

FIAP Winter 2012 *Newsletter*

American Physical Society Forum on Industrial & Applied Physics

Remember to attend the FIAP business meeting on Tuesday, 18 March 2013 at the March Meeting in Baltimore to meet our newest Fellows!

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Exciting Industrial Physics Sessions at the March APS 2013 Meeting

John Rumble

We have put together a series of outstanding speakers on topics of importance to all FIAP members for the March APS 2013 meeting being held in Baltimore MD from Sunday March 17, 2013 to Friday March 22, 2013. The invited sessions have been designed to directly appeal to practicing industrial and applied physicists as well as students and post docs thinking about careers in industry, national laboratories, and other organizations.

We have four broad themes for the invited sessions:

1. **Innovation and Entrepreneurship for Physicists, including “How to become an industrial physicist”**
2. **The Next Big Thing - Nanomanufacturing**
3. **Frontiers of Biophysics – Physics Challenges in Health and Medicine**
4. **Frontier Physics for Industry**

We have concentrated the invited sessions into two days to make meeting attendance profitable for those who can attend just one or two days of the meeting.

In addition to these invited sessions, we will have numerous contributed sessions on semiconductors and other important topics of interest to industrial physicists. These will be announced about January 1, 2013. **Plus we have the 2013 AIP/APS Industrial Physics Forum highlighting how physics will play an important role in the future economy, which is described in more detail below.**

Details about the Invited Sessions are given below. Come join us in Baltimore for a great industrial physics get-together. Let me know if you have questions about the program at jumbleusa@earthlink.net (John Rumble)

Physicists and physics-based companies and research institutes have always been leaders in innovation and entrepreneurship, and the challenges of our 21st century economy provide more opportunities than in recent years. In addition to technical session on two areas – nanomanufacturing and biophysics - where physics-based innovation are highlighted (see right), FIAP is presenting two full sessions on innovation and entrepreneurship.

The first session – Sunday March 17, 2013, (2:30 pm to 5:00 pm) – opens the March 2013 meeting with speakers who approach innovation and entrepreneurship from a variety of approaches. This session is part of the AIP/APS 2013 Industrial Physics Forum. Join us to learn from their successes:

The second session on Thursday March 21, 2013 (2:30 pm to 5:00 pm), organized by Joseph Sabol, is based on successful sessions held at recent American Chemical Society programs on starting your own business. It has assembled five speakers who will address starting your own company from a variety of perspectives.

Industrial Physics Forum: Innovation and Entrepreneurship	
Sunday March 17, 2013 (2:30 pm to 5:30 pm)	
Robert Colwell, DARPA	Government-sponsored Innovation
Mason Peck, Chief Technologist, NASA	The Role of Physics in Innovation
Hubert Lakner, Fraunhofer-Institut für Photonische Mikrosysteme	Physics and Innovation: A German Perspective
Jason Cleveland, Asylum Research	Physics and Entrepreneurship: A Small Business Perspective
Robert Doering, Texas Instruments	Physics and Innovation: A Large Company Perspective

Start-ups and Small Businesses: Success Stories and Tool Kits	
Thursday March 22, 2013 (2:30 pm to 5:30 pm)	
Guiana Arnold, Saul Ewing LP	Top 10 steps to business success
Debra Bowes, Chevy Chase BioPartners	Learning from an entrepreneur: Starting your own consulting business
Joseph Kimberly Brown, Amethyst Technologies, LLC	The road from university to small business
Shirley Collier, Optemx, LLC	The untapped entrepreneurial frontier: Transferring innovation from the Laboratory to the market
Kris Appel, Encore Path, Inc	Identifying, licensing, and commercializing technology: An entrepreneur's point of view

Theme 1: So you want to be an Industrial Physicist

Young physicists often recognize that their interests and career opportunities lie in the direction of industry or applied physics organizations. Where to start? How do you find such jobs? How do you prepare yourself for applying and the interview process? How do you write a resume tailored for industry? In fact, what do industrial physicists do?

FIAP is helping to sponsor two lunch meetings designed specifically for physics graduate students and post docs answer these and many more questions. Reserve your spot now and get prepared for the best jobs in the world – as an industrial physicist. Plus get a free lunch!

