

THE BIOLOGICAL PHYSICIST

The Newsletter of the Division of Biological Physics of the American Physical Society

Vol 5 No 5 December 2005

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This issue of THE BIOLOGICAL PHYSICIST brings you a profile of Albert-László Barabási, as well as some important March Meeting related announcements (be sure to tell your grad students about the announcement on page 18!), including an announcement and registration materials for the APS Workshop on Opportunities in Biological Physics (pages 22-23), more job ads, and a call for proposals from the Human Frontier Science program. Also in this issue, we inaugurate PRL Highlights. Enjoy!

Linked: A Conversation with Albert-László Barabási

S. Bahar

The dynamical properties of networks have recently gained much attention, in guises ranging from small-world networks to the United States power grid. One of the most recent major contributions to the study of network dynamics comes from the research group of Albert-László Barabási. In a widely-cited series of papers in major journals such as *Science* and *Nature*, Barabási and his colleagues in the Physics Department at Notre Dame have added a powerful new dimension to our understanding of network phenomena – a dimension which is highly relevant to many of us working in biological physics.

The study of random networks began, as Barabasi explains in his recent popular book *Linked: How Everything is Connected to Everything Else and What It Means for Business, Science, and Everyday Life* (Plume, 2003), which recounts the history of the study of networks, as well as the story of his group's contributions, with the work of Erdős and Rényi the late 1950s and early 1960s. Their work described randomly connected graphs, with N vertices each making P random connections. As Barabási explains, Erdős and Rényi “acknowledged for the first time that real graphs, from social networks to phone lines, are not nice and regular. They are hopelessly complicated. Humbled by their complexity, [Erdős and Rényi] assumed that these networks are random.” (*Linked*, p. 19)

The introduction of random network theory was a major advance, but it unwittingly provided a stumbling block as well. Researchers took it as a given that complexity was the same thing as randomness. This, it turns out, is very far from the case.

Imagine the network formed by airline routing maps in the United States: certain airports (Chicago's O'Hare, LAX, JFK, etc.) act as *hubs*, while others are visited by only a few routes. The existence of hubs is also present in other networks, such as regulatory networks in the cell (consider the ubiquitous ATP, for example, or the regulatory protein p53, whose disturbance can cause a wide range of cancers). It was Barabási's research group which first identified the predominance of hubs in many networks, and the theory they developed to explain the prevalence of hubs pushed network theory forward in a startling new way.

After growing up in Transylvania, in the Hungarian speaking region of Romania, Albert-László Barabási studied as an undergraduate in Bucharest, and later in Budapest with Tamás Vicsek, the well-known expert in fractal growth phenomena. Barabási then came to the United States to complete a doctorate in Physics at Boston University with Gene Stanley, thus receiving a strong background in materials science and statistical

physics, as well as in scaling phenomena in physics.

During postdoctoral work at IBM, Barabási wrote a paper on network topology which, he explained to THE BIOLOGICAL PHYSICIST, was “rejected everywhere”. When he left IBM to begin a faculty position at Notre Dame in 1995, he initially focused his research on more traditional problems, in materials science. But networks continued to fascinate him. His interest was caught in particular by a network unique in that we are watching it grow under our eyes, and in that *we ourselves are the microscopic forces* that drive its growth – the internet. In collaboration with his “best graduate student”, Réka Albert, and postdoctoral researcher Hawoong Jeong, map the topology of the www. They considered it, at first, as “exploratory research”. But when they noticed the prevalence of hublike behavior in the web (for example, the New York Times web site has an immense number of links, whereas an obscure blogger may have none), and recognized that the classical network theory of Erdős and Rényi was totally unequipped to deal with hubs, they began to map the topology of other networks as well.

A breakthrough came in the summer of 1999, while Barabási was attending a workshop on nonequilibrium dynamics in Porto, Portugal. His group had, by that point, recognized another critical feature of the web’s hublike structure – *it exhibited power law scaling*. In other words, the plot of the *number of nodes with a given number of connections vs. the number of connections* followed could be fit with a power law. An immediate consequence of this scaling was that there existed only a few nodes with a large number of links (nytimes.com, bbcnews.co.uk), and very many hubs with only a few links (obscuresolipsisticblogger.com). Another essential aspect of the internet’s power law

structure is that there is no such thing as a “typical” website. There is no characteristic “size” of a website (measured by the number of links), as there would be if the network followed a Gaussian distribution. (This is why, as many of our readers know, such systems are described as *scale-free*.)



Albert-László Barabási, speaking about his research at a recent conference.

“At that time,” recounts Barabási in *Linked*, “the web was the only network mathematically proven to have hubs. Struggling to understand it, we were searching for its distinguishing features. At the same time, we wanted to learn more about the structure of other real networks. Therefore, just before leaving for Porto, I had contacted Duncan Watts, who kindly provided us the data describing the power grid of the western United States and the *C. elegans* topology. Brett Tjaden, the former graduate student behind The Oracle of Bacon Website, now assistant professor of computer science in Athens, Ohio, sent us the Hollywood actor database. Jay Brockman, a computer science professor at Notre Dame, gave us data on a man-made network, the wiring diagram of a computer chip manufactured by IBM.” (pp. 79-80)

Before leaving for Porto, Barabási asked Réka Albert to analyze these other networks. She wrote to him that she had “looked at the degree

distribution...and in almost all systems (IBM, actors, power grid), the tail of the distribution follows a power law.”

