

SCIENCE AND TECHNOLOGY

VOLUME 3, SUMMER 2010

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Science and Technology Newsletter

Summer 2010

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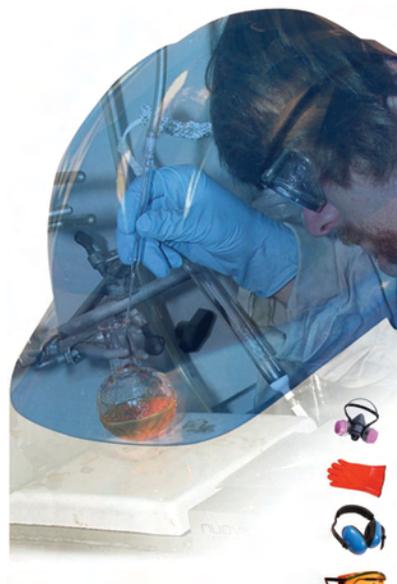
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FRONT: A student exhibits good work habits by wearing the appropriate personal protection equipment for the task at hand.

Source: NAWCWD Photo Lab

NAVAIR Science and Technology (S&T) Newsletters are published to provide unclassified technical information that pertains to chemistry, life sciences, physics, and technical communication. This newsletter also intends to inform the NAWCWD S&T community about updates, professional development opportunities, and technology highlights.

The contents are not necessarily the official views of or are endorsed by the U.S. Government, the Department of Defense, or the United States Navy.

Please direct article submissions and subscription requests to

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“We are committed to improving the transfer of S&T into Warfighting capabilities.”

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WEB ACCESS

All issues of the Science and Technology Newsletter are available online.

- Public NAWCWD website:
www.navair.navy.mil/nawcwd/nawcwd/employment/high_tech_jobs/research.htm
- Internal SciTech website (for Navy Marine Corps Intranet (NMCI) users only):
<https://mynavair.navair.navy.mil/scitech>

Follow us real-time on Twitter www.twitter.com/NAWCWD_SciTech and get updates via SMS by texting **follow NAWCWD_SciTech to 40404** in the U.S.

EMPLOYEE NEWS

WHAT'S NEW?

In July 2010, Mr. Scott O'Neil, the Executive Director and Director for Research and Engineering at NAVAIR Naval Air Warfare Center Weapons Division (NAWCWD), China Lake, California, announced a new structure offering increased awards for each step of the patent process.

Patent protection offers several benefits:

- Legal rights for military to use our products
- More resources to develop new technologies for our Warfighters
- Reduced burden for taxpayers
- Direct financial returns for inventor and NAWCWD
- Recognition to the inventors

For more details about the patent process, call 760.939.8423.



*Dr. Robin Nissan, Research Director,
Research and Intelligence Department,
welcomes new hires.*

Source: NAWCWD Photo Lab

WELCOME ABOARD

William Lai, Ph.D.

Lai is a Research Chemist working in the Chemistry Branch (4L4200D). Lai previously studied at the University of Michigan serving as a Postdoctoral Fellow before transitioning into his civil service position.



Anthony Ochoa

Ochoa is a Student Temporary Employment Program (STEP) participant currently working in the Chemistry Branch (4L4200D). Ochoa will be attending California State University Monterey Bay in the fall.

Emily Roncase

Roncase is a STEP participant currently working in the Chemistry Branch (4L4200D).

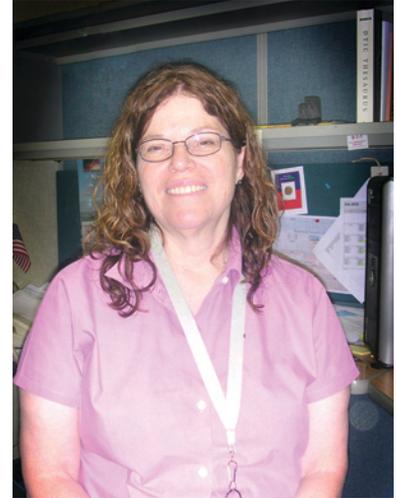
LINDA ROBINETT RETIRES

After 32 years of federal service, Linda Robinett (4L61000D) is retiring on 2 September 2010.

In 1978, Robinett first worked as a front desk clerk at the Bachelor Officers' Quarters (BOQ) for Naval Air Station, Pacific Missile Test Center. Later, her career progressed into technical positions (Cobol programmer, systems analyst, computer specialist) for the various incarnations of the Information Technology Department at NAWCWD, Point Mugu, California.

Today, Robinett serves as a Librarian at the NAWCWD Scientific and Technical Library, China Lake, California. She has worked in the library since 1998.

"My most memorable moment at China Lake is receiving an e-mail from someone describing himself as being on a ship in the Gulf (my sane mind saying the Gulf of Mexico), and sending him the document he wanted and finding out he was in the Persian Gulf," said Robinett.



Robinett is a native Californian. She graduated from Antelope Valley High School, where she enjoyed the rivalry with Burroughs High School Golden League football and basketball teams. Later, she attended Antelope Valley Community College and University of Redlands. She continued her studies, earning a M.L.S. from San Jose State University and an M.S. in Systems Management from the University of Southern California.

