small USB-2000 UV-vis spectrometer from Ocean Optics. The high sensitivity and selectivity of this method make of this glucose sensor reliable and suitable for direct application in the biomedical field. Perhaps, it could be included in a new field named nanomedicine.

The next step in Professor Hernández's research is to do experiments directly with rats and then with humans.

DEAN'S CORNER from pg. 2

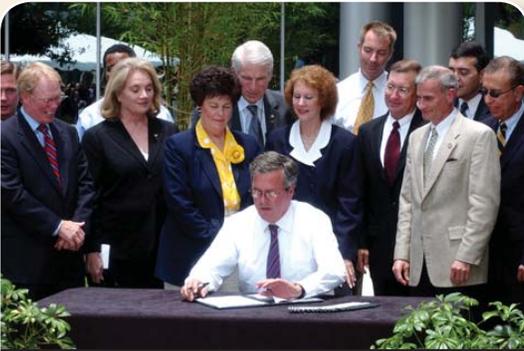
Leadership conference. Upon arriving I was whisked away to the capital in a limousine to meet Senator Christopher "Kit" Bond of Missouri, and presented him with the honor of being named a "Champion of Optics" (see photo). He, along with Congressman Bill Shuster of Pennsylvania, were instrumental in including language in a transportation bill to expand the definition of Intelligent Transportation Systems to include photonics.

It was also great fun to present our own Guifang Li, along with several other

researchers, with their Fellow of the OSA plaques at OFC/NFOEC in March. These activities, along with my duties as chairman of the Board, are really very rewarding. And it is an honor to work with Elizabeth Rogan and her very capable staff at OSA. You will notice on the back page of this issue that OSA is also now one of our Industrial Affiliates. Welcome!

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Governor Jeb Bush, accompanied by Lt. Gov. Jennings and UCF President John Hitt, signs the bill that will create the UCF College of Medicine and continue funding for Centers of Excellence.

Governor Signs Bill to Create Medical Schools and Continue Centers of Excellence

Gov. Jeb Bush signed into law a bill officially establishing the UCF College of Medicine during a ceremony Tuesday outside the UCF College of Optics and Photonics.

Flanked by Lt. Gov. Toni Jennings,

several state legislators and UCF President John Hitt, Gov. Bush signed several economic development bills, including the 21st Century Technology, Research, and Scholarship Enhancement Act, which continues the state's Centers of Excellence Program. The Florida Photonics Center of Excellence at UCF was established in 2003 with a \$10 million grant through this program.

The Florida Photonics Center of Excellence advances research and

graduate education in photonics, optics and lasers and partners with industry, government and economic development organizations to attract and retain photonics companies. The state's investment in the center has already generated more than \$35 million in federal and private grants and state funds and resulted in 14 patents and 31 new employees at UCF and partner companies.

Contributors: Tom Evelyn and Chad Binette

Celebrating 20 years of Creating the Future Alumni Reunion CLEO/QELS 2006

Long Beach Hyatt
Beacon Rotunda



See More Photos: <http://www.creol.ucf.edu/about/CREOL20th.htm>

Awards and Honors:

Faculty

Congratulations to **Stephen Kuebler**. In January he was honored with the "Outstanding Four Year College Teacher Award for 2005" by the Orlando Section of the American Chemical Society

Congratulations to **Dr. Eric Johnson**, Associate Professor of Optics and ECE, elected Fellow of SPIE.

Congratulations to **Aravinda Kar** who has been elected to the Board of Directors of the Laser Institute of America, LIA starting in 2006.

Congratulations to **Guifang Li** for election to Fellow of the OSA! He is being honored for "seminal contributions to all-optical clock recovery, all-optical regeneration, advanced modulation formats for optical transmission and RF photonics".

MURI Awards

Dr. Eric Van Stryland as Principle Investigator, with Dr. David Hagan and Dr. Pieter Kik as co-PIs, will study "Ultrafast Switching for

Optical Imaging". Other institutions participating with CREOL as the lead are Georgia Institute of Technology, Purdue University, and University of Arizona.