Schedule on next page

Tuesday March 19, 2013, 1:00 pm – 2:30 pm: A general session on Industrial Careers for Physicists

Best Practices in your Industrial Job Search

- Resume vs. CV—what is the difference, and how can you use yours to land industrial physics jobs
- Interview skills—“No, you can’t wear your jeans to an interview”
- Networking – building your Industrial job search network when all of your mentors/advisors are academics
- Selling Yourself—making the case for physics expertise in what is likely to be an engineering job
- Transitions between Industrial and Academic Careers—what are the benefits of integrating the two experiences into your career path?

The True Nature of an Industrial Physics Job (as opposed to academic research)

- Would I do “real” research in industrial labs?
- Will I need to develop other skills to be successful (e.g. management, negotiation, presentation skills)?
- Corporate culture: can I keep my “soul” as a physicist in a corporate environment?
- What will define “success” in these environments?

When Nobody Else is Doing It”—Physics entrepreneurship

- Identifying opportunity when it arises (e.g. through graduate research)
- Building Capital/Investment
- Dealing with the concept of risk—are the potential rewards worth it?

Wednesday, March 20, 2013, 1:00 pm – 2:30 pm: Graduate student lunch with experts

This is a lunch sponsored by several divisions and Forums of the American Physical Society. Graduate students sign up in person registration and have an opportunity to be seated at their requested table with an expert who will converse with the students and answering any questions they might have on the experts stated area of expertise.

FIAP is presently committed to multiple tables, with each table seating six students plus one expert. For graduate students interested in careers in industry, national laboratories, and other non-academic institutions, this is an excellent chance to ask expert physicists direct questions. More information is available on the PAS web site when you register for the March 2013 meeting.

Theme 2: The Next Big Thing – Nanomanufacturing

After years of talk and planning, nanomanufacturing is taking off big time, and the physics issues are challenging, interesting, and critical for success. FIAP has organized two invited sessions that define these challenges both on a broad scope and in detail for specific instances. Both sessions will present state-of-the-art talks as well as identify opportunities for new physics research. The sessions are on consecutive days to enable participants who can attend the meeting for only two days to attend both.

The first session, part of the AIP/APS Industrial Physics Forum, takes place Monday March 18, 2013 and has five speakers from industry, academia, and national labs as a frontier activity.

Industrial Physics Forum: Frontiers in Nanomanufacturing	
Monday March 18, 2013 (2:30 pm – 5:30 pm)	
James Alexander Liddle, NIST Center for Nanoscale Science and Technology	Frontiers of Nanomanufacturing: An Overview
Thomas Theis, Semiconductor Research Corporation and IBM Research	New Computing Devices and the Drive toward Nanometer-scale Manufacturing
Michelle Simmons, University of New South Wales	Atomic Scale Electronics
Shawn Douglas, University of California at San Francisco	Nanoscale Construction with DNA
Harry Atwater, California Institute of Technology	Manufacturing for Terawatt-Scale Energy Applications

The second session on focuses on some specific issues in nanomanufacturing, including atomic scale metrology, large scale industry technology challenges and inherent device limitations will be held Tuesday March 19, 2013 (11:15 am to 2:15 pm).

Frontiers in Nanomanufacturing: Atomic Scale Metrology, Large Scale Industry Technology Challenges and Inherent Device Limitations	
Tuesday March 19, 2013 (11:15 am – 2:15 pm)	
Christian Kisielowski, Lawrence Berkeley National Laboratory	Time-Resolved, Atomic-Resolution Imaging of Metastable Atom Configurations
Thomas R. Albrecht, HGST	Nanopatterning of Magnetic Recording Media at 1 Terabit per Square Inch and Beyond
James J. Watkins, University of Massachusetts Amherst	Scalable Fabrication of Nanostructured Devices on Flexible Substrates using Additive Driven Self-Assembly and Nanoimprint Lithography
Scott List, Intel Corporation	Imagining and Imaging Future Devices- A Physicist’s Dream
Asen Asenov, University of Glasgow	Atomic Scale Effects and Variability in Nano Electronic Devices below the 10 nm Mark

Theme 3: Frontiers of Biophysics – Physics Challenges in Health and Medicine

Physics is providing the biological and medical sciences with unprecedented capabilities to look at, manipulate, and alter biological entities at the molecular, cellular, organ, and higher levels. FIAP’s two invited sessions on biophysics cover some of the most exciting topics in the field today. Again, the sessions are scheduled on one day to facilitate attendance at both by those with limited time, with speakers from industry and academia.