Reading this simple statement in an email during a break between sessions, Barabási was stunned. Back in the conference hall, he recalls in *Linked*, “I found myself...paying no attention to the talks, thinking about the implications of this finding. If two networks as different as the Web and the Hollywood acting community both display power-law degree distribution, then some universal law or mechanism must be responsible. If such a law existed, it could potentially be applied to all networks....During a break between talks I decided to withdraw to the quiet of the seminary where we were being housed. I did not get far, however. During the fifteen-minute walk back to my room a potential explanation occurred to me, one so simple and straightforward that I doubted it could be right. I immediately returned to the university to fax Réka, asking her to verify the idea...A few hours later she e-mailed me the answer. To my great astonishment, the idea worked. A simple, rich-get-richer phenomenon, potentially present in most networks, could explain the power laws we spotted on the web and in Hollywood.” (p. 80)

On the flight back from Portugal, Barabási began to write up a description of the simple, elegant model. Nodes with more links get more links. That, and a growing rather than a static network, was all that was necessary to generate hubs and power law scaling. The long flight, he recounts, “seemed like an ideal opportunity to prepare the first draft” of a paper. But things were not to go so smoothly. “A soon as the plane took off, I pulled out a laptop newly purchased before the Porto trip and frantically started typing. I was just about finished with the introduction when the flight attendant, handing a Coke to the passenger next to me, suddenly poured the entire

contents of the glass onto my keyboard. Random letters flickered on the screen of my now useless laptop. But I did finish the paper on the plane, writing it out from beginning to end in longhand. A week later it was submitted to the prestigious journal *Science* only to be rejected after ten days...because the editors believed the paper did not meet the journal’s standards of novelty and wide interest. By then I was in Transylvania, visiting my family and friends in the heart of the Carpathian mountains. Disappointed but convinced that the paper was important, I did something I had never done before: I called the editor who rejected the paper in a desperate attempt to change his mind. To my great surprise, I succeeded.” (pp. 80-81)

After the publication of the *Science* paper (*Science* **286**:509-512, 1999), Barabási took what was, for an untenured assistant professor, a great leap of faith. Despite the advice of friends and colleagues who told him it was a risk, he decided to switch his whole group from materials science to the study of networks. Some people left the lab; others, as intrigued by networks as Barabási, Albert and Jeong, stayed. For a brief period, the advisability of the switch seemed in doubt, and Barabási recalls that his grants were not funded for two years. But as more major papers appeared from his group in journals like *Science* and *Nature*, it quickly became clear that his instinct had been right. Papers followed in rapid succession, exploring network dynamics in a variety of systems. Barabási’s group explored various aspects of network dynamics, adding more realistic parameters such as fitness, and exploring the relative vulnerabilities of hub-like and distributed networks to failure and to attack. On the more practical side, Barabási got his tenure; six months after that he was promoted to a name chair position.

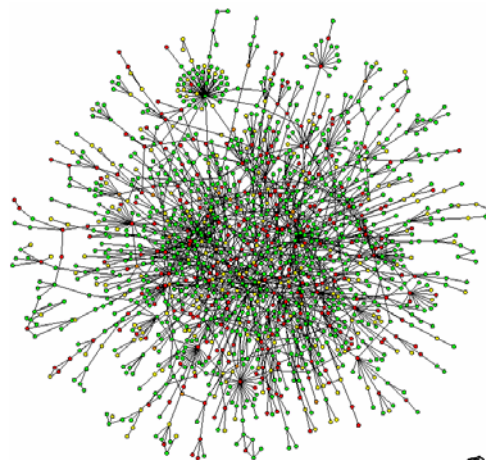
Most recently, Barabási's research is focusing on regulatory networks within the cell, building on his previous collaborations with Zoltán Oltvai of Northwestern University in Chicago. He is moving away, he explains, from a "single gene approach", and addressing theoretical and conceptual problems rather than experimental ones. A particular current focus of his work is the study of protein interaction networks using huge gene chip data sets. In addition to his work on protein interaction networks, which he is pursuing this year during a sabbatical at the Dana Farber Cancer Center in Boston, Barabási is working on a more theoretical problem, that of the role of timing in network dynamics. How does one think, he asks, about a network containing timing, and vice versa? He is also continuing to explore an interest in scaling phenomena in social networks – his group's most recent paper was a study of the correspondence patterns of Darwin and Einstein (*Nature* **437** (7063):1251, 2005).

Barabási tells THE BIOLOGICAL PHYSICIST that he is both a "big critic and a big fan" of current interdisciplinary trends. He worries that neither granting agencies nor universities are embracing true interdisciplinarity. They are doing multidisciplinary work instead. The idea of "let's get together to solve problem x" is misguided. Instead, he says, we must foster the development of new questions, both sides meeting to move together in a new direction.

Physicists can't answer a biologist's question, nor can a biologist answer a physicist's question. We must meet halfway in questions of mutual interest." It is critical, he says, for physicists to work with, and talk to, biologists. They want to talk to us, he says, but sometimes physicists can be too arrogant to listen. What is needed, he adds, is humility. It takes humility to listen, but this is essential.

Another problem with interdisciplinary research, Barabási says, is the issue of credit. Who takes credit for a given project, or piece of a project, can be critical in the high-pressure world of tenure-driven academia. Funding agencies talk about interdisciplinarity, but there are few mechanisms for a grant to have two Principal Investigators. This is an example, he says, of a systemic problem which is slowly beginning to be fixed by bottom-up pressure from a new generation of interdisciplinary scientists. Things are changing – the agencies are finally starting to put their money where their mouth is.

As for parsing the names of various interdisciplinary fields, such as the debate over the definition of "biological physics" versus "biophysics", Barabasi calls this "solipsistic nonsense. If you want to argue over this, be my guest. What matters, and what you are judged by, is what you produce."



Introducing PRL HIGHLIGHTS

Beginning in this issue, In forthcoming issues, THE BIOLOGICAL PHYSICIST will be drawing the attention of readers to papers of interest that have recently been published in Physical Review Letters, in addition to those published in Physical Review E. Both journals welcome the submission of articles in the field of biological physics. In keeping with the general policy of Physical Review, papers should report new results and should include a substantial physics component. Many published articles report advances in the fundamental physical understanding of a biological system, gained through both experimental and theoretical study. Others announce the discovery of new physical phenomena in biological systems or biological materials. Papers describing advances in physical instrumentation applied to biological systems, or the development of better theoretical and experimental methods for the physical analysis of biological data, are also appropriate for the journals.

A glance at the contents of recent issues (abstracts are freely available online at <http://publish.aps.org>) provides an idea of the range of subjects published in Physical Review. Topics have included physical studies of individual biomolecules and their interactions, supramolecular assemblies such as lipid bilayers and cytoskeletal structures, and the morphogenesis of aggregates of cells. Publications have also addressed the logic of signal transduction pathways and gene regulation networks, and the processing of information on a larger scale by assemblies of

neurons. Advances in experimental methods have included X-ray imaging of biological thin films, and new ways to trap biological molecules using optical and electrophoretic techniques.

