THE BIOLOGICAL PHYSICIST

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In this Issue

Happy New Year! This issue of THE BIOLOGICAL PHYSICIST brings you a feature interview with Russell K. Hobbie, author of the classic textbook *Intermediate Physics for Medicine and Biology*. This book, which has had an enormous impact on interdisciplinary research and education, is due to appear in its fourth edition in the next few months, co-authored by Hobbie and newly-elected APS Fellow Brad Roth. Turn to page 2 for the story of how the book came to be written! And don't miss the important DBP announcements in this issue (remind your students to apply for March Meeting travel grants!), as well as the job ads, PRE and PRL highlights, a list of the newest APS Fellows nominated by the Division of Biological Physics, and a call for proposals from the Human Frontier Science Program.

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A Conversation with Russell Hobbie

In just a few months, the fourth edition of Intermediate Physics for Medicine and Biology will be published by Springer. This textbook, first written by Russell Hobbie, of the University of Minnesota, three decades ago, has had a seminal influence on the development of interdisciplinary education and research. Though today there are a number of such texts, at the time it appeared, the book was "quite unique", in the words of Oakland University's Brad Roth, who is a co-author of the fourth edition. In this special feature, THE BIOLOGICAL PHYSICIST *explores the origin of this book and its role in the shaping of interdisciplinary science.*

THE BIOLOGICAL PHYSICIST *(to Brad Roth): Tell us a little about how you first became acquainted with Hobbie's text, and how you see it has having influenced the field.*

Brad Roth: I used the first edition of Hobbie's book for a class taught by John Wikswo when I was a graduate student at Vanderbilt University. This was a very crucial time in my education, when I was changing from a physics undergraduate student to a biological physics graduate student. The book had a huge impact on me and my career.

When visitors come by my office at Oakland University, they sit politely and listen to me describe my research. Then I mention "Oh, by the way, I am also going to be second author on the 4th edition of Hobbie's book *Intermediate Physics in Medicine and Biology*." At this point, their eyes usually light up and they say, almost with disbelief, "Really? I know that book."

In 1989, John Wikswo wrote a review in *Physics Today* of the 2nd Edition of Hobbie's book (*Physics Today*, Vol **42**, 75-76, Jan 1989). He concluded with "A good way to become a medical physicist or biophysicist is to master everything in Hobbie's *Intermediate Physics for Medicine and Biology*." I suppose if he wrote the review now, he would write "A good way to become a biological physicist..."

Editor's note: When contacted by e-mail, John Wikswo did indeed say precisely that!

THE BIOLOGICAL PHYSICIST *(to Russ Hobbie): Could you describe your career trajectory, how you came to be interested in interdisciplinary science, and how you came to write the book?*

Russ Hobbie: My career trajectory has some rather strange kinks in it – almost drift plus random walk. These wanderings had a lot to do with the genesis of the book. In 1956 I did my senior thesis with Ted Hueter in the acoustics lab at MIT, measuring the attenuation of ultrasound in living tissue. Ted was working with a group at Mass. General Hospital that was exploring the use of focused ultrasound for neurosurgery. My measurements were on gastrocnemius and tongue; in those days before informed consent I would snag anyone walking by the lab door as a subject.

During my first year as a graduate student at Harvard, I met a pathology resident from the Peter Bent Brigham hospital named Elias Amador. He allowed me to watch some of the autopsies he was doing, and this gave me a great appreciation of anatomy and physiology. (I learned last year that he is Susan Amador Kane's father. It is a small world!)

I set aside my biomedical interests at that time and did my PhD thesis on polarized neutron-proton scattering at the Harvard cyclotron—just before they started the experiments that led to treating patients on the cyclotron for over 25 years. I continued in nuclear physics when I came to

Minnesota as a post-doc in 1960. After becoming an Assistant Professor, I designed and installed the on-line computer in our new MP tandem Van de Graaf accelerator.

About 1965 I met another pathologist, Richard Reece, at a party. That chance encounter led to a collaboration that lasted 20 years. It was the time when sequential multichannel analyzers were introduced in clinical chemistry labs. Getting first 6, then 12, and finally 20 test results for the price of one led to a number of problems for physicians. Foremost was the false-positive problem when so many tests are performed on a healthy person: $0.95^{12} = 0.54$. But many diseases were associated with abnormal chemistry values that had not been recognized before, because no one had thought to order those tests when that disease was suspected. Dick and I wrote several papers on using the computer to interpret abnormal chemistry results.

Dick is a voracious reader, and he often tore articles that interested him from the journal he was reading (his own copy, I should add!). About this time my father-in-law came down with chronic glomerulonephritis and had to start renal dialysis. I borrowed Dick's collection of articles on dialysis. Mis-filed in that folder was an article that showed the survival curve in a few diseases followed a simple exponential. So I had the idea of snooping around the medical school to see if I could find other examples we could use to "jazz up" the premed physics course. I thought this should not be hard, since the medical school is a block from the physics building.

When I approached medical school Associate Dean W. Albert Sullivan, he invited me to lunch, where he suggested that I audit the first two years of medical school. I demurred that I was teaching, doing research, and serving as director of undergraduate studies in physics; I simply did not have time. Al said, "skip the labs." This was mid-October. I went from lunch directly to an embryology lecture on the 3rd pharyngeal pouch, and I continued sitting in on lectures for the next 20 months.

Two things soon became apparent: there were a *lot* of physics examples, and there is a very large gap between the level of our introductory physics course and the physics background needed to understand a research article, for example in the *Biophysical Journal*. This led me to develop a new course which proved popular with physics and engineering undergraduates, as well as graduate students in physics, physiology, pharmacology, and mechanical, electrical and chemical engineering.

Russ Hobbie

This course led to the first edition of *Intermediate Physics for Medicine and Biology*, which was published by Wiley in 1978. The second edition appeared in 1988. The third edition was published by Springer in 1997 as the initial volume in the AIP Biological Physics Series. I have been working on the fourth edition for about five years with a co-author, Brad Roth of Oakland University. We returned corrected page proofs to Springer just before Thanksgiving, so it should be out soon. I have really enjoyed working with Brad.

Biophysics has become nearly as broad as physics. I like to think of three general areas: the physics underlying physiology; the physics of diagnosis and therapy, known in this country as medical

physics; and molecular biophysics. The way this book came to be, coupled with my own interests and knowledge, mean that it is devoted to the first two.

THE BIOLOGICAL PHYSICIST: *Going back a bit earlier, what got you interested in science in the first place?*

Russ Hobbie: I can't remember. My father taught physics at Skidmore College, and my mother was the college librarian. I vividly remember an electronics kit that I received for my birthday when I was in 4th grade. I became a radio ham at age 13.

THE BIOLOGICAL PHYSICIST: *What made you set aside your biological interests and pursue a "pure physics" PhD?*

Russ Hobbie: Inertia, perhaps. But my biological interests were not strongly developed at that time. There was a lot of serendipity. I would not have received a postdoc at Minnesota in biophysics in 1960. And Minnesota is one of the few places where the medical school and physics building are so close.

