FIAP Newsletter
Spring 2015
American Physical Society Forum on Industrial & Applied Physics

Letter from the Chair - FIAP Activities 2014: Building the Industrial Physics Community

Careers

Announcements & Meetings

Comments and questions can be sent to fiap_newsletter@aps.org**.**

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Building the Industrial Physics Community – FIAP Activities 2014

John Rumble, FIAP Chair

The importance of industrial physics is clearly high; the contributions by industrial physicists to science, technology, the economy, and society are large and well documented. Yet many in the industrial physics community don't get the recognition and support as well as services from professional societies as other physics and scientific communities do. FIAP was founded specifically to help address some of these issues.

During the past year, FIAP has tried to raise awareness of these problems and more importantly taken vigorous steps to develop solutions. Many of these activities are described in other articles in this newsletter, so I will just summarize them here.

- **National Issues in Industrial Physics Workshop** – FIAP and APS held this workshop in October 2014; the attendees identified a number of issues related to industrial physicists themselves, industrial physics as an entity, and industrial physics as part of the U.S. society. A number of recommendations for direct action by FIAP, APS, physics departments and others were made. One key recommendation is to foster the development of the industrial physics community. The final Workshop report has been released and is available at http://www.aps.org/units/fiap/meetings/upload/workshop14.pdf

- **Early career scientists** – FIAP continues to expand its partnership with the APS Careers Program to sponsor events at Section and National meeting directly aimed at introducing industrial careers to undergraduates, graduate students, and postdocs.

- **APS Local Links** – this new program aims to develop local communities, especially of industrial and other physicists. FIAP works closely with APS to help involve industrial physicists in this exciting new activity. More information is at http://www.aps.org/membership/locallinks/index.cfm

- **Industry Day at the APS March 2015 Meeting** – FIAP has organized the first-ever Industry Day (Wednesday, March 4, With satellite sessions on Thursday, March 5) at the APS March Meeting that focuses on the use of polymers in industry and the development of new advanced manufacturing methods, such as 3D-printing. Speakers include industry R&D leaders and senior scientists both academic and industrial labs such as Dow Chemical, IBM, DuPont, ExxonMobil, GE, and Boeing. See more details at http://www.aps.org/meetings/march/events/industrydays.cfm

- **APS Industrial Physics Fellow** – FIAP has worked closely with Steven Lambert, the APS Industrial Physics Fellow, on integrating FIAP goals and mission into the fabric of APS. Steven (who can be contacted at lambert@aps.org) has done an outstanding job of linking FIAP and various APS departments together on looking for new activities and improving existing ones.

- **Distinguished Lectureship Award on the Applications of Physics** - Paul Grant of IBM and W2AZG has concluded a highly successful year as the first recipient of the APS/FIAP Distinguished Lectureship Award on the Applications of Physics. Paul will be giving a brief talk about his experience at the FIAP Business Meeting at 5:45 pm on Tuesday March 3, 2015 at the San Antonio March APS meeting. He also is writing an article for the next newsletter. James Wynne of IBM has been selected at the 2015 recipient of this lectureship.

- **More in 2015** – Incoming Chair David Seiler, Chair-elect Barbara Jones, and Vice Chair Jeffrey Hunt have exciting plans for extending FIAP's efforts to build and serve the industrial physics community. Volunteers are welcomed to help. Contact Dave at david.seiler@nist.gov

National Issues in Industrial Physics Workshop

by John Rumble, October 2014

FIAP and APS jointly held a Workshop on **National Issues in Industrial Physics: Challenges and Opportunities** on October 6-7, 2014, at St. Michaels MD. The Workshop brought together 38 senior and mid-level industrial physicists from diverse industries for a two-day meeting. The primary purpose of the Workshop was to identify and prioritize issues important to U.S. industrial physics.

Report: The final Workshop report has been released and is available at http://www.aps.org/units/fiap/meetings/upload/workshop14.pdf

Motivation for the Workshop: Physics has been a prime mover of industrial development in the United States for over 100 years. Physicists in industry have made possible the technological advances of modern products that make our lives safer, better, and easier as well as improving the security and infrastructure of our Nation. In many ways, industrial physics is responsible for the creation of the modern age.

As we move deeper into the 21st Century, U.S. industrial leadership in using physics as a key driver for success is already significantly challenged and it is urgent to identify and address those challenges. Because industrial physics underpins economic growth

in our technology driven economy, the American Physical Society (APS) recognized in its 2013-2017 Strategic Plan the need to serve better the industrial physics community. The APS Forum on Industrial and Applied Physics (FIAP) has similarly created a new FIAP Strategic Plan for the industrial and applied physics community for the next decade.

Recommendations: Workshop participants made the recommendations in four major areas of concern, as briefly summarized below. The Workshop report more fully describes these recommendations. Several are actionable by FIAP and APS, and discussions are already underway to begin prioritizing and implementing them.

