FIAP Newsletter
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American Physical Society Forum on Industrial & Applied Physics



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

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# Letter from the Editor

Being new in the position as editor of the Forum on Industrial and Applied Physics (FIAP) newsletter, I wanted to provide a brief introduction and welcome to the FIAP community. My name is Todd Brintlinger, and I am a Research Physicist in the Materials Science and Technology Division at the U.S. Naval Research Laboratory, a FIAP sorter for the March Meeting, and a Member-at-Large for FIAP. Having spent much of my career focusing on Applied Physics, first in academia and now at the corporate laboratory for the Dept. of the Navy, expanding the breadth of Applied Physics and combining resources with Industrial Physics is a subject for which I have a passion. 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. fellowship and prize nomination deadlines. 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.

# Nominating Deadlines on June 1st

The nominating deadline for both FIAP Fellows and the Distinguished Lectureship on the Applications of Physics is on June 1st.

The process for nominating someone to a FIAP Fellowship is carefully outlined in a document at https://www.aps.org/units/fiap/fellowship/upload/fiap-fellowship-nominations.pdf

As one of APS's largest units, FIAP represents those physicists plying their craft in both industrial and applied settings, and as such, FIAP provides Fellowships for physicists that have made their marks outside academia. Please consider nominating colleagues that have especially strong patent and/or commercial experience, or who have made an impact on the world using physics in places not conventionally associated with physics. We especially encourage the nomination of underrepresented minorities and female physicists.

FIAP also sponsors the Distinguished Lectureship on the Applications of Physics, which is currently filled by Robert Kleinberg. A description of the prize, the process for nomination, and current and past recipients can be found at: https://www.aps.org/programs/honors/awards/applications.cfm

As with Fellowships, FIAP encourages nominees who have made their careers in non-academic institutions, but who maintained strong ties to their physics background. Also similar to the Fellowship nominations, FIAP especially encourages the nomination of underrepresented minorities and female physicists.

# FIAP at the March Meeting

The FIAP APS March Meeting 2018 in Los Angeles, CA, had numerous FIAP events from a very exciting student panel pizza lunch to our Invited sessions, with additional focus sessions. Some highlights from this year's Industry session with the theme "Big Data" was the special invited session on the "Physics that Changed the World", which Professor Eli Yablonovitch started.

This year's "Physics That Changed the World" session, had speakers:

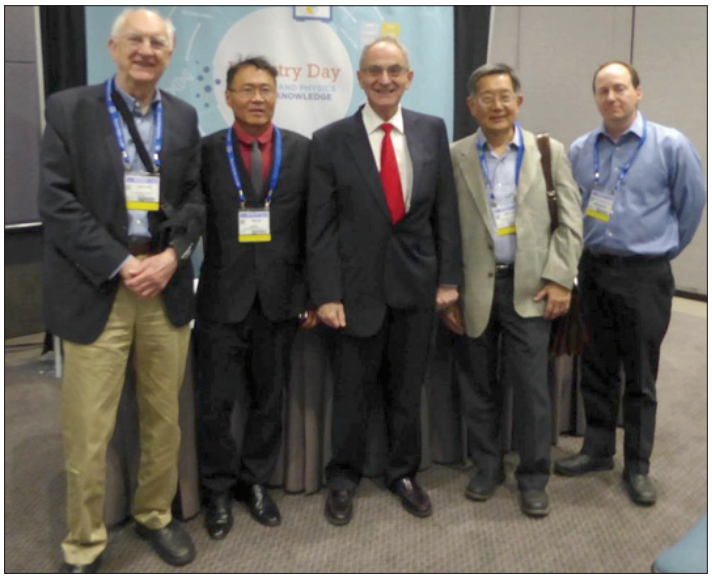
**Prof. Milton Feng**, ***University of Illinois***, "Oxide-Confined VCSELs"

**Prof. John Clarke,** ***UC Berkeley***, "The Ubiquitous SQUID: History and Applications"

**Prof. Stephen Forrest,** ***University of Michigan***, "How Organic Light Emitting Diodes Revolutionized Displays

**Dr. Barry Stipe**, ***Western Digital Corp***, "The Magnetic hard Disk Drive- How Information is Stored in the Cloud"

**Prof. Eli Yablonovitch**, ***UC Berkeley***, "The Double-Heterostructure Concept in Lasers, LED's, and Solar Cells"



*From right to left: Professor John Clarke, Dr. Matt Kim, Professor Eli Yablonovitch, Professor Milton Feng, and Dr. Barry Stipe*

This year this session was recorded and the videos of the talks can be found at the following link https://www.youtube.com/watch?v=3q2L5DyvpJY&index=5&list=PLgxD9DiwxLGp8TwCPVm7Zs3ZPaIBYkwsp.

