

APL Achievement Awards and Prizes

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Scientific excellence and technical credibility make APL's national security mission possible. As a proven leader in conventional and strategic warfare as well as space science and exploration, APL is challenged to develop innovative technologies and concepts to overcome new and unconventional threats to our national defense. APL's Independent Research and Development (IR&D) program is critical in supporting the Laboratory's resolve to foster new technologies and concepts to meet new national challenges. Equally critical, publication of science and development results in refereed journals and disclosure of inventions are essential parts of the scientific process as well as the means by which we communicate APL's innovations to the world.

To encourage and reward technical publication and seminal advancements in the sciences and in engineering and technology, APL conducts three annual competitions: the awards for meritorious writing, the R. W. Hart Prizes for Independent Research and Development (IR&D), and the Invention of the Year Awards. These awards and prizes represent APL's best in publications, research developments, and technical achievements.

APL's first awards program, the competition for meritorious writing, was established in 1985. The Editorial Board of the *Johns Hopkins APL Technical Digest* solicits from each APL department nominations of publications from the previous year to compete for awards in six categories. Members of the Editorial Board judge the entries and base their selections of winning publications on

significance and clarity, with considerably greater weight given to the significance of the work in advancing science, engineering, or the mission of the Laboratory. For the 2010 Publication Awards competition, seven APL departments nominated 24 publications published in 2009. Of these, six won awards, including one book.

The R. W. Hart Prize for Excellence in IR&D was established in 1989 to recognize significant contributions to the advancement of general science and technology. These prizes honor Robert W. Hart, a leader in APL's IR&D efforts and an exemplar of the scientific achievement and technical excellence that this prize represents. The process is similar to that of the writing awards: the Science and Technology Council solicits from each APL department nominations of

science and engineering projects considered to be outstanding during the previous year. Council members judge the nominations, basing their selections on the quality and importance of the work to the Laboratory. Prizes are awarded in two categories: one for the best research project and the other for the best development project. For the 2010 Hart Prize competition, seven nominations were received from six departments—three for research and four for development. Of these, one research and one development project won honors for their projects in 2009.

The first awards for inventions were bestowed in 2000 for pioneering work leading to new technologies and innovations. The Invention of the Year Awards were established to identify the top technology from the hundreds of inventions disclosed during the previous calendar year and to honor innovators whose work keeps APL on the cutting edge with discoveries that change the way we live. The APL Office of Technology Transfer and the Office of Patent Counsel form an independent review panel to judge the inventions; the panel includes technology transfer professionals, intellectual property attorneys, and individuals from the technical and business communities. Judges base their selections on creativity, novelty, improvement over existing technology, and potential benefit to society. For the calendar year 2009, 218 inventors reported 118 inventions to APL's Office of Technology Transfer. Of these, one invention won honors.

The Master Inventor Award was established in 2006 to honor APL inventors who hold at least 10 U.S. patents. From 1942 through 2008, only 23 active and retired employees met this criterion. In 2010, the Office of Technology Transfer and the Office of Patent Counsel awarded the Master Inventor Award to Micah A. Carlson in recognition of his 10 U.S. patents issued while he was at APL. His research has resulted in patents covering time-of-flight mass spectrometers, detection of biological and chemical threats in mail and fluids, optical analyte sensors, and hand-powered medical suction devices. This honor makes Mr. Carlson only the 24th person in the history of the Laboratory to qualify for this special award.

The Master Inventor Award and the top invention for 2009 were announced at APL's 11th annual Invention of the Year awards ceremony on 8 April 2010. The awards for meritorious writing and prizes for outstanding IR&D projects were formally announced at the Principal Professional Staff Dinner on 8 November 2010. The recipients of these prestigious awards and prizes reaffirm and strengthen APL's role as a leader of scientific discovery and technological innovation. The winners are strong leaders who achieve results and consistently demonstrate integrity, industry, and a relentless commitment to excellence. Their names and photographs are displayed on the following pages, along with the titles of their publications, projects, and inventions.