The first session, part of the AIP/APS Industrial Physics Forum, covers an exciting list of topics in which physics provides new techniques and approaches to significant bio-medical problems. This session will be held on Tuesday March 19, 2013 (8:00 am – 11:00 am) and is jointly sponsored by DBIO.

Industrial Physics Forum: Frontiers of Biophysics Tuesday, March 19, 2013 (8:00 am – 11:00 am)	
William Moerner, Stanford University	Single Molecule and Super-resolution Imaging
Sara Nichols, University of California San Diego	Rational Drug Design
Adam Arkin, Synthetic Biology Institute; University of California	Synthetic Biology
Michael Roukes, California Institute of Technology	Single molecule and single cell sensing with nanomechanical systems
Scott Tanner, DVS Sciences and University of Toronto	Mass Cytometry

The second session – Physics Challenges in Biophysics – looks at five areas in which new devices, deeply dependent of state-of-the-art physics, are transforming the way we look at and address bio-medical problems. This session is also on Tuesday March 19, 2013 (2:30 pm – 5:30 pm).

Physics Challenges in Biophysics Tuesday, March 19, 2013 (2:30 pm – 5:30 pm)	
Alessandro Olivo, University College, London	X-ray phase contrast imaging
Cha-Meu Tang, Creatv Micro Tech, Inc.	Circulating tumor cell capture technologies
Sheila Nirenberg, Weill Medical College, Cornell University	Artificial vision
Stuart Harshbarger, Contineo Robotics, Inc.	Smart Prosthetics
Jiangfeng Fei, JDRF	Artificial pancreas

Theme 4: Frontiers Physics for Industry

One of the prime purposes of FIAP and the March APS meeting is to bring the latest advances in physics to the attention of industrial and applied physicists. FIAP has put together three invited sessions, in cooperation with other APS Divisions and AIP, that highlight important areas where new physical insights are open opportunities for industrial applications.

The first of these is the AIP/APS Forum session of Frontiers of Physics, which covers some of the most exciting new fundamental developments in physics today. While some of these areas will impact industry only in the long term, recent advances make it important to keep industrial physics apprised of the future possibilities.

Industrial Physics Forum: Frontiers in Physics Monday March 18, 2013 (8:00 am – 11:00 am)	
Michael Tuts, Columbia University	Updates On The Search For The Higgs Boson
Collin Broholm, NIST	Quantum Liquids Within Crystalline Solids
Matthias Steffen, IBM	Quantum Computing
Millie Dresselhaus, MIT	Frontiers of the Physics of Carbon Nanotubes
Wendy Freedman, Carnegie Observatories	Giant Magellan Telescope

The second session features five interesting talks on the physics and applications of transparent conducting oxides (TCOs) are a technologically important class of materials with applications from solar cells to touch screens. This session, on Thursday March 21, 2013 (8:00 am – 11:00 am) presents both experimental and theoretical results on TCO properties, growth and device fabrication.

Physics and Applications of Transparent Conducting Oxides Thursday March 21, 2013 (8:00 am – 11:00 am)	
John Wager, Oregon State University	Amorphous oxides for display applications
David Ginley, NREL	Growth and characterization of transparent conducting oxides for optoelectronic devices
Hartwin Peelaers, UC Santa Barbara	Fundamental limits on transparency: First principles calculations of absorption
Tim Veal, University of Liverpool	Surface electron accumulation layers in oxide semiconductors
Roy Gordon, Harvard University	Low temperature growth of transparent conducting oxides

The third session is organized DPOLY and is jointly sponsored by FIAP. Five speakers from industry and applied research laboratory will present recent work on industrial applications of polymer-based soft materials. This Thursday March 21, 2013 (2:30 pm – 5:30 pm) session continues FIAP partnership with DPOLY to highlight new industrial research on polymers.