THE BIOLOGICAL PHYSICIST: *Could you give more detail about your own interdisciplinary research interests over the years?*

Russ Hobbie: The computer interpretation of lab test results was not really biophysics, but it certainly used my skills in analyzing data and thinking in Fortran. As examples, I've published papers like these:

"Reading Chemistry Graphs," (with R.L. Reece), *Pathologist*, p. 187, June, 1969

"Computer Evaluation of Chemistry Values: A Reporting and Diagnostic Aid," (with R.L. Reece), *Amer. J. Clin. Path.* **157**: 664 (1972)

"A Computer Reporting and Interpretation System: Acceptance and Accuracy," (with R.L. Reece), in E.S. Benson and M. Rubin, eds. *Logic and Economics of Clinical Laboratory Use.* Elsevier, 1978, pp. 163-172

"Computer Interpretation of Laboratory Tests: An Annotated Bibliography," (with L.B. Winrich), *Journal of Medical Systems* **5**: 219 (1981)
"Interpretive Reporting by Computer," (with R.L. Reece), *Human Pathology* **12**:127 (1981).

I wrote some papers for the *American Journal of Physics* while I was auditing medical school:

"Teaching exponential growth and decay: examples from medicine," *Amer. J. Phys.* **41**:389 (1973)

"The Electrocardiogram as an Example of Electrostatics," *Amer. J. Phys.* **41**: 824 (1973)

"Nerve Conduction in the Pre-Medical Physics Course," *Amer. J. Phys.* **41**: 1176 (1973)

"Osmotic Pressure in the Physics Course for Students of the Life Sciences," *Amer. J. Phys.* **42**: 188 (1974), and

"Physics Useful to a Medical Student," *Amer. J. Phys.* **43**: 121 (1975).

One of the things that really interested me when auditing medical school was osmotic pressure and the flow it induces. (This has been discussed in great detail—perhaps greater than the readers wish—in Chapter 5.) But it led to an article pointing out some incorrect statements in the literature: "On the Interpretation of Experiments on Osmotic Pressure," *Proc. Nat. Acad. Sci.* **71**: 3182 (1974).

I am glad that my career evolved the way it did, so that I could stay abreast of a very broad spectrum of physics useful in medicine rather than specializing in a research area.

I worked with one biomedical engineering PhD student on various physiological contributions to the (electrical) impedance cardiogram, and also advised several students in radiological physics.

In 1984 I became Associate Dean for Student Affairs in the Institute of Technology (our school of engineering, the physical sciences, and mathematics). This helped end my collaboration

with Dick Reese, and it kept me from doing any other research.

Around the edges, I worked quite a lot with high school physics teachers in Minnesota, including several NSF-sponsored summer workshops. This led to an opportunity to work with two high school physics teachers to prepare a unit on Physics of the Body for a new activity-based high school physics curriculum, Active Physics. We wrote chapters on the eye, the ear and hearing, ultrasound, and x rays.

(Editor's Note: These chapters appeared in Active Physics: Medicine, R. Hobbie. with J. Koser, T. Goerke and A. Eisenkraft. College Park, MD., American Association of Physics Teachers, 1995. (Field test version) 1998 (Commercial Version, distributed by Its About Time, Armonk, NY)

THE BIOLOGICAL PHYSICIST: *Are there any stories you have about particular physics examples you have used in the book or in the classroom that have really awakened the interest of medical students to the importance of physics?*

Russ Hobbie: I cannot speak to what has triggered a response in different students. But there is one amusing story. I was working with a pediatric cardiologist, Jim Moeller, to understand the electrocardiogram. I finally wrote up a 5-page paper explaining it with an electrostatic model. When I showed what I thought was simplicity itself to Jim, he could not understand a word of it. But he finally agreed to show it to some second-year medical students. Their response: "Thanks goodness it is rational." I think this shows the gap between our premed course and what the student needs in medical school and also the fact that the physics we love so dearly may be helpful to a medical student during the basic science years but is not so helpful later on.

It also became clear to me that what we teach about x-rays and radioactivity is the **only** exposure to those topic that physicians will receive, unless they go into radiology!

THE BIOLOGICAL PHYSICIST: *How has the book changed over its four editions? Has the way you have presented material evolved over the years?*

Russ Hobbie: It is amusing to compare my explanation of the electrocardiogram in the four editions. In the first, I was thinking in terms of an electrostatic model. By the second edition, I had realized that a current dipole model was much better and had been in the literature for a long time. This has been improved even more in the 3rd and 4th editions. I am a slow learner! But as an excuse, I was confused for a long time because the physiologists called the current dipole moment "the electric force vector."

As I have added material (such as non-linear systems and chaos) it has been necessary to remove material. For example, the first edition had 11 pages and 3 color plates on polarized light and birefringence. This was gone to save money and to make room for biomagnetism in the second edition. I wish it was still there. I did not get around to discussing acoustics, hearing, and ultrasound until the fourth edition.

THE BIOLOGICAL PHYSICIST: *How would you assess the impact of the book on the field of interdisciplinary research, and on interdisciplinary education? Do you have any information on the history of how quickly it was adopted by other departments, and how it is used in other interdisciplinary programs?*

Russ Hobbie: I have always hoped that a physicist without the biological background could teach from the book, and the solutions manual was written in the hope that students could use it for an independent study course. (At the request of instructors, the solutions manual is now an Adobe Acrobat file which is password-protected. Instructors can ask me or Brad for the password and give it to students if they wish.)

Many physicists are more interested in molecular biophysics than physiology- and radiology-oriented physics and find that other books better meet their needs. However, there seems to be a growing interest in the book among biomedical engineers.

One teaching technique that was very successful in the early years of the course had to be abandoned while I was serving as Associate Dean, because it took too much of my time. I required the students

to find an article in the research literature that interested them and then to write a paper filling in all the missing steps. They could come to me for help as often as they needed. Then, three days after they submitted the paper, I would give them an oral exam on anything that I suspected they did not fully understand. They said this was a valuable experience; my office was packed with students the week before the papers were due; and I learned a lot myself.

THE BIOLOGICAL PHYSICIST: *Have you found that there is a "cultural divide" between physicists and MDs? Some people in the Division of Biological Physics describe having difficulty communicating with medical researchers. Do you ever find that?*

Russ Hobbie: Absolutely. One friend, Robert Tucker, got a PhD in biophysics with Otto Schmitt and then went to medical school. Bob said that medical school destroyed his ability to reason. This was probably an extreme statement, but it does capture the "drink from a fire hose" character of medical school. On the other hand, if I am having a myocardial infarct, I would prefer that the clinician taking care of me not start with Coulomb's law!

NEW APS FELLOWS ELECTED

Nine new APS fellows nominated by the Division of Biological Physics were elected this year! The awards will be made officially at the Division of Biological Physics Business Meeting at the upcoming March Meeting. Here are their names and citations.

Chan, Shirley Suiling
Princeton University
Citation: For using sophisticated techniques to explore the spectra, structure, and dynamics of proteins and nuclei acids, and for dedicated service to the American Physical Society.

Deem, Michael W.
Rice University
Citation: For his elegant and pioneering work on the connection between spin glass physics and complex phenomena in biology ranging from the immune system response to the dynamics of evolution.