PUBLICATION AWARDS FOR 2009

Author's First Paper in a Peer-Reviewed Journal



James H. Roberts

For "Giant Impacts on Early Mars and the Cessation of the Martian Dynamo," *Journal of Geophysical Research* **114**, E04009, doi: 10.1029/2008JE003287 (2009).

The paper is the first to show connections among planetary surface and interior and atmospheric processes, demonstrating that impact cratering has the potential to modify the thermal structure of a planet's interior as well as the evolution of its atmosphere and climate, with implications for the inhabitability of Mars.

James H. Roberts, Associate Professional Staff, Postdoctoral Fellow, Ph.D., Univ. of Colorado, 2006, Planetary Geophysics; **R. J. Lillis** (non-APL staff); **M. Manga** (non-APL staff)

Outstanding Paper in the *Johns Hopkins APL Technical Digest*

Walter G. Berl Award



Peter J. Sharer

For "STEREO Trajectory and Maneuver Design," *Johns Hopkins APL Technical Digest* **28**(2), 104–125 (2009).

This paper describes the launch windows, the launch, the phasing orbits, and the two-lunar-swingby targeting and deployment, which were critical to achieving the correct average drift rate relative to Earth and to reaching the required solar distance in the final STEREO heliocentric orbits.

Peter J. Sharer, Principal Professional Staff, M.S., JHU, 1994, Space Mission Design and Systems Engineering; **David W. Dunham** (non-APL staff); **José J. Guzmán** (non-APL staff)

Outstanding Research Paper in an Externally Refereed Publication



Bryan C. Jacobs

For "All-Optical Switching Using the Quantum Zeno Effect and Two-Photon Absorption," *Physical Review A* **79**, 063830, doi: 10.1103/PhysRevA.79.063830 (2009).

This paper describes a fundamentally new technique for all-optical logic and memory operations that could enable optical switches and memories for single-photon signals, thereby enabling scalable classical optical computing as well as quantum computing.

Bryan C. Jacobs, Principal Professional Staff, Ph.D., Univ. of Maryland, Baltimore County, 2003, Optical Quantum Information Processing; **James D. Franson** (non-APL staff)

Outstanding Development Paper in an Externally Refereed Publication



Plamen A. Demirev

For "Top-Down Identification of Protein Biomarkers in Bacteria with Unsequenced Genomes," *Analytical Chemistry*, **81**(23), 9633–9642 (2009).

The paper reports the development of a new and reliable top-down strategy for identification of proteins from bacteria that lack genome sequence information, allowing rapid phyloproteomic classification to be performed for newly isolated (unknown/unsequenced, naturally mutated, or deliberately engineered) microorganisms.

Plamen A. Demirev, Principal Professional Staff, Ph.D., Bulgarian Academy of Sciences, 1988, Rapid Detection of Chemical and Biological Agents; **Colin Wynne** (non-APL staff); **Catherine Fenselau** (non-APL staff); **Nathan Edwards** (non-APL staff)

Outstanding Professional Book



Andrew S. Rivkin

For "Asteroids, Comets, and Dwarf Planets," Greenwood Press, Santa Barbara, CA (2009).

The book is the first to deal with the historical background of small-body astronomy; the orbital dynamics of comets, asteroids, and dwarf planets; the relationship of small bodies to meteorites; small-body interior structure and composition; and past, present, and future spacecraft missions to small bodies.

Andrew S. Rivkin, Senior Professional Staff, Ph.D., Univ. of Arizona, 1997, Planetary Astronomy

Outstanding Special Publication



Bohdan Z. Cybyk



Brian E. McGrath



Timothy M. Frey

For "Unsteady Urban Airflows and Their Impact on Small Unmanned Air System Operations," in *AIAA Atmospheric Flight Mechanics Conference*, Chicago, IL, Paper 2009-6049 (2009).

By incorporating urban terrain, Unmanned Aircraft System (UAS) aerodynamic data, and a UAS vehicle dynamics model, a real-time physics-based simulation tool was created, and described in this paper, for the study of vehicle–environment interactions using extant computational fluid dynamics models.



David G. Drewry Jr.