Collaborative projects between biological and physical scientists are increasingly common. These often result in a range of publications with different emphasis - some involving basic physics, others reporting applications to a sub-field of biology. Physical Review E aims to provide a venue for the physics component. Physical Review Letters publishes papers that keep broadly interested physicists informed about vital current research, so submissions must satisfy the additional criteria of outstanding importance and wide appeal. Because Physical Review Letters has a diverse readership, it is especially important that the introductory paragraphs outline the primary achievements of the research, in clear language that avoids jargon and specialized terms. The communication of technical results to people outside the field requires thought, and, as was emphasized in a recent editorial, <http://prl.aps.org/edannounce/PRLv95i17.html>, authors should take care over writing the introduction.

While the overall number of submissions to Physical Review continues to grow apace, the expansion of biological physics outstrips the general trend. At current rates of growth, the number of submissions is doubling in a five-year period. This reflects the healthy dynamism of the field. Many young physicists

are choosing to specialize in this area, and significant numbers of experienced physicists are switching the emphasis of their research to work in this interdisciplinary field. To maintain the smooth operation of peer review, we editors try to keep track of the expertise of individual referees. It would be most helpful if members of the community would update their fields of expertise in the database at <http://referees.aps.org> and recommend younger colleagues. We greatly value our referees' assistance, because we recognize that speed and quality of review is one of the major motivations for submission to Physical Review. We are equally grateful to the Editorial Board members for their advice. Those responsible for biological physics are currently Didier Chatenay and Marcelo Magnasco for Physical Review Letters, and G. Bard Ermentrout,

Michael Wortis, John Bechhoefer, Rudolf Podgornik and Ralf Bundschuh for Physical Review E.

Finally, we point out that while Physical Review is read by physicists of all description, publication in Physical Review additionally guarantees that a piece of research is exposed to a wide range of biologists. For several years now, both Physical Review E and Physical Review Letters have been indexed by MEDLINE, so papers published in these journals will come to the attention of scientists working in related biological areas.

Thomas Duke
Adjunct Associate Editor,
Physical Review Letters

PRL HIGHLIGHTS

**Soft Matter, Biological, and
Interdisciplinary Physics
Biological Physics Letters from
Physical Review Letters
(October/November 2005)**

October 7, 2005

Volume 95, No. 15 Articles (15xxxx)

<http://scitation.aip.org/dbt/dbt.jsp?KEY=PRLTAO&Volume=95&Issue=15>

Elasticity-Mediated Self-Organization and Colloidal Interactions of Solid Spheres with Tangential Anchoring in a Nematic Liquid Crystal

[I. I. Smalyukh](#), [O. D. Lavrentovich](#), [A. N. Kuzmin](#), [A. V. Kachynski](#), and [P. N. Prasad](#)

Published 3 October 2005
157801

Energy Landscape of a Simple Model for Strong Liquids

[A. J. Moreno](#), [S. V. Buldyrev](#), [E. La Nave](#), [I. Saika-Voivod](#), [F. Sciortino](#), [P. Tartaglia](#), and [E. Zaccarelli](#)

Published 4 October 2005
157802

Dynamics and Spatial Organization of Endosomes in Mammalian Cells

[Chinmay Pangarkar](#), [Anh Tuan Dinh](#), and [Samir Mitragotri](#)

Published 5 October 2005
158101

Mapping the Phase Diagram of Single DNA Molecule Force-Induced Melting in the Presence of Ethidium

[Ioana D. Vladescu](#), [Micah J. McCauley](#),
[Ioulia Rouzina](#), and [Mark C. Williams](#)
Published 6 October 2005
158102

**Harmonic Response of Cellular
Membrane Pumps to Low Frequency
Electric Fields**

[D. Nawarathna](#), [J. H. Miller, Jr.](#), [J. R.
Claycomb](#), [G. Cardenas](#), and [D.
Warmflash](#)

Published 6 October 2005
158103

**Picosecond-Time-Scale Fluctuations
of Proteins in Glassy Matrices: The
Role of Viscosity**

[Elena Cornicchi](#), [Giuseppe Onori](#), and
[Alessandro Paciaroni](#)

Published 6 October 2005
158104

**Scaling Exponents and Probability
Distributions of DNA End-to-End
Distance**

[Francesco Valle](#), [Mélanie Favre](#), [Paolo De
Los Rios](#), [Angelo Rosa](#), and [Giovanni
Dietler](#)

Published 6 October 2005
158105

**Influence of Hydrodynamic Coupling
on Pair Diffusion in a Quasi-One-
Dimensional Colloid System**

[Xinliang Xu](#), [Stuart A. Rice](#), [Binhua Lin](#),
and [Haim Diamant](#)

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158301

**Logic Backbone of a Transcription
Network**

[M. Cosentino Lagomarsino](#), [P. Jona](#), and
[B. Bassetti](#)

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158701

**Anomalous Wave Reflection at the
Interface of Two Strongly Nonlinear
Granular Media**

[V. F. Nesterenko](#), [C. Daraio](#), [E. B.
Herbold](#), and [S. Jin](#)
Published 6 October 2005
158702

October 14, 2005

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**Melting of Copper and Nickel at High
Pressure: The Role of *d* Electrons**

[Stefanie Japel](#), [Beate Schwager](#),
[Reinhard Boehler](#), and [Marvin Ross](#)

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**Relating Airway Diameter
Distributions to Regular Branching
Asymmetry in the Lung**

[Arnab Majumdar](#), [Adriano M. Alencar](#),
[Sergey V. Buldyrev](#), [Zoltán Hantos](#),
[Kenneth R. Lutchen](#), [H. Eugene Stanley](#),
and [Béla Suki](#)

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**Stiffness of Optical Traps:
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**Nonequilibrium Raftlike Membrane
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[Matthew S. Turner](#), [Pierre Sens](#), and
[Nicholas D. Socci](#)

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by Dynamic Force Correlation
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[V. Barsegov](#) and [D. Thirumalai](#)

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Anti-Inertial Lift in Foams: A Signature of the Elasticity of Complex Fluids

[Benjamin Dollet](#), [Miquel Aubouy](#), and [François Graner](#)

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168304

Mechanisms in Adaptive Feedback Control: Photoisomerization in a Liquid

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Analysis of Evolution through Competitive Selection

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Microviscoelastic Moduli of Biomimetic Cell Envelopes