Edwards, Glenn S.
Duke University
Citation: For seminal research in the rapid thermodynamics governing infrared-laser ablation of tissue and for quantifying force producing proceses in tissue dynamics during dorsal closure, a stage of Drosophilia morphogenesis.

Glazier, James Alexander
Indiana University
Citation: For his contributions to the development of the field of biological physics through the Cellular Potts Model and the modeling of limb development and angiogenesis.

Marko, John Frederick
Northwestern University
Citation: For statistical-mechanical theories of DNA and chromosome structure

Milton, John Gordon
The Claremont Colleges
Citation: For his work on the biological physics of nervous systems and their motor control.

Roth, Bradley J.
Oakland University
Citation: For his theoretical and numerical

studies of bioelectric and biomagnetic phenomena, especially for his contributions to the bidomain model of the heart.

Schwartz, Steven David
Albert Einstein College of Medicine
Citation: For the development of the theory of the coupling of protein vibrations to catalytic function in enzymes.

Stolovitzky, Gustavo A.
IBM T.J. Watson Research Center
Citation: For contributions to the use of pattern discovery and other multivariate analytical tools in mining biological data -especially in gene expression- and to modeling noise in biotechnologies such as PCR and gene expression arrays.

PRL HIGHLIGHTS

Soft Matter, Biological, &
Inter-disciplinary Physics Articles from
Physical Review Letters

6 October 2006
Vol 97, Number 14, Articles (14xxxx)
Articles published 30 Sept - 6 Oct 2006
http://scitation.aip.org/dbt/dbt.jsp?KEY=PRLTAO&Volume=97&Issue=14

Orientational Coupling Amplification in Ferroelectric Nematic Colloids
Fenghua Li, Oleksandr Buchnev, Chae Il Cheon, Anatoliy Glushchenko, Victor Reshetnyak, Yuri Reznikov, Timothy J. Sluckin, and John L. West
Published 5 October 2006
147801

Phase Behavior of Symmetric Ternary Block Copolymer-Homopolymer Blends in Thin Films and on Chemically Patterned Surfaces
Mark P. Stoykovich, Erik W. Edwards, Harun H. Solak, and Paul F. Nealey
Published 6 October 2006
147802

Salt-Induced Collapse and Reexpansion of Highly Charged Flexible Polyelectrolytes
Pai-Yi Hsiao and Erik Luijten
Published 5 October 2006
148301

Simulation Test of Hard-Body Colloidal Physics
A. R. Herring and J. R. Henderson
Published 6 October 2006
148302

Initial Value Problem Solution of Nonlinear Shallow Water-Wave Equations
Utku Kânoğlu and Costas Synolakis
Published 4 October 2006
148501

Exactly Solvable Models of Adaptive Networks
Olivier Rivoire and Julien Barré
Published 3 October 2006
148701

13 October 2006
Vol 97, Number 15, Articles (15xxxx)
Articles published 7 Oct - 13 Oct 2006
http://scitation.aip.org/dbt/dbt.jsp?KEY=PRLTAO&Volume=97&Issue=15

Microscopic Observations and Simulations of Bloch Walls in Nematic Thin Films
Jian Zhou, Jung O. Park, Gino De Luca, Alejandro D. Rey, and Mohan Srinivasarao
Published 11 October 2006
157801

Giant Flexoelectricity of Bent-Core Nematic Liquid Crystals

J. Harden, B. Mbanga, N. Éber, K. Fodor-Csorba, S. Sprunt, J. T. Gleeson, and A. Jákli
Published 13 October 2006
157802

Thermodynamics and Statistical Mechanics of Dense Granular Media
Massimo Pica Ciamarra, Antonio Coniglio, and Mario Nicodemi
Published 13 October 2006
158001

Collapse of Spherical Polyelectrolyte Brushes in the Presence of Multivalent Counterions
Yu Mei, Karlheinz Lauterbach, Martin Hoffmann, Oleg V. Borisov, Matthias Ballauff, and Arben Jusufi
Published 9 October 2006
158301

Collapse Transition of Two-Dimensional Flexible and Semiflexible Polymers
Haijun Zhou, Jie Zhou, Zhong-Can Ou-Yang, and Sanjay Kumar
Published 10 October 2006
158302

Flow Rule, Self-Channelization, and Levees in Unconfined Granular Flows
S. Deboeuf, E. Lajeunesse, O. Dauchot, and B. Andreotti
Published 12 October 2006
158303

Freezing and Melting of a Colloidal Adsorbate on a 1D Quasicrystalline Substrate
Michael Schmiedeberg, Johannes Roth, and Holger Stark
Published 12 October 2006
158304

Time Scales in Evolutionary Dynamics
Carlos P. Roca, José A. Cuesta, and Angel Sánchez
Published 12 October 2006
158701

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Articles published 14 Oct - 20 Oct 2006
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Electrowetting-Induced Oil Film Entrapment and Instability
Adrian Staicu and Frieder Mugele
Published 16 October 2006
167801

Bend-Induced Melting of the Smectic-*A* Phase: Analogy to a Type-I Superconductor
Ruiting Wang, Ishtiaque M. Syed, Giovanni Carbone, Rolfe G. Petschek, and Charles Rosenblatt
Published 17 October 2006
167802

Colossal Light-Induced Refractive-Index Modulation for Neutrons in Holographic Polymer-Dispersed Liquid Crystals
Martin Fally, Irena Drevensek-Olenik, Mostafa A. Ellabban, Klaus P. Pranzas, and Jürgen Vollbrandt
Published 17 October 2006
167803

Analytical Approach to Continuous and Intermittent Bottleneck Flows
Dirk Helbing, Anders Johansson, Joachim Mathiesen, Mogens H. Jensen, and Alex Hansen
Published 17 October 2006
168001

Dynamics of Prestressed Semiflexible Polymer Chains as a Model of Cell Rheology
Noah Rosenblatt, Adriano M. Alencar, Arnab Majumdar, Béla Suki, and Dimitrije Stamenović
Published 16 October 2006
168101

Synthetic Aperture Fourier Holographic Optical Microscopy
Sergey A. Alexandrov, Timothy R. Hillman, Thomas Gutzler, and David D. Sampson
Published 18 October 2006
168102

Phase Diagram of Patchy Colloids: Towards Empty Liquids
Emanuela Bianchi, Julio Largo, Piero Tartaglia, Emanuela Zaccarelli, and Francesco Sciortino

Published 16 October 2006
168301

Linking Stochastic Dynamics to Population Distribution: An Analytical Framework of Gene Expression
Nir Friedman, Long Cai, and X. Sunney Xie
Published 19 October 2006
168302

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Articles published 21 Oct - 27 Oct 2006
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Pair Correlation Functions in Nematics: Free-Energy Functional and Isotropic-Nematic Transition
Pankaj Mishra and Yashwant Singh
Published 25 October 2006
177801

Glass Transition in Biomolecules and the Liquid-Liquid Critical Point of Water
Pradeep Kumar, Z. Yan, L. Xu, M. G. Mazza, S. V. Buldyrev, S.-H. Chen, S. Sastry, and H. E. Stanley
Published 27 October 2006
177802