Polymer-based Soft Materials: Industrial Applications (DPOLY and FIAP) Thursday March 21, 2013 (2:30 pm – 5:30 pm)	
Richard Vaia, Air Force Research Laboratory	Polymer-based actuators and their impact for aerospace
Valeriy Ginzburg, Dow Chemical Co.	Associative Thickeners: Industrial Applications and Rheology Modelings
Wilson Lee, Estee Lauder Co.	Particles against Reactive Oxygen Species for Sun Protective products
Jason Z. Li, Ingredion Inc.	Starch Applications for delivery Systems
Anantha Desikan, Israel Chemical	Development of Flame Retardants for Engineering Polymers and Polyurethanes

The AIP/APS Industrial Physics Forum: Physics in the Future Economy

For over 30 years, the Industrial Physics Forum (IPF) sponsored by the American Institute of Physics has brought together research managers and decision makers from industry, academia, and government, who seek to keep abreast of research and policy issues affecting the physical sciences community.

This year, the IPF is being organized jointly by the Corporate Associates of the American Institute of Physics (AIP) and the Forum on Industrial and Applied Physics (FIAP) of the American Physical Society (APS) and will be held in conjunction with the March 2013 APS meeting being held in Baltimore MD on March 17-22, 2013. The IPF features invited-speaker sessions that complement the APS sessions. Experts from across the field discuss new applications of physics, product developments, and other opportunities for science in today's economic environment.

The theme of the 2013 AIP/APS Industrial Physics Forum is Physics in the Future Economy. Four sessions are being held (described in more detail above) on the following subjects.

- Innovation and Entrepreneurship (Sunday March 17, 2013 – 2:30 pm to 5:30 pm)
- Frontiers of Nanomanufacturing (Monday March 18, 2013 – 8:00 am to 11:00 am)

- Frontier of Physics (Monday March 18, 2013 – 2:30 pm to 5:30 pm)
- Frontiers of Biophysics (Tuesday March 19, 2013 – 8:00 am to 11:00 am)

Each of these sessions is open to the public at no charge.

FIAP Focus and Contributed Paper Sessions

As usual, FIAP will have an outstanding lineup of focus and contributed paper sessions. These will be announced in full detail in the APS March meeting announcement and program. So you can do your planning, a brief summary is given here.

Semiconductors

Monday March 18, 2013	3 Focus sessions
Tuesday March 19, 2013	2 Focus sessions
Wednesday March 20, 2013	1 Contributed session
Thursday March 21, 2013	4 Contributed sessions
Friday March 22, 2013	4 Contributed sessions

Quantum Hall Effect

Monday March 18, 2013	3 Contributed sessions
Wednesday March 20, 2013	2 Contributed sessions

Applications

Thursday March 21, 2013 (Nano- and optical technology)	2 Contributed sessions
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FIAP Prize Session

Tuesday March 21, 2013 11:15 am to 12:30 pm

The FIAP Prize session will feature two prize winners.

George E. Pake Prize Award Address -- Mark Pinto, Applied Materials Inc

Prize for the Industrial Applications of Physics Award Address -- John Woollam, University of Nebraska

**Summary Table of FIAP Invited Sessions
APS March 2013 Meeting, Baltimore MD**

	8:00 am to 11:00 am	11:15 am to 2:15 pm	2:30 pm to 5:30 pm
Sunday March 17			AIP/APS IPF: Innovation and Entrepreneurship
Monday March 18	AIP/APS IPF: Frontiers of Physics		AIP/APS IPF: AIP/APS IPF: Frontiers of Nanomanufacturing
Tuesday March 19	AIP/APS IPF: Frontiers of Biophysics	FIAP: Frontiers in Nanomanufacturing: Atomic Scale Metrology, Large Scale Industry Technology Challenges and Inherent Device Limitations	FIAP: Physics Challenges in Biophysics
		11:15 am to 12:30 pm FIAP Prize Session	
		1:00 pm – 2:15 pm FIAP Graduate student/Post-Doc lunch: Industrial careers for physicists	
Wednesday March 20		APS Graduate student: Lunch with experts	
Thursday March 21	FIAP: Physics and Applications of Transparent Conducting Oxides		FIAP: Start-ups and Small Businesses: Success Stories and Tool Kits
			DPOLY/FIAP: Polymer-based Soft Materials: Industrial Applications