[Laurent Limozin](#), [Alexander Roth](#), and

[Erich Sackmann](#)

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Alternative Explanation of Stiffening in Cross-Linked Semiflexible Networks

[P. R. Onck](#), [T. Koeman](#), [T. van Dillen](#), and [E. van der Giessen](#)

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Molecular Communication through Stochastic Synchronization Induced by Extracellular Fluctuations

[Tianshou Zhou](#), [Luonan Chen](#), and [Kazuyuki Aihara](#)

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Role of Physical Mechanisms in Biological Self-Organization

[Adrian Neagu](#), [Karoly Jakab](#), [Richard Jamison](#), and [Gabor Forgacs](#)

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Formation, Manipulation, and Elasticity Measurement of a Nanometric Column of Water Molecules

[H. Choe](#), [M.-H. Hong](#), [Y. Seo](#), [K. Lee](#), [G. Kim](#), [Y. Cho](#), [J. Ihm](#), and [W. Jhe](#)

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187801

See Also: [Phys. Rev. Focus](#)

Log-Rolling Micelles in Sheared Amphiphilic Thin Films

[Gaurav Arya](#) and [Athanasios Z. Panagiotopoulos](#)

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Entangled Networks, Synchronization, and Optimal

Network Topology

[Luca Donetti](#), [Pablo I. Hurtado](#), and [Miguel A. Muñoz](#)

Published 24 October 2005
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[Dwaipayan Chakrabarti](#), [Prasanth P. Jose](#), [Suman Chakrabarty](#), and [Biman Bagchi](#)

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[Daniel M. Colegate](#) and [Colin D. Bain](#)

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Controlling Bending and Twisting of Conjugated Polymers via Solitons

[Xi Lin](#), [Ju Li](#), and [Sidney Yip](#)

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Spontaneous Breaking of Minimal Surface Condition: Labyrinths in Free Standing Smectic Films

[Damian Pociecha](#), [Ewa Gorecka](#), [Nataša Vaupotič](#), [Mojca Čepić](#), and [Jozef Mieczkowski](#)

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Low-Force DNA Condensation and Discontinuous High-Force Decondensation Reveal a Loop-

Stabilizing Function of the Protein Fis

[Dunja Skoko](#), [Jie Yan](#), [Reid C. Johnson](#), and [John F. Marko](#)

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Short-Time Inertial Response of Viscoelastic Fluids: Observation of Vortex Propagation

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Inertial Effects in the Response of Viscous and Viscoelastic Fluids

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Droplet Traffic at a Simple Junction at Low Capillary Numbers

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Liquids on Topologically Nanopatterned Surfaces

[Oleg Gang](#), [Kyle J. Alvine](#), [Masafumi Fukuto](#), [Peter S. Pershan](#), [Charles T.](#)

[Black](#), and [Benjamin M. Ocko](#)
Published 16 November 2005

Computer Simulation of Nematic Reentrance in a Simple Molecular Model

[Enrique de Miguel](#) and [Elvira Martín del Río](#)
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MARCH MEETING ANNOUNCEMENT

DBP Student Travel Grants for 2006 APS 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 travel distance to Baltimore.

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, 2005 for verification purposes.

No more than 2 students from one advisor may apply. Please include the abstract, the assigned session number (available online after mid-January), a letter of recommendation, APS membership numbers of student and advisor, home address, and, for domestic applicants, social security number (which will be kept confidential and used only if an award is made).

Submit applications via email (no attachments) to both the Chair, Dr. Peter Jung, at jung@helios.phy.ohiou.edu, and the Secretary-Treasurer, Dr. Shirley Chan, at ShirleyChan@mailaps.org. The deadline is February 1, 2006. Please personalize the subject of the application email by: "DBP-STG, from STUDENT NAME". Applicants will be notified by email before the Meeting for the awards and instructions on how to receive the checks.

Dr. Peter Jung, Chair, DBP

FACULTY POSITIONS IN COMPUTATIONAL BIOLOGY

The College of Science at Virginia Tech (<http://www.cos.vt.edu>), in cooperation with the Institute for Critical Technology and Applied Science (ICTAS, <http://www.eng.vt.edu/ictas/>) and the Institute for Biomedical and Public Health Sciences (IBPHS <http://www.ibphs.vt.edu/>), is seeking to strengthen research in **COMPUTATIONAL SCIENCE** through interdisciplinary faculty hires. As part of this initiative, the **Department of Biological Sciences** (<http://www.biol.vt.edu/>) anticipates filling one or more tenure-track positions at the junior and/or senior level. We encourage applications from individuals with demonstrated expertise in theoretical and computational methods applied to the following areas of biology: **COMPUTATIONAL CELL BIOLOGY**, particularly deriving the physiological properties of cells (such as signaling, motility, growth and division) from underlying molecular regulatory networks, at the level of gene, proteins, and metabolites; **COMPUTATIONAL ASPECTS OF INFECTIOUS DISEASES**, particularly the mechanisms of host-pathogen interactions at the molecular level or population level; and **ECOSYSTEM DYNAMIC MODELING**, particularly the spatial and temporal dynamics of nutrient transformations in aquatic or terrestrial ecosystems, or at the aquatic/terrestrial interface. The successful applicants must have an earned doctorate in biological, physical or mathematical sciences. Applications must be submitted online at <https://jobs.vt.edu/>. The application package should include a cover letter, resume, and a statement of research interests. Applicants should arrange for (at least) three letters of recommendation to be submitted directly to: Chair, Computational Biology Search Committee, Department of Biological Sciences, Virginia Tech, Blacksburg, VA 24061-0406. Review of applications will begin on December 1, 2005, and continue until the positions are filled. *Virginia Tech is an EO/AA university.* Individuals with disabilities desiring accommodations in the application process should notify Melissa Simpkins, (540) 231-4033, or call TTY 1-800-828-1120.