Statistically Enhanced Self-Attraction of Random Patterns
D. B. Lukatsky, K. B. Zeldovich, and E. I. Shakhnovich
Published 25 October 2006
178101

Dynamically Multilayered Visual System of the Multifractal Fly
M. S. Baptista, Celso Grebogi, and Roland Köberle
Published 27 October 2006
178102

Experimental Evidence of Localized Oscillations in the Photosensitive Chlorine Dioxide-Iodine-Malonic Acid Reaction
David G. Míguez, Sergio Alonso, Alberto P. Muñuzuri, and Francesc Sagués
Published 24 October 2006
178301

Depletion Effects and Loop Formation in Self-Avoiding Polymers
N. M. Toan, D. Marenduzzo, P. R. Cook, and C. Micheletti
Published 26 October 2006
178302

Universal Earthquake-Occurrence Jumps, Correlations with Time, and Anomalous Diffusion
Álvaro Corral
Published 24 October 2006
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Articles published 28 Oct - 3 Nov 2006
http://scitation.aip.org/dbt/dbt.jsp?KEY=PRLTAO&Volume=97&Issue=18

Nonquiescent Relaxation in Entangled Polymer Liquids after Step Shear
Shi-Qing Wang, Sham Ravindranath, Pouyan Boukany, Michael Olechnowicz, Roderic P. Quirk, Adel Halasa, and Jimmy Mays
Published 2 November 2006
187801

Vegetation Against Dune Mobility
Orencio Durán and Hans J. Herrmann
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Designing the Dynamics of Spiking Neural Networks
Raoul-Martin Memmesheimer and Marc Timme
Published 30 October 2006
188101

Percolation in Living Neural Networks
Ilan Breskin, Jordi Soriano, Elisha Moses, and Tsvi Tlusty
Published 30 October 2006
188102

Dynamics of Sequential Decision Making
Mikhail I. Rabinovich, Ramón Huerta, and Valentin Afraimovich
Published 1 November 2006
188103

Eigenvalue Spectra of Random Matrices for Neural Networks

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188104

Zipper Dynamics of Surfactant Nanotube Y Junctions
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Physical Theory of the Competition that Allows HIV to Escape from the Immune System
Guanyu Wang and Michael W. Deem
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188106

Salt-Induced Swelling-to-Shrinking Transition in Polyelectrolyte Multilayer Capsules
Karen Köhler, P. Maarten Biesheuvel, Richard Weinkamer, Helmuth Möhwald, and Gleb B. Sukhorukov
Published 31 October 2006
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Lifshitz-Safran Coarsening Dynamics in a 2D Hexagonal System
Leopoldo R. Gómez, Enrique M. Vallés, and Daniel A. Vega
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Ribbon-to-Fiber Transformation in the Process of Spinning of Carbon-Nanotube Dispersion
Konstantin G. Kornev, Gerardo Callegari, John Kuppler, Sigrid Ruetsch, and Alexander V. Neimark
Published 3 November 2006
188303

Estimating Topology of Networks
Dongchuan Yu, Marco Righero, and Ljupco Kocarev
Published 3 November 2006
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Appearance of a Liquid Crystalline Nematic-Isotropic Critical Point in a Mixture System of Rod- and Bent-Shaped Molecules
K. Takekoshi, K. Ema, H. Yao, Y. Takanishi, J. Watanabe, and H. Takezoe
Published 8 November 2006
197801

Multiscale Monte Carlo Algorithm for Simple Fluids
A. C. Maggs
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197802

Localized Subharmonic Waves in a Circularly Vibrated Granular Bed
Andreas Götzendorfer, Christof A. Kruelle, Ingo Rehberg, and Daniel Svenšek
Published 10 November 2006
198001

Nucleation and Collapse of Scroll Rings in Excitable Media
Tamás Bánsági, Jr. and Oliver Steinbock
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Characterization of the Drastic Increase in Molecular Mobility of a Deformed Amorphous Polymer
Etienne Munch, Jean-Marc Pelletier, Bruno Sixou, and Gérard Vigier
Published 14 November 2006
207801

Dynamic Light Scattering Study of Biaxial Ordering in a Thermotropic Liquid Crystal
K. Neupane, S. W. Kang, S. Sharma, D. Carney, T. Meyer, G. H. Mehl, D. W. Allender, Satyendra Kumar, and S. Sprunt

Published 16 November 2006
207802

From a Simple Liquid to a Polymer Melt: NMR Relaxometry Study of Polybutadiene
S. Kariyo, C. Gainaru, H. Schick, A. Brodin, V. N. Novikov, and E. A. Rössler
Published 17 November 2006
207803

Elasticity from the Force Network Ensemble in Granular Media
Srdjan Ostojic and Debabrata Panja
Published 16 November 2006
208001

Chaos via Shilnikov's Saddle-Node Bifurcation in a Theory of the Electroencephalogram
Lennaert van Veen and David T. J. Liley
Published 13 November 2006
208101

Kinetic Accessibility of Buried DNA Sites in Nucleosomes
Wolfram Möbius, Richard A. Neher, and Ulrich Gerland
Published 14 November 2006
208102

Molecular Shift Register and its Utilization as an Autonomous DNA Synthesizer
Ilya Baskin, Stav Zaitsev, Doron Lipson, Rachel Gilad, Kinneret Keren, Gidi Ben-Yoseph, and Uri Sivan
Published 16 November 2006
208103

DNA Unzipping and the Unbinding of Directed Polymers in a Random Media
Yariv Kafri and Anatoli Polkovnikov
Published 17 November 2006
208104

Control of Electron Transfer Pathways in a Dye-Sensitized Solar Cell
Ben Brüggemann, Juan Angel Organero, Torbjörn Pascher, Tõnu Pullerits, and Arkady Yartsev
Published 13 November 2006
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Layer Reduction in Driven 2D-Colloidal Systems through Microchannels
M. Köppl, P. Henseler, A. Erbe, P. Nielaba, and P. Leiderer
Published 14 November 2006
208302

Computational Investigations of Pore Forming Peptide Assemblies in Lipid Bilayers
Laura J. Douglas Frink and Amalie L. Frischknecht
Published 15 November 2006
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Fluorescence Lifetime of a Single Molecule as an Observable of Meta-Basin Dynamics in Fluids Near the Glass Transition
R. A. L. Vallée, M. Van der Auweraer, W. Paul, and K. Binder
Published 22 November 2006
217801

Optical Measurement of Cell Membrane Tension
Gabriel Popescu, Takahiro Ikeda, Keisuke Goda, Catherine A. Best-Popescu, Michael Laposata, Suliana Manley, Ramachandra R. Dasari, Kamran Badizadegan, and Michael S. Feld
Published 20 November 2006
218101

Structural Model of Eumelanin
Efthimios Kaxiras, Argyrios Tsolakidis, George Zonios, and Sheng Meng
Published 21 November 2006
218102