John F. Keane

Bohdan Z. Cybyk, Principal Professional Staff, Ph.D., Univ. of Maryland, 1994, Fluid Dynamics and Hypersonics; **Brian E. McGrath**, Senior Professional Staff, M.S., Virginia Tech., 1985, Low-Speed and High-Speed Aerodynamics; **Timothy M. Frey**, Senior Professional Staff, M.S., North Carolina State Univ., 1997, M.B.A., JHU Carey School of Business, 2007, Physics-Based Modeling and Simulation, Business Development; **David G. Drewry Jr.**, Principal Professional Staff, M.S.M.E., West Virginia Univ., 1997, Advanced Vehicle Materials and Structures; **John F. "Jack" Keane**, Principal Professional Staff, M.S., Naval Postgraduate School, 1993, Precision Engagement Systems Branch Supervisor, Global Engagement Dept.; **Gopal Patnaik** (non-APL staff)

R. W. HART PRIZE FOR 2009

Excellence in Research



Stergios J. Papadakis



Andrew H. Monica



Noam R. Izenberg

For “Carbon Nanotube Triodes for Harsh Environment Electronics”

This was a multi-department team effort of the Milton Eisenhower Research Center (MERC), the Space Department, and the Technical Services Department, consisting of Stergios Papadakis (MERC/Sensor Science Group), Andrew Monica (MERC/Sensor Science Group), Noam Izenberg (Space Department/Planetary Exploration Group), George Coles (Technical Services Department/Advanced Applications Group), and Robert Osiander (MERC/Sensor Science Group).



George L. Coles Jr.



Robert Osiander

The overall objective of this project was to develop electronics that are based on planar carbon nanotube triodes (CNT) field-emitting devices that can operate over a wide range of temperatures and in the presence of ionizing radiation. The proof-of-principle was demonstrated for a CNT-based lateral field-emission triode, which is the basic building block of harsh-environment electronics.

Stergios J. Papadakis, Senior Professional Staff, Ph.D., Princeton Univ., 2000, Micro- and Nanoscale Devices and Sensors; **Andrew H. Monica**, Senior Professional Staff, Ph.D., Georgetown Univ., 2008, Applied Nanomaterials and Nanotechnology; **Noam R. Izenberg**, Senior Professional Staff, Ph.D., Washington Univ., 1996, Geology and Planetary Science; **George L. Coles Jr.**, Senior Professional Staff, M.S., JHU, 2004, Microelectronics and MEMS Fabrication; **Robert Osiander**, Principal Professional Staff, Ph.D., Munich Univ., 1991, Micro- and Nanotechnology, Millimeter-Wave and Terahertz Imaging and Spectroscopy

Excellence in Development Award



Brian K. Funk



Bohdan Z. Cybyk



Jeffrey D. Barton



David G. Drewry Jr.



Alison K. Carr



Jonathan C. Castelli



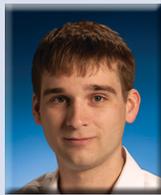
Christopher P. Chiu



Austin B. Cox



Timothy M. Frey



Jeffrey S. Garretson



Sarah J. Haack



Andrew Lee



Brian E. McGrath



Erich H. Mueller

For “Weaponized Small Unmanned Aircraft System (UAS) for Engaging Moving Urban Targets”

The contributing team members are Brian Funk, Jeff Barton, Jon Castelli, Erich Mueller, Bo Cybyk, David Drewry, Sarah Haack, and Brian McGrath from the Weapon and Target Systems Group in the Global Engagement Department; Tim Frey, Jeff Garretson, and Andrew Lee from Special Concepts Engineering and Development Group in the Global Engagement Department; Allison Carr and Austin Cox from the Image Exploitation Group in the Applied Information Sciences Department; Chris Chiu from the Ocean Systems Group in the National Security Technology Department; and Garrick Orchard and Professor Ralph Etienne-Cummings from The Johns Hopkins University.

Engaging moving targets in an urban environment, while minimizing collateral damage and not putting troops at risk, is a significant warfighter challenge. This project has successfully demonstrated the ability of cooperating small UAS to meet this challenge. Accordingly, APL has been recognized as an innovator and creator of new UAS business opportunities.