There will be many opportunities for FIAP members to actively implement these recommendations. Contact David Seiler, FIAP 2015 Chair (david.seiler@nist.gov) and Steven Lambert, APS Industrial Physics Fellow (lambert@aps.org) for further information.

Preparing and Supporting the Industrial Physicist

- Encourage industrial internships for physics students
- Create a new culture of mentorship by industrial physicists
- Improve guidance on industrial physics careers
- Address the needs of early-, mid-, and late-career industrial physicists

Supporting Industrial Physics

- Improve Industry-Government cooperation on industrial physics R&D
- Improve Industry-Academia cooperation on industrial physics R&D
- Establish a FIAP Policy Advisory Committee

Promoting Industrial Physics

- Talk about success
- Prepare a report on the "Impact of U.S. Industrial Physics"
- Brand Industrial Physicists
- Provide leadership in building an Industrial Physics Community
- Hold meetings for industrial physicists
- Identify partnerships for clusters of industrial physics interests

The Way Forward

- Involve industrial physicists and their companies in APS programs and leadership
- Increase APS resources serving industrial physics
- Establish an APS Industrial Physics Advisory Board
- Expand FIAP's programs serving individual industrial physicists

George E. Pake Prize

The George E. Pake Prize is awarded

Thomas N. Theis

IBM T.J. Watson Research Center

Citation: For his major individual contributions at the forefront of semiconductor science, and his inspiring and insightful leadership in the management of industrial research in nanoscale science and technology.

Background:

Thomas Theis is on assignment from the IBM Corporation to serve as the Executive Director of the Semiconductor Research Corporation's Nanoelectronics Research Initiative (NRI), and is based at the Thomas J. Watson Research Center in Yorktown Heights, New York. The NRI is a public-private partnership which supports university-based research aimed at new devices for computing. Tom received his B.S. in physics from Rensselaer Polytechnic Institute in 1972 and his Ph.D. in physics from Brown University in 1978. He joined the IBM Watson Research Center in December of 1978 where he contributed to the fundamental understanding of the electronic properties of some technologically important materials. As a manager and technical strategist, he contributed to the development of technology products including IBM's introduction of copper wiring for integrated circuits in the late 1990's. As IBM's world-wide director for research in the physical sciences from 1998 to 2010, he championed successful new research initiatives in nanoelectronics, nanophotonics, exploratory memory devices, quantum computing, and special projects addressing energy, the environment, and infrastructure. In June of 2010, he was named Program Manager, New Devices and Architectures for Computing, and assumed his present position in July of 2012. He is a Fellow of the American Physical Society, a Fellow of the IEEE and serves on numerous advisory boards and committees. He has authored or co-authored over 70 scientific and technical publications. His current research focuses on new devices for computing and the physical principles by which such devices can evade certain fundamental limits of the field effect transistor.

Nominations for Distinguished Lectureship Award on the Applications of Physics

Would you like a colleague to be recognized for all that terrific work done over many years? The APS Committee on Careers and Professional Development (CCPD) and FIAP award an annual Distinguished Lectureship for just this reason. The goal is to honor physicists in industrial and other non-academic careers for their significant contributions to the advancement of physics of a technical, industrial, or entrepreneurial nature. The award recipients are recognized at a national meeting and will give a minimum of three lectures over a term of one year. The Distinguished Lectureship presentations should discuss key aspects of the recipient's career and professional development in physics, they should be interactive and engaging, and they should be aimed especially at physicists early in their careers. The Distinguished Lectureship will include a $5,000 award and reimbursement of travel costs up to $5,000. Follow this link for more information including the nomination process. The deadline for submission of nominations for the 2016 Distinguished Lectureship is September 1, 2015.

Industrial Speakers List

by Steven Lambert

We are updating the Industrial Speakers list, a resource for conference organizers, physics departments, and community groups who are looking for informative talks about technical issues. The APS is particularly interested in publicizing the industrial physics work done in a wide range of companies from startups to large corporations. Do you have a talk that you would enjoy sharing? You can look at the existing list, and also enroll as a speaker at this link. Enrolling requires your APS Web Account userID and password. If you have questions, please contact APS Industrial Physics Fellow Steven Lambert, lambert@aps.org.

APS Elected Sixteen New Fellows Nominated by FIAP

Abraham, David W. [2014]

IBM T.J. Watson Research Center

Citation: For advancing the science and technology of thermal measurement and control in magnetic storage systems.

Aksyuk, Vladimir [2014]

National Institute of Standards and Technology

Citation: For contributions to the development of integrated photonic and mechanical microsystems, for pioneering work in using such systems to enable both telecommunications and novel nanoscale, high-throughput, measurement methods, and for contributions to the understanding of the Casimir force.