Microcanonical Analyses of Peptide Aggregation Processes
Christoph Junghans, Michael Bachmann, and Wolfhard Janke
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Curvature of the Energy Landscape and Folding of Model Proteins
Lorenzo N. Mazzoni and Lapo Casetti
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Scaling Exponent and Kuhn Length of Pinned Polymers by Single Molecule Force Spectroscopy
Ferdinand Kühner, Matthias Erdmann, and Hermann E. Gaub
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218301

Noseleaf Furrows in a Horseshoe Bat Act as Resonance Cavities Shaping the Biosonar Beam
Qiao Zhuang and Rolf Müller
Published 22 November 2006
218701
See Also: Phys. Rev. Focus

PRE HIGHLIGHTS

Biological Physics Articles from
Physical Review E

October 2006
Volume 74, Number 4, Articles (04xxxx)
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ARTICLES

Electrophoresis of a polyelectrolyte through a nanopore
Sandip Ghosal
Published 2 October 2006 (*5 pages*)
041901

Harnessing microtubule dynamic instability for nanostructure assembly
Ann M. Bouchard, Christina E. Warrender, and Gordon C. Osbourn
Published 3 October 2006 (*16 pages*)
041902

1/*f* ruffle oscillations in plasma membranes of amphibian epithelial cells under normal and inverted gravitational orientations
H. S. Silva, M. L. Martins, M. J. Vilela, Ruy Jaeger, and B. Kachar
Published 4 October 2006 (*8 pages*)
041903

Co-occurrence of resonant activation and noise-enhanced stability in a model of cancer growth in the presence of immune response
Alessandro Fiasconaro, Bernardo Spagnolo, Anna Ochab-Marcinek, and Ewa Gudowska-Nowak
Published 6 October 2006 (*10 pages*)
041904

Heat transfer in Fitzhugh-Nagumo models
D. Bini, C. Cherubini, and S. Filippi
Published 6 October 2006 (*12 pages*)
041905

Subdimension-based similarity measure for DNA microarray data clustering
Benson S. Y. Lam and Hong Yan
Published 9 October 2006 (*8 pages*)
041906

Energy optimization for off-lattice protein folding
Wenqi Huang, Mao Chen, and Zhipeng Lü
Published 9 October 2006 (*6 pages*)
041907

Impedance analysis of cultured cells: A mean-field electrical response model for electric cell-substrate impedance sensing technique
E. Urdapilleta, M. Bellotti, and F. J. Bonetto
Published 9 October 2006 (*11 pages*)
041908

BRIEF REPORTS

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RAPID COMMUNICATIONS

Bubble statistics and dynamics in double-stranded DNA
B. S. Alexandrov, L. T. Wille, K. Ø. Rasmussen, A. R. Bishop, and K. B. Blagoev
Published 1 November 2006 (*4 pages*)
050901(R)

ARTICLES

Thermodynamics of organisms in the context of dynamic energy budget theory
Tânia Sousa, Rui Mota, Tiago Domingos, and S. A. L. M Kooijman
Published 3 November 2006 (*15 pages*)
051901

Complex movements of motor protein relay helices during the power stroke
Miljko V. Satarić, Leif Matsson, and Jack A. Tuszyński
Published 3 November 2006 (*7 pages*)
051902

Subgraph ensembles and motif discovery using an alternative heuristic for graph isomorphism
Kim Baskerville and Maya Paczuski
Published 3 November 2006 (*11 pages*)
051903

Force modulating dynamic disorder: A physical model of catch-slip bond transitions in receptor-ligand forced dissociation experiments
Fei Liu and Zhong-can Ou-Yang
Published 6 November 2006 (*9 pages*)
051904

Stochastic order parameter equation of isometric force production revealed by drift-diffusion estimates
T. D. Frank, R. Friedrich, and P. J. Beek
Published 6 November 2006 (*11 pages*)
051905

Noise-induced cooperative dynamics and its control in coupled neuron models
B. Hauschildt, N. B. Janson, A. Balanov, and E. Schöll
Published 8 November 2006 (*11 pages*)
051906

Coexistence versus extinction in the stochastic cyclic Lotka-Volterra model
Tobias Reichenbach, Mauro Mobilia, and Erwin Frey
Published 10 November 2006 (*11 pages*)
051907

Electrophoresis of DNA on a disordered two-dimensional substrate
C. J. Olson Reichhardt and C. Reichhardt
Published 13 November 2006 (*6 pages*)
051908

Identifying phase synchronization clusters in spatially extended dynamical systems
Stephan Bialonski and Klaus Lehnertz
Published 14 November 2006 (*11 pages*)
051909

Hybrid simulations of stochastic reaction-diffusion processes for modeling intracellular signaling pathways
K.-H. Chiam, Chee Meng Tan, Vipul Bhargava, and Gunaretnam Rajagopal
Published 14 November 2006 (*13 pages*)
051910

Structure of two-component lipid membranes on solid support: An x-ray reflectivity study
Eva Nováková, Klaus Giewekemeyer, and Tim Salditt
Published 15 November 2006 (*9 pages*)
051911

Contractile stress generation by actomyosin gels
A. E. Carlsson
Published 17 November 2006 (*6 pages*)
051912

Effect of chain unsaturation on bilayer response to pressure
I. D. Skanes, J. Stewart, K. M. W. Keough, and M. R. Morrow

Published 20 November 2006 (*8 pages*)
051913

Species abundance distribution and population dynamics in a two-community model of neutral ecology
M. Vallade and B. Houchmandzadeh
Published 21 November 2006 (*9 pages*)
051914

Anomalies and the Eve effect in the asexual Penna model
T. Preece and Y. Mao
Published 21 November 2006 (*4 pages*)
051915

Iridescence in the neck feathers of domestic pigeons
Haiwei Yin, Lei Shi, Jing Sha, Yizhou Li, Youhua Qin, Biqin Dong, Serge Meyer, Xiaohan Liu, Li Zhao, and Jian Zi
Published 22 November 2006 (*6 pages*)
051916

Finite-size domains in membranes with active two-state inclusions
Chien-Hsun Chen and Hsuan-Yi Chen
Published 27 November 2006 (*5 pages*)
051917

Designability and cooperative folding in a four-letter hydrophobic-polar model of proteins
Hai-guang Liu and Lei-Han Tang
Published 29 November 2006 (*8 pages*)
051918

Controlling species richness in spin-glass model ecosystems
Fábio C. Poderoso and José F. Fontanari
Published 29 November 2006 (*8 pages*)
051919

White-noise susceptibility and critical slowing in neurons near spiking threshold
D. A. Steyn-Ross, Moira L. Steyn-Ross, M. T. Wilson, and J. W. Sleigh
Published 30 November 2006 (*15 pages*)
051920

BRIEF REPORTS

Orthotropic elastic shell model for buckling of microtubules
C. Y. Wang, C. Q. Ru, and A. Mioduchowski
Published 14 November 2006 (*4 pages*)
052901

SPECIAL DBP ANNOUNCEMENT

Student Travel Grants for March Meeting

The Division of Biological Physics will award several travel grants of up to $300 each to students as the first author of contributed papers (talks or posters) in sessions sponsored by DBP at the March Meeting. Applicants will be chosen on the basis of the quality of their work as evidenced by the abstract of the paper, a letter of support from their thesis advisor and the travel distances.

