

FIAP

Fall 2018

Newsletter

American Physical Society Forum on Industrial & Applied Physics

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

Opinions expressed represent the views of the individual authors and not the American Physical Society or author's employers.

Letter from the Editor

Fall is a busy time for the Forum on Industrial and Applied Physics (FIAP), with preparations for the March Meeting 2019 already underway and elections happening in multiple units, including FIAP. In this letter, we will hear about some of the planned sessions at the March Meeting that are sponsored by FIAP, reports on some of FIAP's activities, and a student's perspective with a contribution from the FGSA student representative, Carola Emminger, who serves on the FIAP Executive Committee. As mentioned in the Spring and Summer edition, FIAP distributes this newsletter

to ensure the larger community can follow the latest developments within the Forum, esp. at APS Meetings, and to announce several of the important deadlines specific to FIAP, e.g. elections and nominations for fellowship and prizes. Any additional contributions are welcome, and we would like the newsletter to provide an outlet for discussions of interest to the FIAP membership. To submit articles, letters to the editor, or ideas for discussion, please contact me at fiap_newsletter@aps.org.

March Meeting Abstract Deadline on Oct 25th

The deadline submission of contributed abstracts for March Meeting 2019 in Boston, Massachusetts was Oct 25th.

These contributed talks are a substantial portion of the technical content of the meeting and are an important avenue for disseminating the latest applied research. FIAP has primary responsibility for Sorting Category 8 (Semiconductors, Metals, and Dielectrics) and 22 (Applications). Each of these includes both Focus Sessions as well as the standard sorting categories. With multiple sorting categories specifically associated with FIAP, we look forward to learning about research happening both in the United States and across the world.

08.0 SEMICONDUCTORS, INSULATORS, AND DIELECTRICS (FIAP)

08.01.00 FOCUS SESSIONS

08.01.01 *Spin-Dependent Phenomena in Semiconductors* (GMAG, DMP, FIAP, DCOMP) [same as 10.01.05, 16.01.25, 36.10.01.05]

08.01.02 *Dopants and defects in semiconductors* (DMP, DCOMP, FIAP) [same as 16.01.15, 36.08.01.02]

08.01.03 *Dielectric and ferroic oxides* (DMP, DCOMP) [same as 11.01.01, 16.01.14, 36.08.01.03, 36.11.01.01, 36.16.01.14]

08.01.04 *Organometal halide perovskites: photovoltaics and beyond* (DMP) [same as 36.08.01.04]

08.02.00 STANDARD SORTING CATEGORIES

08.03.00 *Materials: synthesis, growth, processing, and defects (bulk and films)* (FIAP, DCOMP)

08.04.00 *Thermodynamic and transport properties (not QHE, FQHE)*

08.05.00 *Atomic structure, lattice properties and phase transitions*

08.06.00 *Electronic structure: theory and spectra*

08.07.00 *Electronic structure: thermodynamic and optical properties*

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08.08.00 *Mechanical and dynamical properties*

08.09.00 *Electricity-to-light conversion: solid state lighting*

08.10.00 *Organic semiconductors, flexible electronics*

08.11.00 *Hybrid semiconductor/magnetic structures*

08.12.00 *Semiconductor materials for beyond CMOS electronics*

08.13.00 *Ballistic transport in semiconductor devices*

22.0 APPLICATIONS (IT, Medical/Bio, Photonics, etc.) (FIAP)

22.01.00 FOCUS SESSIONS

22.01.01 *Moore's Law: More and Beyond* (FIAP)

22.01.02 *Integer and fractional quantum Hall effects and related topics* (FIAP)

22.01.03 *Soft Matters in Industrial Applications* (GSOFT, FIAP) [same as 02.01.19]

22.01.04 *Spin transport and Magnetization Dynamics in Metals-Based Systems* (GMAG, DMP, FIAP) [same as 10.01.04, 36.10.01.04]

22.01.05 *Computational Modeling of Materials for Energy* (GERA, FIAP, DCOMP) [same as 16.01.20, 31.01.02]

22.01.06 *Solar Energy Conversion* (GERA, FIAP, DPOLY) [same as 01.01.38, 21.01.03]

