Crossing Disciplines with Physics

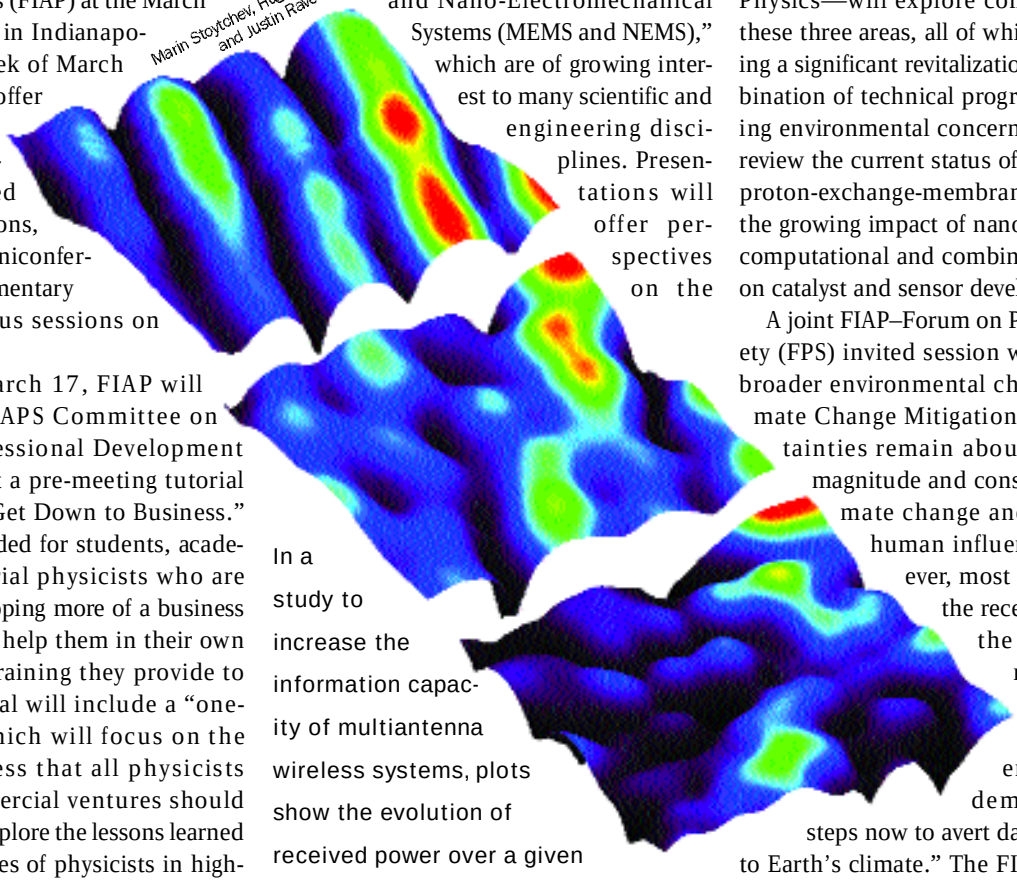
Physicists are particularly well suited for interdisciplinary research because of their thorough grounding in fundamental concepts and the power and broad applicability of their theoretical, experimental, and computational methodologies.

The wide-ranging interests and contributions of industrial and applied physicists will be highlighted by the American Physical Society's (APS's) Forum on Industrial and Applied Physics (FIAP) at the March 2002 APS meeting in Indianapolis. During the week of March 18–22, FIAP will offer its most extensive program ever, consisting of 12 invited and 15 focus sessions, including three miniconferences with complementary invited and focus sessions on the same topic.

On Sunday, March 17, FIAP will partner with the APS Committee on Careers and Professional Development (CCPD) to present a pre-meeting tutorial titled "Physicists Get Down to Business." This event is intended for students, academics, and industrial physicists who are interested in developing more of a business mind-set, either to help them in their own careers or in the training they provide to others. The tutorial will include a "one-hour M.B.A.," which will focus on the aspects of business that all physicists involved in commercial ventures should know. It will also explore the lessons learned from the experiences of physicists in high-tech start-ups and larger corporations.