Banerjee, Kaustav [2014]

University of California, Santa Barbara

Citation: For seminal applied physics research on nanoscale materials, devices, interconnects, and circuits towards realizing ultra-low power electronics.

Bernius, Mark T. [2014]

No Company Provided

Citation: For versatility in successfully commercializing new product technology starting from fundamental physics to final product form in the fields of organic-based LEDs, solar photovoltaics (PVs), composite materials, and thermal science and technology.

Colombo, Luigi [2014]

Texas Instruments Incorporated

Citation: For contributions in research, development, and production of many commercially-important thin-film materials including HgCdTe for infrared detectors, CVD BaSrTiO3 for integrated-circuit capacitors, HfSiON and SiON FET gate-dielectric materials, and CVD graphene on Cu.

del Alamo, Jesus A. [2014]

Massachusetts Institute of Technology

Citation: For fundamental contributions to the development of III-V compound semiconductor electronics.

Goodson, Kenneth E. [2014]

Stanford University

Citation: For contributions to the understanding of phonon and electron conduction in solid films, nanostructures, and in semiconductor nanoelectronics.

Harutyunyan, Avetik R. [2014]

Honda Research Institute

Citation: For major advances in nanomaterials synthesis and analysis, including seminal contributions to the selective growth and industrial use of carbon nanotubes.

King, William P. [2014]

University of Illinois, Urbana-Champaign

Citation: For distinguished contributions to the applied physics of nanometer-scale thermal and mechanical property measurements, and the translation of this work to numerous applications in materials science and nanotechnology.

Kirkpatrick, Douglas A. [2014]

InnerProduct Partners

Citation: In recognition of his pioneering, and ingenious contributions to the conception, development, maturation and commercialization of novel technologies on bio-fuels, high efficiency solid state lightning, and bio-molecular tubular nano-structures and his visionary management of technology programs with major National security implications.

Larkin, Michael I. [2014]

Wyatt Technology

Citation: For his insight, innovative skills, and abilities to transfer physical concepts and laws into the creation of viable analytical instrumentation widely used by both industrial and academic communities.

Mantese, Joseph V. [2014]

United Tech Research Center

Citation: For contributions in applied physics related to the formulation, understanding, and application of novel electronic materials in fundamentally new devices and structures.

Marinero, Ernesto E. [2014]
Purdue University
Citation: For his seminal contributions to the development of materials for recording and sensor devices enabling continuous density increases of information storage technology, in particular of magnetic recording.

Pique, Alberto [2014]
Naval Research Laboratory
Citation: For achievements in laser materials processing and developing the laser-induced forward transfer of nanoparticle inks and complex suspensions for the direct-write of functional materials for applications in micro-power sources, chem/bio sensors and printed electronics.

Svensson, Bengt G. [2014]
University of Oslo
Citation: For pioneering and sustained contributions to ion-solid interactions and defects, doping and diffusion in Si, SiGe, SiC and oxide semiconductors.

Zhang, Wenqing [2014]
Nanjing University
Citation: For pioneering contributions to the understanding of advanced thermoelectric materials and their application in industry based on ab initio calculations, and for developing ab initio thermodynamic tools for metal/ceramic interfaces.

FIAP Executive Committee for 2015
by John Rumble

Chair: David Seiler (03/15 - 02/16) NIST - National Institute of Standards and Technology

Chair-Elect: Barbara Jones (03/15 - 02/16) IBM Almaden Research Center

Vice Chair: Jeffrey Hunt (03/15 – 02/16) The Boeing Company

Past Chair: John Rumble (03/15 - 02/16) R&R Data Services

Councilor: Gregory Meisner (01/12 - 12/15) General Motors Research and Development Center

Secretary/Treasurer: Ichiro Takeuchi (03/14 - 02/17) University of Maryland-College Park

Member-at-Large: Carl Meinhart (03/13 - 02/16) University of California - Santa Barbara

Member-at-Large: Michael Gordon (03/14 - 02/17) IBM T J Watson Research Center

Member-at-Large: Matt Kim (03/14 - 02/17) QuanTera

Member-at-Large: Derrick Mancini (03/14 - 02/17) Illinois Institute of Technology

Member-at-Large: John Rodriguez (03/15-02/18) Texas Instruments Member-at-Large: Cha-Mei Tang (03/15 - 02/18) CreatvMicroTech, Inc.

Newsletter Editor: Joe Mantese (03/15 – 02/18) United Technologies Research Center

As a result of the recent FIAP elections, we have two new and one returning members of the FIAP Executive Committee. We congratulate them on their election and look forward to their active participation in the governance of FIAP.

Jeffrey Hunt of the Boeing Company was elected Vice Chair. In this position he is primarily responsible for the development of the FIAP sessions at the 2016 APS March meeting. A brief bio for Jeff is given below.