22.01.07 *Fuel Cells, Materials and Devices* (GERA, FIAP) [same as 21.01.04]

22.01.08 *Energy Storage* (GERA) [same as 21.01.05, 29.01.01]

22.02.00 STANDARD SORTING CATEGORIES

22.02.00 *Optical/Laser and High Frequency Devices and Applications Including Optoelectronics and Photonics*

22.03.00 *Applications of Semiconductors, Dielectrics, Complex Oxides (non-magnetic)*

22.04.00 Applications of Superconductors and Superconducting Devices

22.05.00 Applications of Thermoelectrics

22.06.00 Magnetic Devices and Applications (FIAP, GMAG)
[same as 10.13.00]

22.07.00 Bionanotechnology and Applications of Polymers and Biomaterials

22.08.00 Nanotechnology (non-bio)

22.09.00 Nanomanufacturing

Vote now! FIAP Elections Extended Through Nov. 9th

Each year, FIAP conducts elections to fill Executive Committee positions. This year's election began on Oct. 5th and will remain open through Nov. 9th and includes votes for Members-At-Large, Vice Chair, and a ballot measure approving changes to the by-laws. FIAP members should have received an email with a link to the ballot, which includes information on the candidates and by-laws amendments. Candidate information is contained in the link to the ballot, but is reproduced for convenience here.

Also, please contact Steven Lambert (lambert@aps.org) if you have not received an email with voting information. It should have come from FIAP Election Coordinator <noreply@directvote.net> with the subject: "APS FIAP Election – login information below".

Vice Chair (choose one)

Todd Brintlinger

Biography

Dr. Todd H. Brintlinger is a Research Physicist in the Materials Science and Technology Division at the U.S. Naval Research Laboratory in Washington, DC. He received his B.S. in Physics from the University of Illinois, Urbana-Champaign, where he worked on sonoluminescence, and his Ph.D. in Physics from the University of Maryland, College Park, where his research involved the growth, imaging, and electrical transport of single-walled carbon nanotube devices. Remaining in College Park, he moved to the Department of Materials Science and Engineering where his postdoctoral appointment included the development of in situ transmission electron microscopy for nanoscale thermometry, the study of geometrically frustrated artificial spin ice systems, and characterization of magnetoelectronic devices. His tenure at Naval Research Laboratory has continued his research in in situ and aberration-corrected transmission electron microscopy for phase change materials, plasmonic systems, and electrochemical systems. Dr. Brintlinger also has led experiments on the predominant physics and materials mechanisms affecting the performance of an electromagnetic launch system (railgun), for which the group was collectively recognized with an NRL Award of Merit for Group Achievement. He has published 37 papers in refereed journals with an average of 35 citations per paper and has been serving FIAP for over 8 years, as a Member-At-Large, Editor-in-Chief of the FIAP Newsletter, and as a sorter for the March Meeting.

Statement

The Forum on Industrial and Applied Physics is an especially important unit within APS for physicists that do basic research while maintaining a strong focus on subsequent applications or commercialization. The U.S. Naval Research Laboratory promotes just such this type of research, and I thus have gleaned first-hand experience with the balance between basic science and applications. Acting as Vice Chair, I would be committed to enhancing the role of FIAP as both an advocate for the applied physicist and as a conduit for information. This conduit is two-way: broadcasting out from APS to its emerging young scientists, APS should promote awareness about the realities and practices of industrial and applied physics; coming in to APS from its members, APS can help transition the latest developments from basic physics research into the industrial and applied physics communities. Federal laboratories occupy a special place for applied physics, and have unique challenges and capabilities that naturally overlap with the mission of FIAP. I hope to cement and expand upon FIAP's role at the March Meeting, the single most visible interaction APS members have with the Society, and to provide a link to the DoD applied physics community.