University of Kentucky

The University of Kentucky Center for Biomedical Engineering is expanding its current foci in biomaterials/biomechanics and systems physiology. The Center invites applications from outstanding individuals to fill three junior to mid-level tenure-track/tenured positions. These faculty members will be expected to develop distinguished research programs and contribute to teaching and mentoring within the Center's graduate program. Of particular interest are investigators in the areas of tissue engineering and regenerative medicine applied to connective, cardiovascular, or neural tissues; integrative and translational research focused on molecular or cellular aspects of cardiopulmonary or nervous system diseases; and image processing, including imaging of molecular and cellular processes. Especially desirable are investigators seeking to develop multi-investigator, interdisciplinary research programs that complement existing faculty in the Center and who will collaborate with other researchers both inside and outside the University. New faculty members will benefit from the close proximity of the Colleges of Agriculture, Arts & Sciences, Dentistry, Engineering, Medicine, and Pharmacy and of the UK Hospital, all within a five minute walk.

Applicants should submit a letter of application, curriculum vitae, a statement of research and teaching interests, and contact information for at least three references. Materials can be sent either electronically to cbmedgs@uky.edu or by postal mail to:

Search Committee
Center for Biomedical Engineering
204 Wenner-Gren Lab
University of Kentucky
Lexington, KY 40506-0070

The University of Kentucky is an Affirmative Action/Equal Opportunity Employer

Virginia Tech Department of Physics

Faculty Positions in Condensed Matter Physics: Computational Physics

The College of Science at Virginia Tech, in cooperation with the Institute for Critical Technology and Applied Science (ICTAS, <http://www.eng.vt.edu/ictas/>) is seeking to strengthen research in nanoscale and computational sciences through interdisciplinary faculty hires across multiple departments (<http://www.cos.vt.edu>). As part of this initiative, the Department of Physics anticipates tenure-track openings in Condensed Matter Physics to start in the fall of 2006. Theorists with an emphasis on computational studies of nanoscale, soft matter, or biological physics are especially encouraged to apply. The levels of the positions are open. Complementary searches across the Colleges of Science and Engineering are in progress. Further information can be found at <http://www.phys.vt.edu>, and questions regarding the position can be directed to Prof. Uwe C. Täuber, Chair, Condensed Matter Physics Search, Physics Department, Virginia Tech, Blacksburg, VA 24061-0435, (540) 231-8998, email: tauber@vt.edu. Applications must be submitted online at <https://jobs.vt.edu/>. The application package should include a cover letter, resume, and a statement of research interests. Applicants should arrange for (at least) three letters of recommendation to be submitted directly to the Search Chair. Review of applications will begin on January 16, 2006, and continue until the positions are filled. Virginia Tech is an EO/AA university, and the recipient of an NSF Advance grant which opens up a wide range of networking and development opportunities to women in science and engineering (<http://www.advance.vt.edu>). The physics department offers a supportive environment, including a mentoring program, to its junior faculty. Individuals with disabilities desiring accommodations in the application process should notify Kim Dix, Physics Department, (540) 231-7566, or call TTY 1-800-828-1120.

University of Alabama at Birmingham (UAB) Assistant Professor of Physics

Applications are invited to fill the position of a full-time, tenure-track Assistant Professor of Physics working in the field of **nanoparticles for biomedical imaging and therapeutic applications** who will be part of a multi-disciplinary team of faculty, including physicists, materials scientists, chemists, cell biologists, biomedical engineers, and clinical faculty supported by the NSF and NIH funded nanoscience, biomaterials, sensors, and spectroscopy programs. We are particularly interested in an experimentalist with a background in one or more of the following areas: biomedical imaging using nanoparticles, functionalization of nanoparticle surfaces with biomarkers, interaction of functionalized nanoparticles with cellular and sub-cellular structures, and surface enhanced Raman spectroscopy, fluorescence, and scanning near field optical microscopy used for clinical applications of nanoparticles. There are state of the art facilities available to support this multi-disciplinary research effort. See department of physics website at www.phy.uab.edu for more information. Preference will be given to candidates with a Ph.D. degree in physics, but all related disciplines are invited to apply. The successful applicant will be expected to seek and obtain extramural research funding and have a strong commitment to excellence in teaching and supervising research at the graduate and undergraduate levels. Applicants should send CV, descriptions of research plans, teaching plans/philosophy and names (inc. address, tel., fax, and email address) of three or more references and arrange for at least one letter of reference to be sent to David L. Shealy, Chair, Dept. of Physics, 1530 3rd Ave. South, CH310, UAB, Birmingham, AL 35294-1170 (dls@uab.edu). Screening of applicants will begin immediately, and continue until the position is filled.

Women and minorities are strongly encouraged to apply. UAB is an affirmative action, equal-opportunity employer.

**FACULTY POSITION
EXPERIMENTAL BIOLOGICAL PHYSICS
WASHINGTON UNIVERSITY IN St. LOUIS**

The Department of Physics invites applications for a tenure-track appointment in experimental biological physics at the assistant professor level, to begin Fall 2006. We seek individuals with an outstanding research record and independent creativity in applying experimental tools combined with quantitative models to study living systems at an integrated level. Applicants should have a strong background in physics and an aptitude for teaching and mentoring both undergraduate and graduate students. The successful candidate will complement and reinforce the Department's strength in biologically oriented physics and may take advantage of the top-ranked Washington University Medical School and the vigorously growing Departments of Biology and Biomedical Engineering. Applications will be considered until the position is filled, but priority will be given to those received by November 15, 2005. Applicants should send their curriculum vitae with a publication list and a statement of research interests and future plans, and ask three referees to send letters of evaluation. Correspondence should be sent to:

Professor John W. Clark
(Biological Physics Search)
Washington University
Department of Physics - Campus Box 1105 - 1 Brookings Dr.
St. Louis, MO 63130-4899

For more information call (314)-935-6276.