This session followed the inaugural session of "Physics that Changed the World" at the 2017 March meeting in New Orleans, LA had the following speakers:

**Prof. Steven Denbaars**, ***UCSB***, "Energy Efficient GaN Lighting"

**Dr. Jim Wynne**, ***IBM***, "LASER Refractive Surgery"

**Prof. Paul Bottomley**, ***Johns Hopkins***, "Magnetic Resonance Medical Imaging (MRI) from the Inside",

**Dr. Peter Littlewood**, ***Argonne National Lab***, "Batteries that Changed the World"

**Prof. Steven Chu**, ***Stanford University***, "GPS and Precision Time-Keeping"

# Careers Events at the March Meeting

Several additional events promoting non-academic career paths took place at the March Meeting. The APS Future of Physics Days events, targeted primarily at undergraduate students, included a workshop "Building Your Undergraduate Physics Career." Crystal Bailey, Careers Program Manager at APS led the workshop, which gave an overview of physics employment for BS, MS, and PhD degree paths, and provided information on key professional skills such as building one's network, doing informational interviews, and writing an effective resume. The event was attended by nearly 200 undergraduate students and their faculty mentors.

APS also hosted a Careers in Physics workshop, presented by acclaimed career author and coach Peter Fiske. Fiske provided comprehensive strategies and advice for science graduates on how to take their physics job search to the next level, including tips for self-assessment, network building, resume writing, interviewing, and salary negotiation. The event was attended by over 120 undergraduates, graduate students, and postdocs.

The Forum on Education also hosted an invited session focusing on the skills needed to prepare physics graduates for 21st century careers. The session featured a report from the Joint Task Force on Undergraduate Physics Programs, which recommends that physics educators focus on giving students an understanding of physics applications in real-world settings, working well in interdisciplinary teams, and how to communicate meaningfully to a variety of audiences. The session also featured educators associated with the APS PIPELINE program, an NSF-funded effort to support innovation and entrepreneurship in physics by building and disseminating curricular approaches to teaching these important skills. For more information about innovation and entrepreneurship (PIE) education efforts in physics, please see this article

http://www.aps.org/units/fiap/newsletters/201712/pipeline.cfm?utm_source=Units&utm_campaign=7590d1d3fc-FIAP+Winter+2017+Newsletter&utm_medium=email&utm_term=0_a5eb4215e8-7590d1d3fc-107052813 in the FIAP Winter 2017 Newsletter.

# Industry Day Highlights

*Ichiro Takeuchi*

The theme for the Industry Day this year was "Big Data and Physics - Bits to Knowledge," and FIAP had multiple co-sponsored invited sessions covering a range of topics on data science. The Wednesday morning session titled "Data Science as the Driving Force for Industrial Physics" was chaired by Jason Gardner from FECS (Forum on Early Career Scientists), and speakers from academia and industries talked about how data science is transforming our society. In-depth discussions included pitfalls of big data and how to navigate one's career in the field of data science.

The midday session was "Physics That Changed the World" chaired by Eli Yablonovitch (UC Berkeley). From laser diodes and organic LEDs to bipolar transistors and magnetic hard drives, invited speakers chronicled invention and history of a number of key device components used in everyday electronics, the hardware which supports and enables big data. See "FIAP at the March Meeting" on page 2 in this newsletter for additional details.

The afternoon session titled "Put Big Data in Your Physics Toolbox" was co-sponsored by AIP, and it was chaired by Steven Lambert (APS) and Brad Conrad (AIP). This session featured invited speakers who are actively using data science techniques in tackling physics and other science problems, and the use of artificial intelligence and machine learning was the recurring theme of the talks.

# *Meet Your Future* Panel Discussion

For several years FIAP and the APS Careers team have organized a panel discussion at the March Meeting with physicists working in the private sector. This year more than 250 students came to hear from these panelists:

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|---|---|---|---|
| Mike Matthews | AOSense | Director of Inertial Navigation | LI |
| Alexa Staley | Rigetti Computing | Quantum Engineer | LI |
| Daniel Sank | Google | Quantum Electronics Engineer | LI |
| Christy Tyberg | IBM Research | Manager, Novel Computing Technologies | LI |

You can learn more about their background from the LinkedIn link at the end of each line. Each panelist gave a short self-introduction including how they arrived in their present job. The floor was then open for questions which continued for more than 90 minutes. Students raised many topics including how to prepare for an interview, work-life balance, and making contacts with physicists working in industry.