Both student and advisor, domestic or foreign, must be members of the DBP, not just of the APS. New members can sign up at http://www.aps.org/memb/joinaps.cfm, and are encouraged to do so before Dec. 31, 2006 for verification purposes.

No more than 2 students from one advisor may apply. Please include (1) applicant's name, (2) institute affiliate, (3) the abstract, (4) the assigned session number (available online after mid-January), APS membership numbers of (5) the applicant and (6) the advisor, (7) applicant's home address, (8) for domestic applicant, the social security number (which will be kept confidential and used only if an award is made), and (9) a short letter of recommendation from the advisor.

Submit all applications via email (absolutely no attachments) to both the Chair, Dr. Marilyn Gunner, at gunner@sci.ccny.cuny.edu, and the Secretary-Treasurer, Dr. Shirley Chan, at ChanShirley@mailaps.org. (Only applications with all required information included in ONE EMAIL will be considered. Incomplete applications will be returned for resubmission in entirety.) Please personalize the subject of the application email by "DBP-STG 2007, From (last name)." The deadline is February 1, 2007. Decisions for the awards will be sent by email to the applicants before the Meeting with Instructions on how to receive the checks.

SPECIAL DBP ANNOUNCEMENT

Immediately before March meeting...Don't miss it!

4th APS Workshop on Opportunities in Biological Physics

Sunday, March 4, 2007

Denver Convention Center, Denver, Colorado

Organized by the APS Division of Biological Physics

http://www.aps.org/meetings/march/special/workshop.cfm

Modern Biomedicine provides a host of research and employment opportunities for physicists. New techniques for monitoring and manipulating complex biological processes at the molecular level promise to revolutionize our ability to understand and control normal and disease states. This workshop will introduce some of the most exciting recent and prospective areas of this rapidly expanding field. Topics will include tissue mechanics, tissue engineering, regenerative medicine, microfluidics and micro-optics. Speakers from academia and industry will provide extensive tutorial overviews, accessible to non-specialists. Breaks and a lunch with speakers will allow ample time for participants to discuss their current and future scientific and career directions with the speakers. The workshop is aimed at all physicists who are curious about the interface between physics and biology, especially graduate students and post-docs who are eager to apply their expertise in novel ways in the life sciences.

The workshop will start at 8:30 AM and run until approximately 7:30PM. The pre-registration deadline is February 2, 2007. Pre-registration fees are $50 for students, $75 for postdoctoral researchers and $100 for all others. The registration fee includes a box lunch. On-site registration will be allowed with a late fee ($20) and cash payment only, but availability of box lunches is not guaranteed for late registrants.

CONFIRMED SPEAKERS:

- Chris Chen, Stem Cell Engineering, University of Pennsylvania
- Andrea Chow, Microfluidics, CaliperLS Corporation
- Lance Davidson, Tissue Mechanics, University of Pittsburgh
- Bogdan Dragnea, Micro-optics, Indiana University Bloomington
- ChihMing Ho, Bioengineering, University of California Los Angeles
- Bob Jones, Microfluidics, Fluidigm Corporation
- Darren Link, Microfluidics, Raindance Technologies, Inc.
- David Stocum, Regenerative Medicine, Indiana U. Purdue U. Indianapolis
- William Warren, Tissue Engineering, VaxDesign Corporation
- Jennifer West, Tissue Engineering, Rice University
-

Steering Committee Chair: James A. Glazier (glazier@indiana.edu) Vice-Chair, DBP
Committee Members: Shirley Chan (ChanShirley@mailaps.org) Secretary-Treasurer, DBP
Gabor Forgacs (forgacsg@missouri.edu)
Stephen Hagen (sjhagen@ufl.edu) Member-at-Large, DBP
Steve Quake (quake@stanford.edu) Member-at-Large, DBP

FINANCIAL SUPPORT PROVIDED IN PART BY: Agouron Foundation, Fluidigm Corp.
For information on past workshops, see: http://www.aps.org/units/dbp/links/index.cfm.

SPECIAL CONFERENCE ANNOUNCEMENT

Boulder School for Condensed Matter and Materials Physics

"Biophysics"

July 2 - July 27, 2007

Scientific Coordinators:
William Bialek, Anirvan Sengupta, Sima Setayeshgar, Chris Wiggins
Site Coordinator:
Leo Radzihovsky

The 2007 Boulder Summer School aims to give graduate students and postdocs exposure to some of the most exciting current areas of experimental and theoretical study in biophysics.

Topics Include:

Signals, noise and information flow in biological networks;
Dynamics on multiple times scales: Adaptation, learning and evolution;
Emergence of macroscopic functions from molecular mechanisms;
Mechanics, from molecules to cells.

The electronic application form (deadline: February 23, 2007) is available on the School's main web page: http://research.yale.edu/boulder

Most local expenses are covered through the School's NSF support. See webpage for details on speakers, cost to attend, possible fiscal support, and other meeting aspects. E-mail can be sent to the organizers at: boulder.organizers@yale.edu

Lecturers for 2007 include:

Meredith Betterton, Dmitrii Chklovskii, Michael Desai, Winfried Denk, Mark Goldman, Jané Kondev, Leonid Kruglyak, Philip Nelson, Sebastian Seung, Boris Shraiman, Peter Swain, John Tyson, Ned Wingreen, and additional lecturers to be confirmed

SPECIAL CONFERENCE ANNOUNCEMENT

Nanomaterials in Biology and Medicine: Promises and Perils

Organizer: Robert Austin (Princeton University)
April 10-11, 2007
National Academy of Sciences, Washington, D.C.

There has been an explosive development in materials development which uses nanoscale materials to probe biological processes and diagnose medical conditions (such as tumor detection). There are unique aspects of nanoscale materials which allow them to preferentially penetrate and be retained by biological cells and tissue and there have been developments in new ways to detect and image and nanomaterials in cells and biological tissue. Further, the size scale of nanoprobes will allow us to build complexity into nanoprobes which allow them to be multi-functional, with both diagnostic and drug delivery. However, we must also be aware that these nanomaterials can have drastically different behavior in biological tissue than larger scale materials of exactly the same composition, so issues of societal and ethical outcomes must also be considered. The colloquium will be structured to address graduate students, postdoctoral fellows, directors of public granting agencies, and policy makers.