Matthew Thompson

Biography

Matthew Thompson is Director of Physics at TAE Technologies, Inc. a diversified company working on fusion, related power handling and particle accelerator technologies, and new medical devices for cancer treatment. He leads the 50 scientists and technical personnel of TAE's Physics Division in their work on experimental operations, pulsed power systems, high-power neutral beams, plasma diagnostics, data acquisition, analysis, and data science. Dr. Thompson transitioned to private industry eleven years ago with his first Senior Scientist position at Tri Alpha Energy working on energy conversion and magnetic sensor technologies. Prior to becoming an industrial physicist, he worked at Lawrence Livermore National Laboratory on picosecond resolution electron diffraction, and at both SLAC and Fermilab on dielectric and plasma wakefield accelerators. Outside the lab, Dr. Thompson is heavily involved in the mentorship of young scientists, leadership activities of the American Physical Society, and science advocacy. He holds a bachelor's degree with honors in physics from Stanford University, and both a MS and PhD in physics from the University of California, Los Angeles, where his graduate work focused on experimental plasma physics.

Statement

My single focus in running for Vice Chair is to make participation in FIAP as valuable as possible to our present and future members. The APS's own statistics clearly show that well over 50% of the young men and women trained in physics ultimately find careers in private industry, yet FIAP members are only about 13% of the total APS membership. I believe we can do better by providing and communicating a compelling value proposition to physicists who have exited the academic and government laboratory communities. In addition to maintaining strong and useful programs at our meetings and working to recruit new and diverse members, I feel some of the best areas to work on in the future are: encouraging industrial internships, fostering a culture of mentorship, supporting mid- and late-career networking and development, and advocating at the federal level for reforms in areas such as immigration policy, intellectual property rights, and access to national user facilities.

I have a history of acting in the service of industrial physicists. At the 2014 National Issues in Industrial Physics workshop, I proposed the idea of an online mentorship matching site for industrial physics and later helped Steven Lambert, the APS Industrial Fellow, implement the concept in the form of the IMPact program (<https://impact.aps.org/>). In the first year of operation, IMPact attracted over 450 participants and made 90 mentoring relationship matches. This is exactly the sort of low-cost, high-payoff program I will seek to further as Vice Chair. My formal APS leadership experience includes a term as member-at-large on the Far West Section executive committee and current service on the Committee on Careers & Professional Development. Finally, my professional activities outside the APS demonstrate commitment to a vibrant and successful industrial physics community. I have personally mentored over fifteen students on professional issues, made several career-oriented speaking appearances, and maintain a blog on career skills for industrial physicists (www.prosperousphysicist.com). I hope that I can continue to serve you as a chair line officer of FIAP. Thank you for your time and attention.

Member-At-Large (choose two)

Ken Bradley

Biography

Ken Bradley was trained in experimental condensed matter physics at Brown University and MIT, where he received his Ph.D. and was a postdoctoral fellow, respectively. His academic research focused on the structure and dynamics of complex molecules and proteins. Before graduate school, he was an Associate Member of the Professional Staff at Schlumberger-Doll Research developing x-ray and neutron scattering methods for geological measurement. Later, he was Director of Product Development at Nanophase Technologies, a nanotechnology-based spinout of Argonne National Laboratory (now a public company) and then Publisher of Electronic Products at Morningstar during its transition from print- to internet-based publishing. In 2000, he co-founded Arrayx, an optical measurement-technology spinout of the University of Chicago. He continued as Arrayx's CEO and, after it was acquired by the medical device company Haemonetics in 2006, he served as Haemonetics' Vice President of Development until 2011. He has been a Venture Partner with ARCH Venture Partners and is currently CEO of PixelEXX, a venture backed startup commercializing next generation imaging devices.

Statement

The majority of my career has involved refining an understanding of the science behind technological advances that could, but have yet to, deliver new products and services, and then utilizing that knowledge to implement the promise of those advances. If elected I hope to highlight the excitement that can accompany the combination of science, innovation and commercial opportunity of such work. Although my career began in a large corporate research environment, most of my experience has been in startup companies. Recent transitions in industrial research have made startups the frequent source of innovation feeding the development and commercialization process of large companies. Helping students and post-docs—the scientists and innovators of tomorrow—understand and navigate this portion of the physics enterprise is a crucial mission of the FIAP that I would look to strengthen.