"I plan on doing nothing for awhile then increasing my exercise, volunteer work, and taking up home brewing," said Robinett. Her hobbies also include the Society for Creative Anachronism and science fiction.

"The important thing in science is not so much to obtain new facts as to discover new ways of thinking about them."

- Sir William Bragg

LABORATORY SAFETY

At NAVAIR, we believe that safety is paramount. It is our responsibility to consistently demonstrate good laboratory safety practices. Here are few tips that can help you prevent laboratory accidents.

Laboratory Safety Tips:

1. Personal Protective Equipment (PPE)

(29 CFR 1910.132)

- ✓ Use appropriate PPE designed for the specific hazard and task you are facing.
- ✓ Wear your PPE whenever you are exposed to the hazards for which it is designed.
- ✓ Check your PPE for wear and tear after every use. Replace it when it is damaged.

2. Housekeeping—A clean lab is essential to protect yourself and others!

(29 CFR 1910.1450 and 29 CFR 1910.22)

- ✓ Keep only the glassware and chemicals you need. Keeping a clean laboratory not only is more efficient, it is safer.
- ✓ Clean all minor spills promptly. Be sure to use approved methods.
- ✓ Clean all glassware promptly. Clutter in or near the sinks invites accidents.

3. Emergency Eyewashes/Showers

(29 CFR 1910.1450)

- ✓ Check and document eyewashes weekly.
- ✓ Check and document showers monthly.
- ✓ Keep emergency eyewash stations clean and free from clutter (e.g., chemicals and glassware).

This information was provided by Morgan Ramirez who serves as the 4L Safety Coordinator and the NAWS Confined Space Program Manager. She spends 75% of her workday in the field visiting customers and providing support.



Personal protective equipment should be worn for safety purposes.

Source: NAWCWD TCO

This support includes, but is not limited to, the following activities:

- ✓ Conducting ergonomic evaluations
- ✓ Providing Operational Risk Management (ORM) assistance
- ✓ Training and consulting
- ✓ Inspecting buildings
- ✓ Assessing safety programs
- ✓ Briefing new employees about the safety policies aboard China Lake and within codes
- ✓ Providing guidance to the supervisors and employees on how to improve workplace safety

Mrs. Ramirez is also responsible for walking through workspaces to observe HAZMAT, machine guarding, PPE, cleanliness, adherence to safety standards, and general laboratory safety.

NAWCWD 4L personnel may direct laboratory safety questions and concerns to

760.939.0964 or 760.939.2315

All other NAWCWD personnel questions may be directed to

760.939.3067 or 760.939.0274

PEDESTRIAN SAFETY AT AIRFIELDS

All personnel should be extremely careful when entering the fence line at the airfield terminal. This is an active portion of the airfield. Here are a few safety tips to keep in mind:

- Aircraft and vehicles have the right-of-way; never walk in front of a moving aircraft or directly behind it.
- Maintain a distance of at least 200 feet between you, and moving vehicles or aircraft.
- Stay between the white lines when walking between

the gate and the terminal. Remove all hats and ensure that your bags are closed inside the fence line by the terminal. Even the smallest piece of litter can get sucked into a jet engine and cause expensive damage.

- Never assume that aircraft or ground vehicles can see you.

Questions about pedestrian safety at airfields may be directed to

Operations Officer
NAWS China Lake, CA
760.939.5117
DSN 437.5117

FY09 ILIR/IAR PUBLICATION SUMMARY

The In-House Laboratory Independent Research (ILIR) and Independent Applied Research (IAR) Programs carried out within NAVAIR conducted research efforts in FY09 that led to 14 papers that have appeared in the scientific literature and several more that are in preparation. The scientific and engineering journals in which our

researchers are publishing reflect the wide range of activities that the ILIR/IAR Programs cover. ILIR/IAR researchers also presented their results at conferences and seminars this year.

NAVAIR researchers submitted eight new patents. In addition, they have published one book chapter and seven unrefereed papers.

FY09 ILIR PROJECTS

Title: 2-D to 3-D Image and Video Registration

Principal Investigator: Dr. Scott Merritt

Associate Investigator: Dr. Gary Hower

Associate Investigator: Dr. Alan Van Nevel

Key Technologies: Mathematical and Computer Sciences (Numerical Mathematics)

Bibliometric Information:

1. Published Paper/Report (Refereed): S. A. Merritt. "A Multiframe 2D-to-3D Georegistration Algorithm," Automatic Target Recognition XIX, 7335, pp. 73350S-73350S-9, 2009.
2. Patent Application Submitted: S. A. Merritt. "Method for Georegistering an Image and Generating a Predicted Target Image," patent application filed 18 February 2009, Navy Case No. 99744.