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

Arizona State University

Department of Physics and Astronomy and Department of Chemistry and Biochemistry
PO Box 871504, Tempe, AZ 85287-1504, Telephone: 480-965-3561
www.phy.asu.edu, www.chemistry.asu.edu

**Assistant Professorships in
Theory in Biological Physics and/or Theoretical Biochemistry**

The Department of Physics & Astronomy and the Department of Chemistry & Biochemistry at Arizona State University seek candidates for two tenure-track assistant professorships in theoretical/computational biological physics and/or theoretical/computational biochemistry starting August 2006. Candidates will conduct and publish research, teach graduate and/or undergraduate courses, and perform appropriate service activities. In exceptional circumstances, an appointment at a more senior level may be made. Applicants must have a Ph.D. degree in physics, chemistry, biochemistry, or a closely related discipline by the time of appointment, a strong demonstrated research experience, the potential to attract external funding, and a commitment to effective teaching appropriate to rank. Experience working in an interdisciplinary environment is desired. As part of its development plan, Arizona State University is expanding all aspects of interdisciplinary biological research, which includes the new Biodesign Institute and the School of Life Sciences. Research in this area spans the range from the most fundamental questions through biotechnology. Joint appointments as appropriate are encouraged involving departments, the Biodesign Institute, and the School of Life Sciences. Applicants must send a résumé and a statement describing their current and future research interests, and arrange to have three letters of recommendation sent on their behalf. Initial review of applications will begin on November 15, 2005, and, if the position is not filled, will continue every two weeks until the search is closed. Further information about this position can be obtained from the chair of the search committee, Michael Thorpe (mft@asu.edu). Please send application materials to: Theory Search, ATTN: Margaret Stuart, Arizona State University, Department of Physics & Astronomy, P.O. Box 871504, Tempe, AZ 85287-1504 or email materials to biotheory@asu.edu. A background check is required for employment. *ASU is an equal opportunity/affirmative action employer, and actively seeks diversity among applicants and promotes a diverse workforce.*

FACULTY POSITIONS IN SYSTEMS BIOLOGY/MICROBIOLOGY

Department of Biology and Biocomplexity Institute

Indiana University, Bloomington

The Department of Biology and the Biocomplexity Institute invite applications for two tenure-track faculty positions in experimental and/or computational Systems Biology. We anticipate an appointment at the Assistant Professor level, but outstanding senior-level candidates will also be considered. We will be especially interested in individuals whose research will enhance our current strengths in: 1) Mechanisms of bacterial cell function, 2) Cell differentiation and developmental biology, and 3) Biomolecular networks, including signaling, gene regulatory and metabolic networks.

The successful candidate will have strong interdisciplinary interests and will benefit from opportunities to collaborate with scientists in the Departments of Biology, Medical Sciences, Physics, Chemistry, Mathematics, the School of Informatics, the Center for Genomics and Bioinformatics, and the Biocomplexity Institute. While his/her primary appointment will be in the Department of Biology, joint appointments with other departments are possible.

This position is part of a major expansion of IU-Bloomington's research efforts in the life sciences. That expansion includes construction of two research buildings, a new NSF IGERT program in genomics, evolution and development, new program initiatives including METACyt, a \$53 million dollar project in molecular and cellular life sciences, a program in human biology, and new hiring in microbiology, biochemistry, cell and developmental biology, molecular evolution, and ecology.

The successful candidate will be expected to establish a vigorous, externally funded research program and to participate in teaching undergraduate and graduate courses. For information about the Biology Department and the Biocomplexity Institute, and for links to the campus and the Bloomington community, see: <http://www.bio.indiana.edu> and <http://biocomplexity.indiana.edu/>.

Candidates should send a curriculum vitae, a statement of research (past, present, and planned) and teaching interests, and representative publications, and arrange to have at least four letters of recommendation sent to: **Yves Brun, Systems Biology/Microbiology Faculty Search, Department of Biology, Indiana University, Jordan Hall 142, 1001 E 3rd St, Bloomington IN 47405-7005**. Review of applications will begin as soon as possible, and will continue until suitable candidates are identified.

Indiana University is an Affirmative Action/Equal Opportunity Employer. Women and minority candidates are encouraged to apply.

Postdoctoral Position – Imaging Live Malarial Parasites

A postdoctoral position is available immediately to join an interdisciplinary team of scientists studying red blood cells infected with the malarial parasite *Plasmodium falciparum*. We use a variety of interdisciplinary approaches including novel live cell imaging and image processing techniques, fluorescent probe development, and recombinant DNA technologies. We have developed a high-speed, high resolution confocal/DIC microscope with an integrated laser tweezer and capacity for localized photo-release and photo-activation. The successful applicant will have the opportunity to develop new applications of this instrument to study fundamental biophysical process including invasion of the red blood cell by the malaria parasite, vesicle trafficking, and the phenomenon of endo-reduplication. Intraerythrocytic malarial parasites present a fascinating and profoundly important topic for study.

For more information, see <http://bouman.chem.georgetown.edu/roepe/> and <http://www.physics.georgetown.edu/~urbach/dil.html>

Please send a CV, a description of your research interests, and the names of at least 3 references to urbach@physics.georgetown.edu

APS Workshop on Opportunities in Biological Physics

March 12, 2006

Baltimore Convention Center, Baltimore, Maryland

Organized by APS Division of Biological Physics

<http://www.aps.org/units/dbp/meetings.cfm>

Biology is a rapidly changing field that has been making tremendous strides forward in recent years. Biology is changing from a descriptive to a quantitative and conceptually profound field. This workshop will showcase a sample of the rich opportunities in biology for physicists. It is aimed at physicists, especially graduate students and postdocs, who are curious about how a background in physics can provide a unique perspective of biological systems. We believe that physicists will make a substantial contribution to this revolution by working together with biologists.

The workshop will start at 8 am with both morning and afternoon sessions. Participants are on their own for lunch.

Invited speakers include:

William Bialek (Princeton)

Robijn Bruinsma (UCLA)

Hans Frauenfelder (Los Alamos)

Klaus Lehnertz (Bonn)

Yale Goldman (Penn)

Boris Shraiman (Santa Barbara) (tentative)

Charles Stevens (Salk Institute)

Zuzanna Siwy (Irvine)

Sunney Xie (Harvard)

Co-chairs of Organizing Committee:

Dean Astumian, DBP Vice Chair, astumian@maine.edu

Clare Yu, cyu@uci.edu

Organizing Committee:

Shirley Chan, DBP Secretary/Treasurer

Ken Cole, APS Liaison

Harold Craighead

Hans Frauenfelder

Marilyn Gunner, DBP Chair-Elect

Steve Hagen, DBP Member-at-Large

Peter Jung, DBP Chair

Herbert Levine, DBP Member-at-Large

Heiner Linke

Denis Rousseau, DBP Past-Chair

Zuzanna Siwy

Xiaowei Zhuang

*Foreign speakers sponsored by the International Institute for
Complex Adaptive Matter (I2CAM).*

REGISTRATION FORM
APS Workshop on Opportunities in Biological Physics
March 12, 2006
Baltimore Convention Center
Baltimore, Maryland

Organized by APS Division of Biological Physics

Please print all information.