Brian K. Funk, Principal Professional Staff, M.S., Univ. of Tennessee Space Inst., 1993, Guidance, Navigation, and Control; **Bohdan Z. Cybyk**, Principal Professional Staff, Ph.D., Univ. of Maryland, 1994, Fluid Dynamics and Hyper-sonics; **Jeffrey D. Barton**, Senior Professional Staff, M.S., JHU, 2000, Guidance and Control Engineer; **David G. Drewry Jr.**, Principal Professional Staff, M.S.M.E., West Virginia Univ., 1997, Advanced Vehicle Materials and Structures; **Alison K. Carr**, Senior Professional Staff, M.S., Virginia Tech., 2003, Optical Systems and Remote Sensing; **Jonathan C. Castelli**, Associate Professional Staff, B.S., Syracuse Univ., 2007, Unmanned Aircraft Guidance, Navigation, and Control; **Christopher P. Chiu**, Associate Professional Staff, M.S., JHU, 2008, Autonomous Systems; **Austin B. Cox**, Associate Professional Staff, M.S., Univ. of Maryland, College Park, 2006, Optomechanical Systems Engineering; **Timothy M. Frey**, Senior Professional Staff,

M.S., North Carolina State Univ., 1997, M.B.A., JHU Carey School of Business, 2007, Physics-Based Modeling and Simulation, Business Development; **Jeffrey S. Garretson**, Associate Professional Staff, M.S., Cornell Univ., 2007, Physics-Based Modeling and Simulation; **Sarah J. Haack**, Associate Professional Staff, M.S., Univ. of Maryland, College Park, 2007, Aerodynamic System Analysis; **Andrew Lee**, Associate Professional Staff, M.S., JHU, 2007, Physics-Based Modeling and Simulation; **Brian E. McGrath**, Senior Professional Staff, M.S., Virginia Tech., 1985, Low-Speed and High-Speed Aerodynamics; **Erich H. Mueller**, Senior Professional Staff, M.S., Georgia Inst. of Technology, 1994, Modeling and Simulation; **Garrick Orchard** (non-APL staff); **Ralph Etienne-Cummings** (non-APL staff)

MASTER INVENTOR AWARD FOR 2009



Micah A. Carlson

In recognition of his 10 issued U.S. patents covering time-of-flight mass spectrometers, detection of biological and chemical threats in mail and fluids, optical analyte sensors, and hand-powered medical suction devices.

Former APL researcher Micah Carlson was named as a “Master Inventor,” joining 22 other past and current APL staff members who earned that honor by holding at least 10 patents.

Micah A. Carlson, formerly Senior Professional Staff, M.S., JHU, 2001, Mechanical Engineering

INVENTION OF THE YEAR AWARDS FOR 2009



Plamen A. Demirev



Miquel D. Antoine



Andrew B. Feldman



Nathan A. Hagan



Jeffrey S. Lin

For “Mass Spectrometry-Based Method and System to Establish Drug Resistance/Susceptibility in Microorganisms: IsoMS-Drug-Array”

The “IsoMS-Drug-Array” uses mass spectrometry to determine whether a microorganism is susceptible or resistant to one or more drugs—in a fraction of the time required by current technologies. The method requires no prior identification or characterization of the organism; in fact, it can simultaneously characterize and identify the organism

and determine its drug susceptibility or resistance in a matter of hours. Based on APL-developed algorithms, this novel method has potential applications in homeland defense, clinical microbiology, infectious disease treatment, and drug development and testing.

Plamen A. Demirev, Principal Professional Staff, Ph.D., Bulgarian Academy of Sciences, 1988, Rapid Detection of Chemical and Biological Agents; **Miquel D. Antoine**, Senior Professional Staff, Ph.D., Univ. of Maryland, Baltimore County, 1998, Chemical and Biological Sensor Development; **Andrew B. Feldman**, Principal Professional Staff, Ph.D., Harvard Univ., 1997, Bioinformatics; **Nathan A. Hagan**, Senior Professional Staff, Ph.D., Univ. of Maryland, Baltimore County, 2006, Mass Spectrometry Applications; **Jeffrey S. Lin**, Principal Professional Staff, M.S., JHU, 1989, Biological Systems and Processes