Steven Lambert, APS Industrial Physics Program Manager, (below left), opened the session with an overview of career opportunities, salary expectations, and APS career resources for physics majors and PhD students. The most important message is that there's about 1800 new physics PhD's every year, and about 300 academic openings. The good news is that industry wants to hire physicists, and APS has resources to help with that. There's also many pathways for startups and entrepreneurs. Crystal Bailey, APS Careers Program Manager, commented on some of the questions including referrals to the APS Careers Webpage at http://www.aps.org/careers/. Check out those resources and prepare for your future!


# FIAP Chair's Thoughts

One of the main roles of FIAP is to attract outstanding industrial physicists to provide guidance and mentorship to the numerous physics students. When most graduating physicists (70%) will not find academic positions, we can provide a haven for such linkages. We are also reaching out to other societies such as the Materials Research Society (MRS) and Institute of Electrical and Electronics Engineers (IEEE). Dr. Todd Brintlinger (FIAP News Letter Editor) and I along with the Arizona Nanotechnology Cluster (non-profit to promote science in Arizona) have met with MRS organizers at the MRS spring meeting in Phoenix, AZ (April 2-6), to discuss further collaboration between the two organizations. I will be meeting with members of IEEE MTTS meeting in Philadelaphia, PA (June 10-15) to look at collaborations between our organizations. I congratulate Ichiro Takeuchi our new chair elect and the rest of the FIAP team for putting out an outstanding March Meeting program. I look forward for hearing feedback from our membership in methods to further promote ideas for the betterment of APS! Please contact me at mk@quanttera.com with your thoughts.

Thank You

**Matt Kim**

# Letter to the Editor

At this past March American Physical Society meeting in Los Angeles, a very well planned and executed program was presented under the title: "How to Get a Job". The very large audience in attendance was predominantly comprised of graduate students in the process of completing their Ph.D. programs. Getting a job was their next career task…and the excellent speakers at this session provided a broad range of ideas for how to begin their quest.

As I looked back at my own three decades of hiring physicist colleagues who provide the backbone and substance of my company, I realized that I (like virtually all other employers) begin with a review of the applicant's previous experience as exemplified in their publications. I must admit that I am somewhat prejudiced in this regard, having written a brief article for *Physics Today* several years ago. That article, "Too Many Authors, Too Few Creators,"[1] cited (complained about) the increasing number of coauthors appearing on published articles. Basically, the number of authors per paper has been increasing steadily with each passing decade. Virtually no paper nowadays is written by a single author. Perhaps by coincidence, perhaps as a consequence, the number of journals has increased explosively, from 74,000 in 1981 to 172,000 by 2003! Add to that, of the articles published from 2002 through 2006, only 40.6% were cited at least once in the 5 years following publication.[2] And, of those, probably the majority were self-citations.

But the glut of academic publishing (perhaps because of the academic mantra of "Publish or perish!"[3]) is not the focus of this brief article. However, it does suggest immediately a means to accelerate the chance that your job application will be noted and result in a high probability of an immediate interview: write and have accepted for publication a quality paper on which you are the only author. Hard to do during graduate work? Absolutely! Impossible? Not if you are a physicist with a broad understanding of science outside the area of your Ph.D.

Such a single author article could be on a whimsical subject[4] that involves physics or even a brief fragment of your thesis work (provided your advisor is willing…very rarely possible).

So, start learning…fast. Then, in your spare time, begin zeroing in on your exceptional, single author paper…and an interview for a possible job.

**Philip J. Wyatt**
***Wyatt Technology Corporation, Santa Barbara, California***

1. Wyatt, Philip J. "Too Many Authors, Too Few Creators" *Physics Today* 65,4, 9 (2012).
2. Trimble, Stanley W., Grody, Wayne W., McKelvey, Bill, and Gad-el-Hak, Mohamed. *Academic Questions* 23, 269-271 (2010).
3. Gad-el-Hak, Mohamed. *Physics Today* 57(3), 61 (2004).
4. Wyatt, Philip J. "The taste of things to come" *Applied Optics* 21, 2471-2472 (1982).