For program agenda and registration information:
http://www.nasonline.org/Sackler_nanoprobes

Registration $250
Student / Postdoc registration $100
Student/Postdoc Travel Awards are available - $100 hotel and $150 airfare

Speakers:

- George Whitesides (Harvard University) 7th Annual Sackler Lecture - *Size matters: changes in chemical reactivity with size at the nanoscale*
- Shuang-Fang Lim (Princeton University) *Nano-upconversion Phosphors*
- Uwe B. Sleyt (University of Natural Resources and Applied Life Sciences, Vienna) *A molecular construction kit for nanobiotechnological applications*
- Angela Belcher (Massachusetts Institute of Technology) *Evolution of biometric nanomaterials*
- Charles Lieber (Harvard University) *Designed Nano-biosensors*
- Robert Prod'homme (Princeton University) *How size matters in the retention of nanomaterials in tissue*
- Herc Neves (BioMEMS, IMEC, Belgium) *Micro/Nanosystem integration in healthcare*
- K. Eric Drexler (NanoRex, Inc.) *The road to advanced nanotechnologies: health issues and applications*
- Oleg Salata (Oxford University) *Nanoparticles known and unknown health risks*
- Lisa Brannon-Peppas (University of Texas, Austin) *Targeted Delivery of Nanoparticulate Drug Delivery Systems*
- Vikki Colvin (Rice University) *Sustainability for nanotechnology*
- Nadrian Seaman (New York University) *Nanorobots*
- Barbara Baird, (Cornell University) *Nanobiology*

Indiana University
Junior Faculty Position in Biological Physics and Biocomplexity

Indiana University's Department of Physics and Biocomplexity Institute announce a junior faculty position in biological physics, broadly defined, to complement their ongoing expansion in this area under Indiana University's Commitment to Excellence Program. Present areas of interest include developmental biology, microbiology, neuroscience, and networks. To complement these strengths we particularly encourage applications from experimentalists who can take existing areas in novel directions or lead the development of new areas, such as molecular biophysics, subcellular structure and dynamics, tissue mechanics and engineering, bioMEMS and medical microdevices. The successful candidate will have strong interdisciplinary interests, a track record of experimental/theoretical collaboration and will collaborate closely with other faculty associated with the Biocomplexity Institute. The expected primary appointment will be in the Department of Physics. However, joint appointments or primary appointments in other departments are possible. Laboratory space will be available in the new Simon Multidisciplinary Sciences Building. Indiana University is an EOAAE. Applications from women and minorities are especially encouraged. Applicants should submit a curriculum vitae and statements of research and teaching, preferably online at http://biocomplexity.indiana.edu/recruit, and arrange for submission of a minimum of three letters of reference. Should it be impossible to apply online, applications may be sent by email to: glazier@indiana.edu, or by mail to Dr. James A. Glazier, Faculty Search, Biocomplexity Institute and Department of Physics, Swain Hall West 159, 727 E 3rd St., Bloomington IN, 47405-7105, USA. For more information see http://biocomplexity.indiana.edu/.

EXPERIMENTAL BIOLOGICAL PHYSICS
Northeastern University, Boston, MA

The Department of Physics at Northeastern University invites applications for a tenure-track position in experimental biological and/or medical physics to begin September 2007. Senior appointments at the tenured level will also be considered for individuals who have a demonstrated track record of outstanding research in this area. The department already has an established program in both experimental and theoretical biological physics and plans to further expand its interdisciplinary research potential across both departmental and college boundaries. The successful candidate is expected to establish (or have) an independent, externally funded research program and to teach effectively at undergraduate as well as graduate levels. Interested candidates should submit a *curriculum vitae* and a description of their research interests, and arrange for at least three letters of recommendation to be sent to: **Experimental Biological Physics Search Committee, Northeastern University, Department of Physics, 110 Forsyth Street, Boston, MA 02115 or via email to EBPsearch@neu.edu.**

Northeastern University is an Affirmative Action/Equal Opportunity/Title IX Employer and particularly welcomes applications from minorities, women and persons with disabilities.

TENURE-TRACK POSITION IN BIOLOGICAL PHYSICS DEPARTMENT OF PHYSICS, UNIVERSITY OF OTTAWA

The Department of Physics of the University of Ottawa invites applications for a tenure track position in experimental or theoretical biological physics. The appointment will normally be at the Assistant Professor level, but applications for higher ranks will also be considered. The Department is continuing to build its strength in areas such as, but not limited to, biological modeling and computation, neurophysics, computational biology, cellular interactions, genomics, proteomics, molecular biophysics and biophotonics. More information can be obtained at http://www.science.uottawa.ca/phy/eng/welcome.html.

Canadians and permanent residents will be given priority. As the University of Ottawa is a bilingual institution, bilingualism is an asset. Applicants are requested to send a curriculum vitae, the names of at least three referees, and a statement of research interests to:

Search Committee (c/o Dr. André Longtin), Department of Physics, University of Ottawa, 150 Louis Pasteur, Ottawa, Ont. Canada K1N 6N5. Applications will be reviewed starting in December 2006 until the position is filled.

POSTDOCTORAL POSITION in BIOLOGICAL PHYSICS

University of California San Francisco

A postdoc position is open immediately in theoretical/computational study of complex biological systems. Candidates with strong background in physical sciences who are interested in working in an interdisciplinary environment at an excellent biological institution are encouraged to apply. There will be access to wet benches if the candidate prefers to also carry out some experimental work.

Applicants please send CV, research interest and names of references to Prof. Chao Tang (Chao.Tang@ucsf.edu).

FACULTY POSITION IN BIOLOGICAL PHYSICS AT GMU

The Department of Physics and Astronomy at **George Mason University**, a growing Department of 24 faculty members, is accepting applications for two tenure track positions at the assistant professor level in an area of experimental physics. Although we will consider applicants in any field, we are especially interested in filling one position in biological physics, and the other in the areas of condensed matter, atomic physics or quantum optics. Successful candidates should have some post-doctoral research experience, and be able to develop an independent, externally-funded research program. The Washington DC area offers prospects of collaboration with physicists at nearby federal labs, such as NIH, NIST or NRL.

Successful candidates should be able and interested in teaching at the graduate and undergraduate levels, and play an active role in the department.

Applicants should complete the online faculty application for position F7462z at http://jobs.gmu.edu and MAIL a CV, the names and e-mail addresses of three references, and separate statements on their research and teaching interests to: Dr. Karen N. Sauer, Chair of Search Committee, Physics and Astronomy Department (3F3), George Mason University, 4400 University Drive, Fairfax, VA 22030. Deadline for applications is December 20, 2006.

George Mason University is an Affirmative Action, Equal Opportunity Employer committed to excellence through diversity.

Faculty Position in Condensed Matter Theory
Georgetown University

The Department of Physics at Georgetown University anticipates filling a tenure-track position at the level of Assistant Professor beginning Fall 2007. Candidates should have a Ph.D. in physics and significant postdoctoral research experience in theoretical condensed-matter, statistical, or materials physics, or in a closely related field such as biological physics or cold-atom systems. The successful applicant will be expected to initiate an active research program and must demonstrate a strong commitment to teaching at both the undergraduate and graduate levels. The department encourages cross-disciplinary activities and values industrial ties, especially those that can be linked with its Industrial Leadership in Physics graduate program. Applicants should submit a curriculum vitae and brief summaries of research and teaching interests, and arrange to have three letters of reference sent to: Theory Search Committee, Department of Physics, Georgetown University, Washington, DC 20057. For full consideration, application materials must be received by January 5, 2007. General information about the department is available at http://www.physics.georgetown.edu.

Georgetown University is an affirmative action/equal opportunity employer. Women and members of minority groups are encouraged to apply.