Edlyn Levine

Biography

Edlyn V. Levine, Ph.D. is a Senior Physicist at the MITRE Corporation and a Research Associate in the Department of Physics at Harvard University. Dr. Levine's research at MITRE focuses on the physical kinetics, electrodynamics, and thermodynamics of complex media. Her research efforts are aimed at the development of advanced platforms for sensing and communications systems in the interest of national security. She is a four-time awardee of the MITRE Innovation Program grant for her research. Dr. Levine earned her Ph.D. from Harvard University in 2016 and was an NSF Graduate Fellow and an NDSEG Graduate Fellow.

Dr. Levine is a member of the Harvard Graduate School Alumni Council, and has previously served as Coordinating Fellow for Graduate Student Life at Harvard. She held the position of president of the Harvard Graduate Science Policy Group and was the founder of the annual Harvard - DC Trip, bringing science graduate students to the capital to visit agencies involved in science policy. Dr. Levine is currently the leader of MITRE's Academic Engagement Team, focusing on building research and recruitment relationships with universities. Dr. Levine is active in scientific and technical exchange meetings including APS March Meeting, Boston APS Local Link, and a Program Committee Member for the COMSOL Multiphysics Conference. She engages in student outreach and mentorship at her alma maters, Harvard University and the University of Pittsburgh.

Statement

I am running for member-at-large of FIAP due to my desire to contribute to our community and to translate my efforts to bridge industrial and academic physics from Boston/Cambridge to the wider APS FIAP community. I have the unique perspective of an early-career physicist who has successfully spanned both academia and industry: I hold a joint appointment between Harvard University and MITRE Corporation. I have also striven to build research collaboration between industry and academia, and am leading one such effort between MITRE and Harvard. Finally, I am deeply engaged in exposing physics students (primarily PhDs) to opportunities to work as physicists in industry: this includes direct mentorship, serving on career panels at universities, serving as a mentor on the FIAP IMPact program, and introducing PhD candidates to consider internship opportunities while they are in graduate school.

If I am elected as a member-at-large of FIAP, I will focus on fostering increased collaboration between physicists in academia and industry. This will involve encouraging larger participation by industrial physicists in national meetings to present research results and ideas for crosspollination with academia. I will also support highlighting of successful collaborations and best practices to serve as examples stimulating future efforts. I would like to build increased mentorship of graduate students by industrial physicists in programs like IMPact and networks such as LinkedIn. Finally, I would like to facilitate graduate students entering industry by exposing them to the range of possible research positions. This can be done by adding industrial career mentorship, panels, and job fair participants at the national meetings.

Curt Richter

Biography

Dr. Curt A. Richter is an experimental physicist and Group Leader of a dynamic team of research scientists in the Nanoelectronics Group of the Engineering Physics Division, Physical Measurement Laboratory (PML) at the National Institute of Standards and Technology (NIST). The Group conducts basic research to develop the measurement science needed for innovation in future nanoelectronic and thin-film devices. Richter has worked in the Division at the National Institute of Standards and Technology, Gaithersburg, MD since 1993.

Dr. Richter received the M.S., M.Phil., and Ph.D. degrees in Applied Physics from Yale University after receiving a B.S. in Physics from The College of William and Mary. After graduating from Yale, Dr. Richter joined NIST directly. Technically, he currently focuses on extracting critical properties of future nanoelectronic devices for use in high performance computing systems. He is an expert in the quantum properties of low-dimensional systems and has experience studying mesoscopic physics and quantum interference effects in semiconductor devices by using magnetotransport measurements. During Richter's tenure at NIST he has strongly engaged with the semiconductor industry through direct collaborations and through joint planning and oversight activities at the Semiconductor Research Council (SRC). Richter is an author of more than 160 technical articles and editor of one book.