Title: Analysis of Probability Tails Sums With Applications to Detecting Maximally Meaningful Peaks in Multivariate Histograms

Principal Investigator: Dr. Arjuna Flenner

Bibliometric Information:

1. Published Paper/Report (Refereed): Earl W. Ferguson, Arjuna Flenner, Gary Foster, Gerhart Graupner, Yoko Murata, Guck T. Ooi, Sun H. Paik. "Geometric Diffusion Approach to SELDI TOF - Mass Spectral Data Analysis," published paper.
2. Professional Society Presentation: Earl W. Ferguson, Arjuna Flenner, Gary Foster, Gerhart Graupner, Yoko Murata, Guck T. Ooi, Sun H. Paik. "Geometric Diffusion Approach to SELDI TOF - Mass Spectral Data Analysis."
3. Editorial Review: "Extension of the Helmholtz Principle to the Hypergeometric Distribution for Change Detection and Coherent Motion."
4. Academic/Industrial Colloquium: Dr. Gary Hewer and Dr. Arjuna Flenner. "Coherent Gestalt Extraction in Video Sequences by Combining the Helmholtz Principle, the Fast Level Set Transform, and Sampling Without Replacement."

Title: Automatic Target Recognition via Sparse Based Representation

Principal Investigator: Dr. Katia Estabridis

Bibliometric Information:

1. Other: Recent work with the NVESD database has been submitted for consideration to the SPIE Defense, Security and Sensing Conference.

Title: Biochemical Surface Plasmon Polariton Resonance Sensor

Principal Investigator: Mr. Matthew Chen

Bibliometric Information:

1. Published Paper/Report (Refereed): H. M. Chen, L. Pang, A. Kher, Y. Fainman. "Three-Dimensional Composite Metallodielectric Nanostructure for Enhanced Surface Plasmon Resonance Sensing," Applied Physics Letters 94, 073117 (February 2009).
2. Professional Society Presentation: "Reconfigurable Large Area Metallic Nanohole Array and Its Application in Bio-Sensing," The 21st Annual Meeting of IEEE Laser Electro-Optic Society, 11 November 2008.
3. Professional Society Presentation: "Plasmonic-Coupled Nanostructure for Improved Surface Plasmon Resonance Biosensing," Conference on Laser and Electro-Optics (CLEO), 1 June 2009.

Title: Determination of the Elastic Constants of CL-20 Using Brillouin Scattering Spectroscopy

Principal Investigator: Dr. James J. Haycraft

Bibliometric Information:

1. Published Paper/Report (Refereed): James J. Haycraft. "The Elastic Constants and Related Properties of the Epsilon Polymorph of the Energetic Material CL-20 Determined by Brillouin Scattering," J. Chem. Phys. 131, 214501 (2009).
2. Other: Cover image of Journal of Chemical Physics, Volume 131, Number 21, 7 December 2009.

Title: Fundamental Diffusion Flame Calculations for Predicting Interactions Between Propellant Ingredients Using Detailed Chemical Kinetics

Principal Investigator: Dr. Matthew L. Gross

Mentor: Dr. Ephraim Berk Washburn

Bibliometric Information:

1. Published Paper/Report (Refereed): M. L. Gross, M. W. Beckstead. "Diffusion Flame Calculations for Composite Propellants Predicting Particle-Size Effects," *Combustion and Flame*, CNF 7326, 17 September 2009.
2. Other: M. L. Gross. "Predicting Particle-Size Effects on AP/HTPB Composite Propellants," DEA 4822, Rijswijk, The Netherlands, June 2009.

Title: Investigation of Catalysts for the Selective Oligomerization of Olefins

Principal Investigator: Dr. Benjamin G. Harvey

Associate Investigator: Dr. Michael E. Wright

Bibliometric Information:

1. Published Paper (Unrefereed): Benjamin G. Harvey, Michael E. Wright, and Roxanne L. Quintana. "High Density Tactical Fuels From Renewable Feedstocks," *Am. Chem. Soc.*, 2009, 54(1).
2. Professional Society Presentation: "High Density Tactical Fuels From Renewable Feedstocks," ACS Presentation 2009.

Title: Multidimensional Modeling of Aluminum Particle Combustion With Detailed Chemical Kinetics

Principal Investigator: Dr. Ephraim B. Washburn

Bibliometric Information:

1. Published Paper/Report (Refereed): E. B. Washburn, J. A. Webb, M. W. Beckstead. "The Simulation of the Combustion of Micrometer-Sized Aluminum Particles With Oxygen and Carbon Dioxide," *Combustion and Flame*, doi:10.1016/j.combustflame.2009.11.005, 2009.
2. Published Paper (Unrefereed): E. B. Washburn. "The Simulation of the Combustion of Micrometer-Sized Aluminum Particles With Solid Propellant Combustion Products," JANNAF 43rd Combustion Subcommittee, La Jolla, California, 7-11 December 2009.

Title: Nanoplasmonic Y-Splitters for Sensor Applications

Principal Investigator: Dr. Simin Feng

Bibliometric Information:

1. Professional Society Presentation: Simin Feng. "Broadband Cyclic Sommerfeld Resonances in Nanorods for Defense Applications," presented in the 7th Annual NanoTechnology for Defense Conference, 6-9 April 2009, Burlingame, California.
2. Published Paper (Unrefereed): Simin Feng and Klaus Halterman. "Exotic Grazing Resonances in Nanowires," Los Alamos Archive, arXiv:0905.1357v1, published in <http://arxiv.org/abs/0905.1357>, 8 May 2009.
3. Published Paper/Report (Refereed): Simin Feng, Klaus Halterman, Pamela L. Overfelt, and Donald Bowling. "Cyclic Sommerfeld Resonances in Nanorods at Grazing Incidences," *Optics Express*, Vol. 17, No. 22, p. 19823, 16 October 2009.
4. Paper Accepted for Publication: P. L. Overfelt, Klaus Halterman, Simin Feng, and D. R. Bowling. "Mode Bifurcation and Fold Points of Complex Dispersion for the Metamaterial Goubau Line," submitted to *Phys. Rev. E*.