Cha-Mei Tang of CreatvMicroTech, Inc. was re-elected and John Rodriguez of Texas Instruments was newly elected as members-at-large to the Executive Committee. Brief bios for them are below.

Dr. Jeffrey. H. Hunt is a principal scientist and Technical Fellow at The Boeing Company. He received a B.S in physics from MIT and M.A and Ph.D. in physics from UC Berkeley. At MIT, Dr. Hunt developed technology for spectroscopic measurement of atomic isomer shift. At UC Berkeley, he pioneered the use of Surface Sum-Frequency Generation, creating a means to do direct *surface sensitive* IR spectroscopy. Dr. Hunt was at Rockwell Corp. from 1988 until 1996, working on advanced optical projects, including high power laser systems, optical surface diagnostics, and photon-counting spatial light modulators.

Hunt joined Boeing in 1996, continuing work on next generation optical system, such as autonomous manufacturing, quantum key distribution, and nonlinear optical spectral and imaging diagnostics. He is actively performing basic research on electronic behavior of thermo-electric nanowires. His career has included physics-based projects in condensed matter physics, quantum information sciences, surface science, and nonlinear optics and work on diverse applications, including both in defense sciences and commercial air and space technologies. He has published over 30 papers, 3 books and 2 encyclopedia articles on condensed matter sciences. He holds 61 US patents on sources, sensors, diagnostics, quantum information, and network centric operations. He is a member of the Optical Society of America, the SPIE, and the American Physical Society (Fellow 2008). He was elected to the Boeing Technical Fellowship in 2000.

Dr. Hunt has a strong record of volunteering within the public school system and is an educational counselor for MIT admissions. He received the Boeing exceptional volunteer service award (2010) for work within the Los Angeles Unified School District. He has been honored by the LA City Council for his educational work. In 2011, he received the Jaime Escalante Legacy award for his long term involvement with students from socio-economically disadvantaged backgrounds.

Dr. Cha-Mei Tang is president and CEO of Creatv MicroTech (Creatv). Dr. Tang received her B.S., M.S. and E.E. and Sc.D. from MIT. She worked at Johns Hopkins Applied Physics Laboratory, Naval Research Laboratory (NRL) and National Institute of Standards and Technology (NIST). At the NRL Plasma Physics Lab from 1978-1993, she served as Head of the Radiation and Accelerator Physics Section for 7 years. She did research on free-electron lasers, charged particle beams, accelerator physics, and field emission cathodes. She was a visiting scientist at the NIST Physics Lab from 1993-1996 doing research on x-ray physics and applications.

She founded Creatv in 1996 initially focusing on novel x-ray anti-scatter grids and nuclear collimators to improve image quality. She led Creatv in the development of advanced high-aspect-ratio microfabrication, providing microfabrication services for all copper THz waveguides for video radar, x-ray masks for x-ray phase contrast imaging, and nuclear collimators for gamma ray imaging. In 2000, she led the company into medical diagnostics developing instruments, assays and diagnostic kits, making products requiring combined expertise of microfabrication, instrumentation and assay methods.

Recently, Dr. Tang developed a lithographically fabricated microfilter applied to the collection of cancer-associated cells from the blood of cancer patients with solid tumors. She has received numerous awards, including Fellow of the American Physical Society (1990), the most outstanding woman scientist in the Federal Government by Women in Science and Engineering (1992), senior member of IEEE (1995), and R&D 100 Award for Anti-scatter Grids for X-ray Imaging and Collimators for Nuclear Imaging made by LIGA (2006). She is active in APS and is a current FIAP Member-at-Large. She helped setup a new APS Prize for Industrial Applications of Physics (2007) and was on the APS Society Membership Committee (2004-2006).

John A. Rodriguez was born in San Antonio, TX. He received the Ph.D. in electrical and computer engineering from Rice University in Houston, TX. Dr. Rodriguez is currently a Distinguished Member of the Technical Staff in Analog Technology Development at Texas Instruments in Dallas, where he researches the reliability physics of ferroelectric memory devices in advanced process technology. He is a member of the American Physics Society, American Ceramic Society and the IEEE.

Dr. Rodriguez has published or presented more than 40 papers in conferences and journals and has been awarded 21 US patents. Dr. Rodriguez is a recipient of the 2002 IEEE Reliability Physics Symposium Outstanding Paper Award, the 2005 Electrical Over-Stress/Electrostatic Discharge Symposium Best Presentation Award and the 2012 Semiconductor Research Corporation Mahboob Khan Outstanding Industry Liaison Award for his mentorship of a research program at the University of Florida. He received the prestigious Texas Instruments "Innovators in Action" Award in 2013 for his contributions to novel ultra-low-power integrated circuits.