Richter has engaged in many leadership and service roles at Con-

ferences, Professional Societies, in public/private consortia, and within the Federal service: for example, American Institute of Physics (AIP) Prize Selection Committee, Frequent APS March Meeting Abstract Sorter, Member of the Technical Board of the Electronic Materials Conference (EMC), Former-Chairman of the International Semiconductor Device Research Symposium (ISDRS): Nanoelectronic Computing Research (nCORE) Science Advisory Board (SAB) member, and Nanoelectronics Research Initiative (NRI) Technical Program Group (TPG) member, Richter is a US technical expert in Nanotechnologies for ISO, and his federal leadership roles include, co-chair of the Federal Government's Interagency Coordination Team for the U.S. National Nanotechnology Initiative (NNI), National Signature Initiative (NSI): Nanoelectronics for 2020 and Beyond, and Working Group Member for the NNI Grand Challenge for Future Computing.

Statement

As a member at large on the FIAP Executive Committee, I will strive to help address what I consider to be the three main issues facing the applied physics community: (1) the education of young physicists, (2) jobs and the availability of a highly-trained workforce, and (3) focused research activities and funding. I will endeavor to increase awareness in and improve the direct relationship between industry and the academic community. The FIAP must continue to strongly support the education and training of young applied physicists to ensure that the academic community continues to deliver a skilled technical workforce for our industrial partners. In addition, I will use role in the FIAP to remind the industrial community of the creativity and flexibility of a highly-educated, well-trained physicist. Combining physics and ingenuity can lead to industrial innovation that will enhance economic security and improve our quality of life.

Being an applied physicist at NIST, which is in the Department of Commerce, gives me a rare perspective on the relationship between academic researchers, federal government lab needs, and industrial applications and goals. I believe strongly in public/private organizations that combine the strengths of industrial partners with those of the federal government to identify, inspire, and fund important applied research topics. I would hope that I can use the platform of the FIAP to help enable the formation of more such public/private partnerships.

FIAP at the March Meeting

FIAP will be sponsoring or cosponsoring nine invited sessions at the APS March Meeting 2019 in Boston, MA. These invited sessions include a variety of topics of interest to both FIAP members and students interested in physics outside of academia. These sessions are a highlight of FIAP's technical contribution at the meeting, and will complement other FIAP-sponsored activities, including careers events that are outlined in another article in this newsletter.

In fitting with FIAP's broad scope, the sessions have a wide variety of topics with the theme "Physics for Tomorrow". They will run continuously from Tuesday morning through Thursday afternoon. The sessions begin on Tuesday morning with "Radiation Detection and Monitoring in Medical Imaging and Therapy" (co-sponsored with GMED- the Topical Group on Medical Physics), moves on to "Polymer Physics to Address the Dual Energy Challenge at Global Industrial Scale" (co-sponsored with GSOF- the Topical Group on Soft Matter), and finish the day with a retrospective on "Five

Decades of Physics at ExxonMobil Corporate Strategic Research”. The Wednesday sessions change focus toward “Future and Evolving Careers of Physicists” (co-sponsored with FECS- the Forum for Early Career Scientist), keep the “Future” theme with “Future of Transportation” (chaired by FIAP Vice-Chair Mike Gordon), and round out the day with “Recent Advances on Spintronics-based Computing: from Deterministic to Probabilistic”. Finally, on Thursday, FIAP picks up an entrepreneurial theme, starting with

“Live Long and Prosper as Physicist, Innovator, and Entrepreneur” (co-sponsored with FED-the Forum on Education) then “Entrepreneurial Physics” (chaired by FIAP Chair Matt Kim), and finishes the week with “Innovations from Industry” (chaired by APS Industrial Physics Program Manager Steven Lambert).

FIAP is looking forward seeing everyone in Boston. Please attend our series of exciting invited talks at the March Meeting.

Student’s Perspective by Carola Emminger

The numerous events and sessions at the March Meeting organized by FIAP are a great opportunity for undergraduate and graduate students to get in touch with representatives from industry. At the “Lunch with the Experts”, for example, students were invited to enjoy a meal together with professionals working in industry who gladly shared their experiences. Another very inspiring event was the panel discussion and pizza lunch at the March Meeting 2018, where students could ask questions and gain valuable inputs on career opportunities.

In many cases, physics students do not have any connections to non-academic sectors and are therefore uncertain about the possibilities they have outside of academia. Talking with experts from

industry answers questions of young researchers, such as how to start a career, what are the key professional skills or how to prepare for job interviews. Furthermore, a wide variety of research topics in applied and industrial physics with future relevance is provided by the large number of focus sessions and Invited talks sponsored by FIAP. It is motivating for prospective scientists to find out about the relevance of physics and science in the modern world.