Title: Novel Optical Phase Front Detection for High-Energy Laser Weapons

Principal Investigator: Dr. R. Steven Kurti

Associate Investigator: Mr. Philip Land

Bibliometric Information:

1. Professional Society Presentation: "A Novel Approach to Coherent Combining of Fiber Lasers," Annual Directed Energy Professional Society, November 2008, presentation.
2. Professional Society Presentation: "A Novel Approach to Coherent Combining of Fiber Lasers," Optical Society of America (OSA) Frontiers in Optics, November 2008, presentation.
3. Other: "Discrete Cylindrical Vector Beam Generation From an Array of Optical Fibers," OSA Journal Optics Letters, submitted December 2008.
4. Other: "Novel Optical Phase Front Detection for High-Energy Laser Weapons," OSA Journal Optics Letters, submitted December 2008.

Title: Optical Nanocircuit Elements for Metamaterials

Principal Investigator: Mr. Joseph Roberts

Associate Investigator: Dr. Simin Feng

Bibliometric Information:

1. Academic/Industrial Colloquium: Nanotechnology for Defense Applications Conference, April 2009
2. Professional Society Presentation: M. Joseph Roberts, Simin Feng, Mark Moran, Linda Johnson, Klaus Halterman, Andrew Guenther. "Metallo-dielectric Periodic Nanostructures for Epsilon Near Zero Metamaterials," Metamaterials Symposium, MRS Fall 2009 Meeting.

Title: Organic Electronics From pi-Stacked Molecular Complexes

Principal Investigator: Dr. Nicholas Prokopuk

Bibliometric Information:

1. Other: "Field Effect Mobilities of 1:1 Molecular Complexes With Face-to-Face pi-Stacking," to be submitted to Advanced Materials.
2. Title: Polyimide-Lanthanide Conjugates for Optical Gain Media

Principal Investigator: Dr. Stephen Fallis

Associate Investigator: Dr. Andrew Guenther

Bibliometric Information:

1. Professional Society Presentation: S. Fallis, A. J. Guenther, M. E. Wright. "Polyimide-Lanthanide Conjugates for Optical Gain Applications," Polymer Preprints 2009, 50(1), 475.
2. Professional Society Presentation: S. Fallis, A. J. Guenther, M. E. Wright. "Polyimide-Lanthanide Conjugates for Optical Gain Applications," presented at American Chemical Society National Meeting, March 2009, Salt Lake City, Utah.

Title: Preparing Metal-Organic Frameworks as Hosts for Energetic Materials

Principal Investigator: Dr. Andrew P. Nelson

Bibliometric Information:

1. Published Paper/Report (Refereed): A. P. Nelson, O. K. Farha, K. L. Mulfort, and J. T. Hupp. "Supercritical Processing as a Route to High Internal Surface Areas and Permanent Microporosity in Metal-Organic Framework

- Materials,” *J. AM. Chem. Soc.*, 131, 458–460 (2009).
2. Published Paper/Report (Refereed): A. P. Nelson, D. Parrish, L. Cambrea, L. Baldwin, N. J. Trivedi, K. L. Mulfort, O. K. Farha and J. T. Hupp. “Crystal to Crystal Guest Exchange in a Mixed Ligand Metal-Organic Framework,” *Crystal Growth & Design*, Vol. 9, 4588-4591 (2009).
 3. Published Paper/Report (Refereed): Y-S. Bae, D. Dubbeldam, A. P. Nelson, K. S. Walton, J. T. Hupp, and R. Q. Snurr. “Strategies for Characterization of Large-pore Metal-organic Frameworks by Combined Experimental and Computational Methods,” *Chem. Mater.*, 21, 4768–4777 (2009).
 4. Professional Society Presentation: A. P. Nelson, L. R. Cambrea, N. J. Trivedi. “Energetic MOFs: Trapping Energetic Materials Within Thermally Stable Metal-Organic Frameworks,” Presentation for the Division of Inorganic Chemistry, 238th ACS National Meeting, Washington, DC, 16 August 2009.

Title: Reconfigurable Nanosystems for Multifunctional Structures

Principal Investigator: Dr. Andrew J. Guenther

Bibliometric Information:

1. Published Paper (Unrefereed): D. M. Hess and A. J. Guenther. “Formation of Sparse Network Microstructures by Photopolymerization-Induced Phase Separation and Subsequent Solidification of Solvent,” *Polymer Materials Science and Engineering*, 100, in press (2009).