Dr. Martin Richardson as Principle Investigator will study "Ultrafast Laser Interaction Processes For LIBS and Other Sensing Technologies". Other institutions participating with CREOL as the lead are University of Nebraska, Lincoln; University of California, Berkeley; Johns Hopkins University; and Florida A&M University.

Students

Erwan Baleine, CREOL Student of the Year. Erwan advised by Professor Aristide Dogariu.

Konstantinos Makris was awarded an SPIE Educational Scholarship for 2006. Konstantinos works with Professor Demetrios Christodoulides.

Costin E. Curatu who has been Awarded the 2006 William H. Price Scholarship in Optical Engineering by the SPIE. Costin works with Professor Jannick Rolland.

- Dr. Guifang Li: "High-speed Signal Acquisition Systems"

The UCF Presidential Major Equipment Awards are an initiative of UCF President John Hitt with an annual budget of \$1,000,000 in matching funds for the purchase or upgrade of major equipment to enhance UCF's research capacity that will further two of the University's major goals, namely: (1) Achieve international prominence in key programs of graduate study and research; and (2) Be America's leading partnership university. The program provides matching cash funding, that when combined with other cash funding, will enable the purchase of major equipment for federal research equipment initiatives, such as the DURIP or CAREER program, for startup packages for new faculty for laboratory equipment, or for major equipment costing over \$50,000.

COP Receives Presidential Major Equipment Awards

Congratulations to four COP faculty members who have recently received a combined total of \$238,449 from the UCF Presidential Initiative to Fund Major Equipment:

- Dr. Winston Schoenfeld: "Dual Chamber MBE System for Advanced Growth of Wide Band Gap Oxide/Nitride Compounds"
- Dr. Dennis Deppe: "Electrochemical Profiling Systems of Precise Analysis of Charge Carrier Densities in Semiconductor Optoelectronic Devices"
- Dr. Pieter Kik: "High Speed Variable Temperature Photoluminescence Setup"

Spring 2006 Graduates

Mads Demenikov
MS Optics Non-Thesis

Amitabh Ghoshal
MS Optics Non-Thesis

Yigit Yilmaz
MS Optics Non-Thesis

Max Obando
MS Optics Non-Thesis

Tarik McMillian
MS Physics Non-Thesis

Chiew Seng Koay, Optics Ph.D.
Advisor: M. Richardson

Jeremy D. Ellis, Optics Ph.D.
Advisor: Dogariu

Hakob Sarkissian, Optics Ph.D.
Advisor: Zeldovich

Yung-Hsun Wu, Optics Ph.D.
Advisor: S.T. Wu

Chien-Hui Wen, Optics Ph.D.
Advisor: S.T. Wu

Yi-Hsin Lin, Optics Ph.D.
Advisor: S.T. Wu

Kyungbum Kim, Optics Ph.D.
Advisor: Delfyett

Mahesh Pitchumani, Optics Ph.D.
Advisor: Johnson

Robert Stegeman, Optics Ph.D.
Advisors: Delfyett/Stegeman

Anne Janet Milliez, Optics Ph.D.
Advisor: Bass

Zhaoxu Tian, MMAE Ph.D.
Advisor: Kar

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Industrial Affiliates

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Cobb Family Foundation
Dr. Arthur H. Guenther
Northrop Grumman Corporation

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Tektronix

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Hewlett Packard Company
HORIBA Jobin Yvon
Laser Institute of America
LaserPath Technologies
New Focus
Ocean Design, Inc.
Optical Society of America 

Optronic Laboratories, Inc
Photonics Online 
Photonics Spectra
Raydiance, Inc. 
Ray Williamson Consulting 
Rini Technologies
Rorze Systems Corporation
Siskiyou Corporation
SPIE- The Int'l Society for Optical
Engineering
Spiricon
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Trinity Technologies
TwinStar Optics, Coatings & Crystals
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Jim Pearson 407-823-6858

Diana Randall 407-823-6834