As a graduate student who attended several FIAP events, I can tell that FIAP does a wonderful job in offering young physicists a platform for exchange and receiving advice from experienced researchers.

Distinguished Lectureship Award on the Applications of Physics

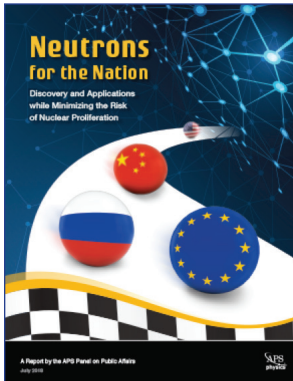


Dr. Cynthia Keppel

Each year, the Forum on Industrial and Applied Physics (FIAP) and the Committee on Careers and Professional Development (CCPD) recognize a physicist who has distinguished themselves in an industrial or non-academic career through the Distinguished Lectureship Award on the Applications of Physics. Selection of the awardee follows a formal application managed by both FIAP and CCPD, and the Award continues for an entire

year in which the awardee gives a series of lectures on physics outside an academic setting. We are pleased to announce next year’s Distinguished Lecturer as Dr. Cynthia Keppel of Thomas Jefferson National Accelerator Facility “For pioneering work in proton therapy and for the promotion of the applications of physics to both experts and non-experts”. Dr. Keppel will be receiving her plaque and will give the inaugural lecture at the March Meeting 2019 in Boston. More information on Dr. Keppel and the award can be found at this [link](#). We encourage all to attend and to congratulate Dr. Keppel on both this prestigious achievement and for the opportunity to help young physicists understand a career in Industrial and Applied Physics.

Panel on Public Affairs Report on Neutron Scattering



The APS Panel on Public Affairs (POPA) includes a standing representative from FIAP, a position currently held by James Michael Adams of the National Institute for Standards and Technology (NIST). One function of [POPA](#) is to produce periodically reports of concern to the larger science community and especially those of unique concern to physicists. Released in August 2018, the most recent report, “Neu-

trons for the Nation: Discovery and Applications while Minimizing the Risk of Nuclear Proliferation,” details the need to balance the development of intense neutron sources that support critical neutron-based research and discovery with the simultaneous goal of reducing the amount of Highly Enriched Uranium used as fuel for fission-based neutron sources. The key findings, executive summary, recommendations, and full report are available on the POPA website, and we encourage FIAP members to see for themselves the results of this comprehensive report.

FIAP Chair’s Thoughts

With start of autumn the Divisions, Units, and Topical Groups of APS are ramping up efforts to have another outstanding March Meeting in Boston, MA. FIAP continually strives to be inclusive to all physicists with special regard to the students and our industrial colleagues. We are making strong efforts to inform industrialists and students of the numerous efforts at the APS to be more relevant to their needs by participating in APS Industrial Advisory Board, by having a representative on the APS Panel of Public Affairs (Jim Adams) and having a representative from Forum on Graduate Student Affairs (Carola Emminger) to keep us current on the additional needs and interactions that FIAP should be striving for. We work with Crystal Bailey on Physics Innovation & Entrepreneurship Education (PIE) and feel that entrepreneurship is an important avenue for future careers of physicists. One of the best skill sets that physicist’s possess is their problem solving abilities and in this regard numerous opportunities exist for physicists in making of new companies and technologies.

I applaud our new Vice Chair Mike Gordon, whose efforts and hard work in orchestrating the FIAP invited sessions for March Meeting 2019 resulted in FIAP sessions continuously from Tuesday-Thursday with outstanding and very relevant talks. The inherent complexity of the March Meeting can leave one lost. If that happens to be you, please stop by our invited talk session meeting room and the numerous events that are outlined in the FIAP Industry Day brochure (to be published in January). I look forward to hearing feedback from our membership so that we can improve FIAP to better serve the APS community and appreciate all your support. Please contact me at mk@quanttera.com with your ideas.

Thank You.

Matt Kim