Title: Study of Energetic Compound Adsorption on Nanoporous Carbons

Principal Investigator: Dr. Anna Merritt, 760-939-7719, anna.merritt@navy.mil

Associate Investigator: Dr. Nirupam Trivedi

Bibliometric Information:

1. Professional Society Presentation: Dr. Anna R. Merritt, Dr. Nirupam J. Trivedi, Dr. Andrew Guenther, Prof. Henry C. Foley, Prof. Ramakrishnan Rajagopalan. “Nanoenergetics Research at NAWCWD China Lake,” presentation at the Frontiers in Nanoenergetics workshop for the Florida Institute for Research in Energetics, Shalimar, Florida, 27-29 October 2008.

Title: Transport in Semiconductor Nanostructures

Principal Investigator: Dr. Will Freeman

Bibliometric Information:

1. Professional Society Presentation: W. Freeman and G. Karunasiri. “Monte Carlo Simulation of Terahertz Step Well Quantum Cascade Laser Structures,” presented at SPIE Defense, Security, and Sensing Conference, April 2009, Orlando, Florida.
2. Paper Accepted for Publication: W. Freeman and G. Karunasiri. “Monte Carlo Simulation of Terahertz Step Well Quantum Cascade Laser Structures,” *Proc. SPIE*, Vol. 7311, 73110V (2009).
3. Dissertation: W. Freeman. “Terahertz Quantum Cascade Structures Using Step Wells and Longitudinal Optical-Phonon Scattering,” PhD Dissertation, Naval Postgraduate School, June 2009.

Title: Triplet Correlations in Superconducting Nanojunctions With Spin-Active Interfaces

Principal Investigator: Dr. Klaus B. Halterman

Bibliometric Information:

1. Published Paper (Unrefereed): Simin Feng and Klaus Halterman. “Exotic Grazing Resonances in Nanowires,” [arXiv:0905.1357v1](https://arxiv.org/abs/0905.1357v1), 8 May 2009. (internet)
2. Published Paper/Report (Refereed): R. S. Kurti, Klaus Halterman, Ramesh K. Shori, and Michael J. Wardlaw.

- “Discrete Cylindrical Vector Beam Generation From an Array of Optical Fibers,” *Optics Express*, Vol. 17, Issue 16, pp. 13982-13988 (2009).
3. Published Paper/Report (Refereed): Klaus Halterman and Oriol T. Valls. “Emergence of Triplet Correlations in Superconductor/Half Metallic Nanojunctions With Spin Active Interfaces,” *Phys. Rev B*, 80, 104502 (2009)
 4. Published Paper/Report (Refereed): Simin Feng, Klaus Halterman, Pamela L. Overfelt, and Donald Bowling. “Cyclic Sommerfeld Resonances in Nanorods at Grazing Incidences,” *Optics Express*, Vol. 17, No. 23, August 2009.
 5. Government Report (Archived): Naval Air Warfare Center Weapons Division. Application of Numerical Methods to Solve Integral Equations Arising in Computational Physics/Electromagnetics, NAWCWD, China Lake, California, August 2009. (NAWCWD TP 8673, publication UNCLASSIFIED.)

FY09 IAR PROJECTS

Title: Affordable High-Temperature Composite Resins for Naval Environments

Principal Investigator: Dr. Harvey Benjamin

Associate Investigator: Dr. Andrew Guenther

Associate Investigator: Dr. Michael Wright

Bibliometric Information:

1. Book/Chapter: S. J. Tomczak, M. E. Wright, A. J. Guenther, B. J. Petteys, T. K. Minton, A. Brunsvold, V. Vij, L. M. McGrath, J. M. Mabry. “Space-Survivability and Characterization of Main-Chain and Side-Chain POSS-Kapton® Polyimides,” in *Polyimides and Ot*.
2. Published Paper (Unrefereed): A. J. Guenther, M. E. Wright, S. Fallis, L. R. Cambrea, J. J. Cash, G. R. Yandek, B. J. Petteys. “Kinetics of Cross-Linking and Chromophore Degradation in Polyimide-Based High Performance Electro-Optical Materials,” *Polymer Preprints*, 50(1) (2009).
3. Published Paper (Unrefereed): M. E. Wright, E. T. Abernethy, A. J. Guenther, J. J. Cash, G. R. Yandek. “Synthesis of New Phenyl-ethynyl End-Capped Poly(p-phenylene) High Performance Composite Resins,” *Polymer Preprints*, 50(1), in press (2009).
4. Paper Accepted for Publication: A. J. Guenther, J. J. Cash, D. M. Hess. “Silicone RTV Composites With Enhanced Thermal Conductivity for Mold-Making Applications,” *Polymer Materials Science and Engineering*, 101, to appear in fall 2009.

Title: Metamaterial Antenna

Principal Investigator: Dr. Pamela Overfelt

Associate Investigator: Mr. Donald Bowling

1. Published Paper/Report (Refereed): P. L. Overfelt, K. B. Halterman, S. Feng, and D. R. Bowling. “Mode Bifurcation and Fold Points of Complex Dispersion Curves for the Metamaterial Goubau Line,” submitted to *Phys. Rev. E*, September 2009.
2. Published Paper/Report (Refereed): S. Feng, K. B. Halterman, P. L. Overfelt, and D. R. Bowling. “Cyclic Sommerfeld Resonances of Nanowires at Grazing Incidence,” submitted to *Optics Express*, August 2009.
3. Government Report (Archived): D. R. Bowling, P. L. Overfelt, A. F. Starr, and D. R. Smith. Measurement of Effective Permittivity and Permeability of Metamaterials Using a Free Space Lens Focused Reflectometer, NAWCWD, China Lake, California, April 2009. (NAWCWD TP 8677, publication UNCLASSIFIED.)