First Name: _____ Last Name: _____

Institution: _____

Mailing Address: _____

City: _____ State: _____ Zip Code: _____

Email: _____ Phone: _____

Registration Fee:

A conference fee is required for registration. \$25 will be added for late registration.
Payment may be made by Credit Card, Personal Check or Business Check.

Please make checks payable to the American Physical Society.

PAYMENT

- Personal Check
- Business/Institution Check
- Credit Card
 - Amex
 - Mastercard
 - Visa
 - Diners Club
 - Discover

FEES:

- \$25 Student
- \$50 Postdoc
- \$75 All other participants

**NOTE: On-site registration is
CASH ONLY!**

Complete this form and return it by **February 20, 2006**. Fax: 301-209-0865. Mailing Address: Biological Physics Workshop, Attn. Ken Cole, American Physical Society, One Physics Ellipse, College Park Maryland 20740.

Credit Card #: _____ Exp. Date: _____

Signature: _____ TOTAL: \$ _____

Workshop Announcement

Quantitative Approaches to Gene Regulatory Systems

July 9-21, 2006

**Center for Theoretical Biological Physics
University of California, San Diego**

This workshop will provide an introduction to quantitative approaches to modeling and analyzing gene regulatory systems. The two-week workshop will consist of two parts: During the first week, tutorial lectures will be given to provide the basic molecular and biophysical underpinning of gene regulatory systems, including models of protein-DNA interaction, and mechanisms of transcriptional control. Lectures will then be given to introduce the participants to current computational approaches to studying gene regulation and its evolution, including methods of regulatory element identification, transcriptional module reconstruction and network motif analysis. The second week will be devoted to quantitative analysis of specific gene regulatory systems, including transcriptional and post-transcriptional control systems, fluctuation in gene expression, and dynamics of small genetic circuits. The participants will be assigned mini-projects to apply the lecture materials to model and analyze specific biological systems, thereby gaining hands-on experiences in both the nature of the biological problems and the methodologies of approaching them. The workshop is designed primarily for people with graduate-level training in the physical sciences (e.g., physics, physical chemistry, engineering) with a serious interest of moving into areas of quantitative/systems biology. Familiarity with the fundamentals of statistical mechanics and thermodynamics as well as computing is highly recommended. Housing, meals and a generous travel stipend will be provided to all invited participants. To apply point your web browser to: <http://ctbp.ucsd.edu/workshops/index.php?id=18>.

For additional information and questions, please contact Christopher Smith, PhD., (858) 534-8370 or csmith@ctbp.ucsd.edu. This workshop is sponsored by the NSF Physics Frontiers Centers – Center for Theoretical Biological Physics (<http://ctbp.ucsd.edu>).

New Book Announcement

The new textbook

"Biological Physics of the Developing Embryo"

(Cambridge University Press)

by **Gabor Forgacs and Stuart A. Newman**

appeared in November 2005 (Europe) / December 2005 (U.S.)

Abstract

During development cells and tissues undergo changes in pattern and form that employ a wider range of physical mechanisms than at any other time in an organism's life. This book demonstrates how physics can be used to analyze these biological phenomena. Written to be accessible to both biologists and physicists, major stages and components of the biological development process are introduced and then analyzed from the viewpoint of physics. The presentation of physical models requires no mathematics beyond basic calculus. Physical concepts introduced include diffusion, viscosity and elasticity, adhesion, dynamical systems, electrical potential, percolation, fractals, reaction-diffusion systems, and cellular automata. With full-color figures throughout, this comprehensive textbook teaches biophysics by application to developmental biology and is suitable for graduate and upper-undergraduate courses in physics and biology.

Contents

Introduction;

1. The cell: fundamental unit of developmental systems;
 2. Cleavage and blastula formation;
 3. Cell states: stability, oscillation, differentiation;
 4. Cell adhesion, compartmentalization and lumen formation;
 5. Epithelial morphogenesis: gastrulation and neurulation;
 6. Mesenchymal morphogenesis;
 7. Pattern formation: segmentation, axes and asymmetry;
 8. Organogenesis;
 9. Fertilization: generating one living dynamical system from two;
 10. Evolution of developmental mechanisms;
- Glossary; References; Index.

An article by Gabor Forgacs on the biological physics of morphogenesis will be appearing in an upcoming issue of
THE BIOLOGICAL PHYSICIST.



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 2007

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. Recent developments in the biological and physical sciences and 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 for support 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 more members are absolutely necessary for the interdisciplinary nature of the project, which is an essential selection criterion. Applicants may also establish a local **interdisciplinary** collaboration as a component of an international team but 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.

Awards are dependent upon team size and successful teams will receive up to \$450,000 per year for the whole team.

Important Deadlines :
Compulsory pre-registration for password: 20 MARCH 2006
Submission of Letters of Intent: 30 MARCH 2006

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

MARCH MEETING 2006

DBP AND RELATED SESSIONS

Session A7: Bacterial Flagellar Dynamics, Polymorphism, and Conformational Spread DBP

Mon Chair: Phil Nelson - Monday rm 307

8:00AM 01: Theory of polymorphic transformations of flagella [Thomas Powers](#)

8:36AM 02: Synchronization of rotating flagella by hydrodynamic interactions [Holger Stark](#)

9:12 03: Bacterial Flagellar Transformations [Nicholas Darnton](#)

9:48AM 04: Spiroplasma swim by a processive change in body helicity. [Joshua Shaevitz](#)

Session A13: Focus Session: Spectroscopy of Biomolecules from Isolated Molecules to Cell

Environment I DCP

Mon Chair: David Pratt Room - 305

8:00AM 01: Watching proteins function with picosecond X-ray crystallography and molecular dynamics simulations. [Philip Anfinrud](#)

8:36AM 02: Raman spectra of normal and cancerous mouse mammary gland tissue using near infrared excitation energy
Vaman Naik, G.K. Serhatkulu, H. Dai, N. Shukla, R. Weber, J.S. Thakur, D.C. Freeman, A.K. Pandya, G.W. Auner, R. Naik, R.F. Miller, A. Cao, M.D. Klein, R. Rabah

8:48AM 03: Probing the beta-hairpin local structure by FTIR, 2D IR and ab initio calculation Jianping Wang, Jianxin Chen, Robin M. Hochstrasser