ASSISTANT OR ASSOCIATE PROFESSOR
OAKLAND UNIVERSITY

The Department of Physics at Oakland University is seeking an Assistant or Associate Professor for a tenure-track or tenured position in Biological or Medical Physics, starting Aug. 15, 2007. A Ph.D. in physics and research experience in medical or biological physics is required. Priority will be given to candidates with existing external funding. The department offers a Medical Physics Ph.D. program, is active in OU's Center for Biomedical Research, and has close ties with local hospitals.

For further information about the department, see http://www.oakland.edu/physics. Applicants should submit a curriculum vitae, a description of research interests, a publication list, a statement of teaching philosophy and experience, and arrange for three letters of reference to be sent to: **Dr. Brad Roth, Medical Physics Search Committee, Department of Physics, Oakland University, Rochester, MI 48309**, or by email to **roth@oakland.edu**. To receive full consideration, applications must be received by January 15, 2007.

Oakland University is an Equal Opportunity/Affirmative Action Employer.
Women and Minorities are encouraged to apply.

Faculty Position in
Experimental Biological or Condensed Matter Physics
Georgetown University

Applications are invited for a tenure-track position in experimental biological or condensed matter physics at Georgetown University beginning in fall 2007. Areas of particular interest include cross-disciplinary research that complements existing strengths in MEMS, nanoscience, nonlinear dynamics, optics and computational physics. The successful applicant will be encouraged to take advantage of the proximity to the Georgetown Medical School for possible collaborations. The appointment is anticipated to be at the Assistant Professor level and the successful candidate will be expected to establish an independent, externally funded research program and to have a strong interest in teaching at the undergraduate and graduate levels. The department values industrial ties, especially those that can be linked with our Industrial Leadership in Physics graduate program. Applicants must have a Ph.D. and preferably postdoctoral experience. Interested candidates should submit a curriculum vitae, descriptions of their research interests and teaching philosophies, and make arrangements for at least three letters of recommendation to be sent to: Experimental Search Committee, Department of Physics, Georgetown University, Washington, DC 20057-0995. For full consideration, application materials must be received by January 5, 2007. Information about the department is available at http://www.physics.georgetown.edu.

Georgetown University is an affirmative action/equal opportunity employer.
Women and members of underrepresented minority groups are especially encouraged to apply.

TENURE-TRACK FACULTY POSITION IN EXPERIMENTAL BIOPHYSICS

Department of Physics, Texas Tech University, Lubbock, TX

The physics department of Texas Tech University invites applications from scientists in the area of experimental biophysics for an open tenure-track faculty position. Appointment will be made at the Assistant/Associate Professor level depending on qualifications of the applicants. A Ph.D. in physics or related field is required for this position. The successful candidate must demonstrate the potential of effective teaching at undergraduate and graduate levels and of conducting a vigorous research program that will strengthen the biophysics research efforts in our department.

This new faculty appointment represents a major initiative in expanding our biophysics research program in our physics department. Texas Tech is one of the major state-supported PhD granting universities in Texas (see http://www.ttu.edu). Our physics department (see www.phys.ttu.edu) currently has 20 full time faculty members working on various physics research areas. Among which, biophysics has been selected as an emerging and strategic area for major expansion at this time. Two tenured physics faculty members are currently engaged in biophysics research and we are seeking a third tenure-track faculty member in biophysics.

Our current biophysics research interests are in the structure and function of lipid bilayers, cholesterol domains, protein/lipid interactions and biosensors. Our current biophysics research tools include steady state and time-resolved fluorescence, time-resolved UV/VIS, FTIR, fluorescence microscopy, microfluidics and computer simulations. We also have access to the facilities in our new Experimental Science Building for biomaterials fabrication, tissue cell culture, AFM, confocal microscopy and Electron Microscopy. Our biophysics group is part of the molecular bioengineering (MBE) group in the newly completed Experimental Science Building. Other than collaboration within our physics department and MBE, our group has established successful collaborations with the nanochemistry group in Chemistry and Bioengineering group in Chemical Engineering on Texas Tech main campus. In addition, we have interactions with the molecular immunology group and neuronal science group of Texas Tech Health Sciences Center, our medical school.

We are particularly interested in the research areas that utilize advanced optical imaging and/or spectroscopic techniques to study cells or biomaterials with applications in disease diagnosis or therapy. Interested applicants should submit a curriculum vitae, a list of publications, a statement of research and teaching objectives online at http://jobs.texastech.edu (Req. # 72952), and arrange for four letters of recommendation to be sent directly to:

Biophysics Search Committee Chair
Physics Department
PO Box 41051
Texas Tech University
Lubbock, TX 79409-1051

Review of applications will commence immediately and will continue until the position is filled. Please email all enquires to Biophysics Search or call (806) 742-3767 for more information about this position.

TTU is an Equal Opportunity/Affirmative Action/Americans with Disabilities Employer.

HUMAN FRONTIER SCIENCE PROGRAM (HFSP)

12 quai St. Jean, 67080 STRASBOURG Cedex, FRANCE

E-mail: grant@hfsp.org
Web site: http://www.hfsp.org

OPPORTUNITIES FOR INTERDISCIPLINARY RESEARCH

The Human Frontier Science Program (HFSP) supports **international** collaborations in basic research with emphasis placed on *novel*, **innovative** and **interdisciplinary** approaches to fundamental investigations in the life sciences. Applications are invited for grants to support projects on **complex mechanisms of living organisms.**

CALL FOR LETTERS OF INTENT FOR RESEARCH GRANTS: AWARD YEAR 2008

The HFSP research grant program aims to stimulate novel, daring ideas by supporting collaborative research involving biologists together with scientists from other disciplines such as chemistry, physics, mathematics, computer science and engineering. Developments in these as well as emerging disciplines such as computational biology and nanoscience open up new approaches to understanding the complex mechanisms underlying biological functions in living organisms. Preliminary results are not required in research grant applications. Applicants are expected to develop new lines of research through the collaboration; projects must be distinct from applicants' other research funded by other sources. HFSP supports only international, collaborative teams, with an emphasis on encouraging scientists early in their careers.

International teams of scientists interested in submitting applications must first submit a letter of intent online via the HFSP web site. The guidelines for potential applicants and further instructions are available on the HFSP web site (www.hfsp.org).

Research grants provide 3 years support for teams with 2 – 4 members, with not more than one member from any one country, unless an additional member is absolutely necessary for the interdisciplinary nature of the project. A local or national **interdisciplinary** collaboration, as a component of an international team, will be considered as 1.5 team members for budgetary purposes (see below). The principal applicant must be located in one of the member countries* but co-investigators may be from any other country. Clear preference is given to **intercontinental** teams.

TWO TYPES OF GRANT ARE AVAILABLE:

Young Investigators' Grants are for teams of scientists who are all within 5 years of establishing an independent laboratory and within 10 years of obtaining their PhDs.

Program Grants are for independent scientists at all stages of their careers, although the participation of younger scientists is especially encouraged.

Depending on team size, successful teams will receive from $250,000 to $450,000 per year for the whole team.

Important Deadlines :
Compulsory pre-registration for password: 22 MARCH 2007
Submission of Letters of Intent: 03 APRIL 2007

**Members are Australia, Canada, the European Union, France, Germany, India, Italy, Japan, New Zealand, the Republic of Korea, Switzerland, the United Kingdom and the United States*.