Title: Novel Concepts for Air/Sea Surface-to-Underwater Communication and other Anti-subsurface Warfare Applications

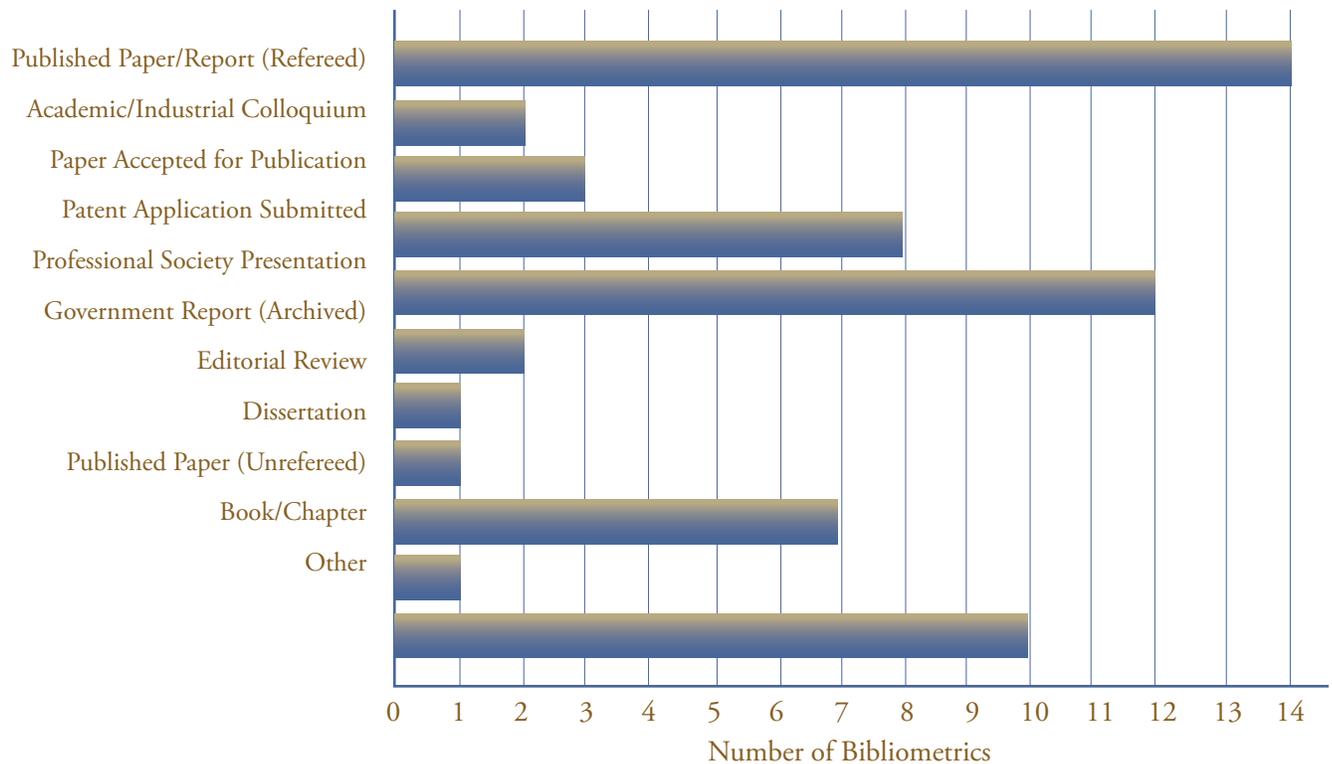
Principal Investigator: Dr. Ramesh Shori

Principal Investigator: Dr. Keith Miller

Bibliometric Information:

1. Other: R. Shori and J. K. Miller, "Mid-IR Laser Technology and Potential Uses for Naval Applications," presented at ONR 321 Maritime Sensing (MS) Program Review.
2. Other: Results Submitted for Presentation at the 2009 OCEANS Conference.
3. Other: Results in Preparation for Submission to Journal of Applied Optics.
4. Other: Results in Preparation for Submission to Journal of Acoustics.

FY 2009 Bibliometrics for NAWCWD



UPCOMING EVENTS

AUGUST

Defense Technical Information Center (DTIC) is pleased to announce DTIC Boot Camp: S&T Resources for Labs

Date: 25 August 2010

Description: This one-day, hands-on workshop will highlight DTIC's Suite of Services and other resources tailored for the Department of Defense (DoD) and Federal laboratory communities. DTIC's Suite of Services is aimed at saving valuable time and resources, leveraging existing research to reduce the taxpayer's burden, increasing collaboration between the science and technology community, sharing knowledge, and reducing the time it takes to move enabling technologies into the hands of the Warfighter. The workshop is free.