The tutorial will follow a complementary CCPD workshop held earlier that day and provide useful background for a joint FIAP–Forum on Education invited symposium on Monday, March 18, on the topic "Educating Physicists for Industrial Careers." The symposium will review the changing career opportunities and needs of industrial physicists and describe some of the innovative ideas, courses, and programs that are being developed in university physics departments in response to these needs and opportunities.

The three miniconferences are part of FIAP's efforts to strengthen the ties between the mainstream APS community and more-applied interdisciplinary researchers who typically favor smaller, specialized meetings. A miniconference co-sponsored by the APS Topical Group on Instrument and Measurement Science (GIMS) is titled "Micro- and Nano-Electromechanical Systems (MEMS and NEMS)," which are of growing interest to many scientific and engineering disciplines. Presentations will offer perspectives on the science, technology, measurements, and applications of MEMS and NEMS, with emphasis on fabrication issues and the evolving interface with biotechnology.



Marin Stoytchev, Hugo Safar, and Justin Ravenhe

In a study to increase the information capacity of multiantenna wireless systems, plots show the evolution of received power over a given area after launch of a microwave pulse.

"Bioimaging," a FIAP–Division of Biophysics miniconference, recognizes the growing demand for physics-based imaging technologies in all aspects of biology, from medical diagnostics to the behavior of single biological molecules. This topic will provide an in-depth follow-up to FIAP's successful March 2001 Pake Prize session in honor of Lewis Edelheit of General Electric Co. Invited talks will emphasize emerging trends in techniques for bioimaging, from blood vessels, to living cells, to single molecules, to the human genome.

The third miniconference—"Catalysis, Fuel Cells, and Chemical Sensors," a joint effort with the Division of Chemical Physics—will explore common issues in these three areas, all of which are undergoing a significant revitalization due to a combination of technical progress and increasing environmental concerns. Speakers will review the current status of solid-oxide and proton-exchange-membrane fuel cells and the growing impact of nanotechnology and computational and combinatorial methods on catalyst and sensor development.

A joint FIAP–Forum on Physics and Society (FPS) invited session will examine the broader environmental challenge of "Climate Change Mitigation." Many uncertainties remain about the potential magnitude and consequences of climate change and the degree of human influence on it. However, most experts support the recent statement by the science academies of 16 countries that "the balance of scientific evidence demands effective steps now to avert damaging changes to Earth's climate." The FIAP–FPS session will examine some of the strategies and technologies being considered for reducing greenhouse-gas emissions in different sectors, especially the electric-power, oil, and automobile industries.

FIAP and FPS will also sponsor an invited session titled "Industrial Physics Success Stories." These presentations—modeled in part on the American Institute of Physics' lobbying materials (available at http://www.aip.org/success/)—will provide examples of how physics research has fostered

economic growth and other societal benefits. Various speakers will offer historical perspectives on developments in optical fibers, global positioning, liquid-crystal displays, oil exploration, and automotive emissions control.

Another ongoing success story will be the subject of "The Future of Information Technology," this year's Pake Prize symposium in honor of Paul Horn of IBM. This symposium will focus on emerging computing technologies, such as quantum and "amorphous" computing. Technologies that facilitate the wireless transfer of information will be the subject of a complementary FIAP invited symposium titled "Frontiers in the Physics of Wireless Communication" (see figure on p. 18).

Most other FIAP invited and focus sessions will emphasize exciting developments in relatively traditional areas of applied physics research. "Novel Magnetic Technologies," an invited session jointly sponsored with the Topical Group on Magnetism and its Applications, will include diamagnetic levitation, magnetic shape-memory materials, and magnetorheological fluids and elastomers. A FIAP-GIMS invited symposium will discuss "Vacuum-Ultraviolet Optical Science and Measurements," and FIAP and the Division of Materials Physics will team up for an invited symposium titled "Wide Bandgap Semiconductor Device Applications." A variety of focus sessions will cover many other topics, with several each in the categories of nanoscale materials and optical spectroscopies.

A highly interdisciplinary FIAP invited symposium, "Coping with Complexity," will explore the growing interest in physics-based insights and methods in complex systems research. Co-sponsored by the Topical Group on Statistical and Nonlinear Physics, this session will address progress in linking fundamental developments to important practical problems, including applications to engineering, finance, traffic modeling, drug design, and politics.

Further information about the March 2002 APS Meeting and all of FIAP's sessions is available at www.aps.org. Ω

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