However, advance registration is required as space is limited.

Location: Gestalt Partners, LLC, Washington, DC

Additional Information: To view the agenda and register, go to www.dtic.mil/dtic/bootcamp/LabsBootCamp10Home.html. For more information, please email labconnect@dtic.mil.

SEPTEMBER

11th Spacecraft Charging Technology Conferences

Date: 20-24 September 2010

Description: The Spacecraft Charging Technology Conference (SCTC) is an international series focusing on the science and technology concerning the charging of spacecraft by the space environment. The purpose of the conference is to provide opportunities for the presentation, exchange, and discussion of new research results within the overall sphere of spacecraft-plasma interactions and their impact on spacecraft technology and space plasma science instrumentation. The detrimental effects of charging include change in availability and performance of spacecraft and even the loss of spacecraft.

Location: Hotel Albuquerque, Albuquerque, NM

Additional Information: <http://www.usasymposium.com/sctc/default.htm>

Colloquium Series: Resonance in Metamaterial Gratings

Date: 22 September 2010

Time: 1030

Description: Dr. Merle Elson, NAVAIR Fellow, former RF, Optics, and Material Science Branch Head, will discuss "Resonance in Metamaterial Gratings."

Additional Information: For specific times and locations of each lecture, please call either 760.939.8650 or 760.939.7719.

Colloquium Series: Coherent Control of Short, Intense Laser Pulses

Date: 30 September 2010

Time: 1030

Description: Professor Wendell Hill, University of Maryland, will discuss “Coherent Control of Short, Intense Laser Pulses.”

Additional Information: For specific times and locations of each lecture, please call either 760.939.8650 or 760.939.7719.

NOVEMBER

AIAA Missile Science Conference

Date: 16-18 November 2010

Description: The AIAA Missile Sciences Conference focuses on the technology and science as applied to missile system and subsystem design, from concept development to operational fielding and testing. The conference provides participants with a classified forum to communicate to a unique audience of peers who are involved in the detailed implementation of weapon system design and test. Developing science and technology are the keys to providing the U.S. military with the most capable and robust strategic and tactical missile systems in the world.

Location: Hyatt Regency Monterey, Monterey, CA

Environmental Technology Technical Symposium and Workshop

Date: 30 November to 2 December 2010

Description: The Strategic Environmental Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP) will sponsor the Environmental Technology Technical Symposium and Workshop

Location: Marriott Wardman Park Hotel, Washington, DC

Additional Information: Visit www.serdp-estcp.org/syposium or call 703.736.4513.

NEW ALGORITHMS MAXIMALLY EXPLOIT VISUAL INFORMATION



*Dr. Stefano Soatto,
Director of UCLA Vision Laboratory, Professor*
Source: UCLA

Discerning the manner in which images reproduce physical properties of an environment is crucial to developing an engineering system that can perceive visual images and interact intelligently with its surroundings. On 1 July, the Director of the University of California, Los Angeles (UCLA) Vision Laboratory and professor of computer science, Dr. Stefano Soatto, presented a non-traditional definition and characterization of visual information and perception based on the ecological approach used by American psychologist Dr. James J. Gibson.

“[Dr. Soatto’s] research centers around precisely defining...what visual information is, in both a mathematically well-founded and physically realistic manner,” said audience member and new Colloquium Series coordinator Scott Merritt (4L4100D). “This is done with the purpose of developing new algorithms that can maximally exploit this visual information while ignoring or discounting nuisances.”

Dr. Soatto’s definition of information applies to its use in visual decision and control tasks. Throughout his presentation, he contrasted Dr. Gibson’s approach to visual perception with the more traditional information theory developed by Dr. Claude Shannon, which centers

on the concept that entropy is information and focuses on the quantity and readability of data. Dr. Soatto posed this question to the audience: can the entropy of data truly be considered “information?”

“The operational definition of visual information suggests desirable properties that a visual representation should possess to best accomplish vision-based decision and control tasks,” stated Dr. Soatto. “I propose a notion of visual information as the complexity not of the raw images, but of the images after the effects of nuisance factors such as viewpoint and illumination are discounted.”

Dr. Soatto led the audience through his process of validating what he terms a “Gibsonian information theory.” Through the course of his research, he determined the following:

1. General-case viewpoint invariants exist and are non-trivial for Lambertian scenes in ambient light.
2. Non-trivial contrast invariants exist and are sufficient statistics.
3. Viewpoint-illumination invariants exist for Lambertian scenes in ambient light and are discrete structures supported on a thin set (such as an attributed Reeb tree [ART]). They are sufficient statistics in that they are equivalent to the image up to changes of viewpoint and contrast.
4. Occlusions and quantization are invertible.

Dr. Soatto explained that he defines actionable information in terms of the coding length of a maximal statistic that does not vary with the nuisances associated with a given task. “According to this definition, the actionable information in an image depends not just on the complexity of the data, but also on the structure of the scene it portrays,” said Dr. Soatto.

“This stands in contrast to traditional information as entropy or coding length of the data regardless of its use and regardless of the nuisance factors affecting it.”

Thus, an explorer favoring Dr. Gibson’s approach is guided by the environment’s topology, while an explorer inclined toward Dr. Shannon’s viewpoint is guided by the entropy of the data and navigates a physical space unaware of the space’s structure.

Upon successfully validating Dr. Gibson’s theories, Dr. Soatto believes a Gibsonian method to be the most effective in describing a scene’s useful information as well as for developing a higher level of intelligent engineering systems that are capable of using images to deduce environmental properties such as shape, location, motion, and material properties of objects. Such an engineering system would benefit numerous defense oriented tasks. In addition to exploration of unknown operational theaters, “one of the most important applications is target detection and recognition,” shared audience member Katia Estabridis (4L4100D).

Dr. Soatto earned a PhD in control and dynamical systems from the California Institute of Technology in 1996. Soatto’s general research interests are in computer vision and nonlinear estimation and control theory. His professional accomplishments include more than 150 publications, several awards, and 2 patents.

HIGH-BRIGHTNESS, ULTRAFAST LASERS IMPROVE PULSE ENERGY

High-brightness, ultrafast lasers are an important element in many defense-related fields, such as remote sensing, optics, communications, target illumination, and frequency metrology.

On 22 June, Dr. Juliet Gopinath, an assistant professor in the Electrical, Computer, and Energy Engineering Department and the Physics Department at the University of Colorado at Boulder, discussed three components of her research directed at improving pulse energy and achieving high-brightness, direct-diode laser arrays:

1. High-power, cryogenically-cooled Yb:YAG chirped pulse amplification system
2. A slab-coupled, optical waveguide laser (SCOWL)
3. Wavelength beam combining

“These laser [technologies] are compact and efficient,” Dr. Gopinath said, adding that applications include eye-safe lasers such as optical parametric oscillators, fiber lasers, and Ramangas-cell lasers.

“It’s a huge advantage to collaborate with leaders in the field,” said Rick Albro (474200D). “They introduce new technology and perspectives for old problems.”

For specific dates, times, and locations of each lecture, please call 760.939.8650 or 760.939.7719.

Dr. Gopinath earned a B.S. in electrical engineering from the University of Minnesota and an S.M. and PhD in electrical engineering from the Massachusetts Institute of Technology. Her areas of research include infrared sources, semiconductor lasers, ultrafast spectroscopy, and optofluidics.

The Colloquium Series offers those in the Engineer and Scientist Developmental Program (ESDP) an opportunity to stay abreast of trends in defense-related fields while earning training credits. It also provides mid-career employees with an opportunity to increase their knowledge of current research.

For specific times and locations of each lecture, please call 760.939.8650 or 760.939.7719.

NAWCAD Innovation Award

To provide motivation and incentives for individuals or teams (civilian or military personnel) to achieve NAWCAD Corporate Goals, to create a culture of innovation, to produce dramatically improved future capabilities, to support and acknowledge innovative achievement in carrying out our mission, to cause our people to recognize and value achievements, and to emphasize the value the NAWCAD places on innovation. Nominations must be submitted to NAVAIR_AWARDS@navy.mil.

Eligibility Military & Civilian (NAWCAD only)
Due 24 August 2010

Aviation Week Laureate Award

To recognize individuals and teams for extraordinary accomplishments which embody the spirit of exploration, innovation, vision, broad-reaching progress in aviation and aerospace. Endorsement will be required.

Eligibility Military & Civilian
Due 1 October 2010

Secretary of Defense Environmental Awards

The annual program recognizes Navy individuals, teams, ships, and installations for their exceptional environmental stewardship. Award categories are rotated each FY. Award categories include: Installation-Natural Resources Conservation, Large; Cultural Resources Management; Environmental Quality, Industrial; Environmental Quality, Overseas; Pollution Prevention, Non-Industrial; Environmental Restoration, Team/Individual Cultural Resources Management, and Pollution Prevention.

Eligibility Military & Civilian
Due 1 December 2010

Invention/Patent Award

To recognize an invention (i.e., any patentable original design, or improvement of existing design for a machine, process, or manufactured item). The Counsel Office (K00000D/E) may be contacted for additional award information and guidance and direction on applying for a patent.

Eligibility Military & Civilian
Due Ongoing

Research and Engineering Excellence Award

To recognize employee(s) in the Research and Engineering Competency for outstanding achievement in various disciplines that contribute to the mission of NAWCWD. For more information contact your Award Administrator.

Eligibility Military & Civilian
Due Ongoing

Contact your Awards Coordinator for more details.

4L, Awards Coordinator
 Award Coordination Office
 Phone: 760.939.7659

4.0/5.0, Awards Coordinator
 AIR-4.0C Staff Office
 Phone: 301.342.7129

AWARDS

At the 2010 Honorary Awards Ceremonies the achievements of NAVAIR personnel were celebrated across both the NAWCWD at China Lake and Point Mugu, California. The China Lake Awards Ceremony took place on 14 June 2010 at the Paradise Community Center Ballroom. On 8 June 2010, the Point Mugu Awards Ceremony took place in Building 3015. *Science and Technology* congratulates all of the 2010 Honorary Award recipients.

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Submissions for the next newsletter are requested by 3 September for immediate consideration.

Cheers,

Science and Technology Managing Editor