9:00AM 04: Spectral Signatures of 3-10 and alpha Helices Revealed by Two-Dimensional Infrared Spectroscopy Nien-Hui Ge, Hiroaki Maekawa, Claudio Toniolo, Quirinus Broxterman

9:12AM 05: Terahertz Absorption and Circular Dichroism Spectroscopy of Solvated Biopolymers Jing Xu, Kevin Plaxco, S. James Allen

9:24AM 06: "Intermediate couplings: NMR at the solids-liquids interface" [Megan Spence](#)

10:00AM 07: Time correlation functions in Light Harvesting Complexes embedded in Glassy Hosts Felipe Caycedo, Ferney Rodriguez

10:12AM 08: Conformational Dynamics of the Receptor Protein Galactose/Glucose Binding Protein Troy Messina, David Talaga

10:24AM 09: Quantifying Energy, Entropy and Free-Energy in Protein Folding Funnels Bernard Gerstman, Prem Chapagain

10:36AM 10: Landscape model of protein-DNA search: coupling of folding and sliding. Michael Slutsky, Mehran Kardar, Leonid Mirny

10:48AM 11: Modelling Ultra-fast folding proteins Kingshuk Ghosh, S. Banu Ozkan, Ken Dill

Session A26: Biomolecular Computation DBP

Mon Chair: Thomas Darden Mon Rm - 323

8:00AM 01: Quantum Mechanical Study of C-Terminal Cleavage Reaction in Inteins Philip Shemella, Saroj Nayak, Brian Pereira, Shekhar Garde, Georges Belfort, Patrick Van Roey, Vicky Derbyshire, Marlene Belfort

8:12AM 02: Evolutionary Strategies for Protein Folding Srinivasa Murthy Gopal, Wolfgang Wenzel

8:24AM 03: Towards predictive molecular dynamics simulations of DNA: electrostatics and solution/crystal environments
Volodymyr Babin, Jason Baucom, Thomas Darden, Celeste Sagui

8:36AM 04: Coarse-grained model of chaperonin-mediated protein folding George Stan, D. Thirumalai, George Lorimer, Bernard Brooks

8:48AM 05: Using Molecular Dynamics simulations in the analysis of Electron Spin Resonance spectra Deniz Sezer, Benoit Roux

9:00AM 06: Locating structural energy minimum of biological molecules in explicit solvent Eric Dykeman, Otto Sankey

9:12AM 07: Predicting 3D structures of transient protein-protein complexes Petras Kundrotas, Emil Alexov

9:24AM 08: Charge transfers from Na atom in (H₂O)_n clusters and in water solution Takeshi Nozue, Junichi Hoshino, Kazuo Tsumuraya

9:36AM 09: Coarse-graining protein energetics in sequence variables Fei Zhou, Gevorg Grigoryan, Amy Keating, Gerbrand Ceder, Dane Morgan

9:48AM 10: MAME Water Model: hydrogen bonding, electrostatic, polarization and van der Waals interactions in water.
Eugene Tsiper

10:00AM 11: Accurate computation and interpretation of spin-dependent properties in metalloproteins Jorge Rodriguez

10:12AM 12: Electrostatic effects on the shape of charged lipid membranes Graziano Vernizzi, Monica Olvera

10:24AM 13: Computational studies of a redox-driven proton pump: Cytochrome c oxidase and biological energy transduction Alexei A. Stuchebrukhov

10:36AM 14: Ab Initio QM/MM Study of the Ester-hydrolysis Reaction Mechanism in Haloalkane Dehalogenase Yiming Zhang, Yu Zhou, Saroj Nayak, Angel Garcia

10:48AM 15: Combining biophysical and bioinformatical approaches for predicting residue's contacts. Emil Alexov, Amber Allardice, Petras Kundrotas

Session A29: Experimental Techniques in Biophysics DBP

Mon Chair: J. P. Landry room - 326

- 8:00AM 01: The healing mechanism for excited molecules near metallic surfaces B. Barbiellini, P.M. Platzman
8:12AM 02: Pulse-shaping and Fourier Transform Techniques in Multiphoton Microscopy Jennifer Ogilvie, Delphine D'Jebarre, Emmanuel Beaufrepaire, Antigoni Alexandrou, Manuel Joffre
8:24AM 03: MutY: optimized to find DNA damage site electronically? Jong-Chin Lin, Daniel Cox, Rajiv Singh
8:36AM 04: Templated biomineralization on self assembled protein fibers S. Palmaccio, K. Subburaman, N. Pernodet, S.-Y. Kwak, E. DiMasi, S. Ge, N.L. Yang, M. Rafailovich
8:48AM 05: Advances in energy filtered electron tomography for quantitative 3-D phosphorus imaging of cell nuclei Maria A. Aronova, Guofeng Zhang, Richard D. Leapman
9:00AM 06: Adaptive wave-front correction for multi-photon microscopy using coherence-gated wave-front sensing Markus Rueckel, Winfried Denk
9:12AM 07: Label-free optical detection of protein binding on small-molecule ligand microarrays Y. S. Sun, J. P. Landry, X. D. Zhu, T. Bao, K. S. Lam
9:24AM 08: Dynamic Dimensional Analysis of In-Vivo Microorganisms Using Polarized Light Scattering Willem Van De Merwe, Jozsef Czege
9:36AM 09: Fast Cooling and Vitrification of Aqueous Solutions for Cryopreservation Matt Warkentin, Naji Husseini, Viatcheslav Berejnov, Robert Thorne
9:48AM 10: Active and Passive Microscopic Viscoelastic Response in Poly(Ethylene) Oxide Solutions Olga Latinovic, H. Daniel Ou-Yang
10:00AM 11: Specifically Detect Vascular Endothelia Growth Factor (VEGF) with Micro Cantilever Resonator Jianhua Gu, Debin Li, David Lederman, Jarod Kabulski, Peter Gannett, Daniel Flynn
10:12AM 12: Serial Crystallography: imaging single proteins at a synchrotron David Shapiro, John Spence, R. Bruce Doak, Dmitri Starodub, Uwe Weierstal, Henry Chapman, Stefano Marchesini, Malcolm Howells
10:24AM 13: Structural investigations of human hairs by spectrally resolved ellipsometry Benjamin Schulz, D. Chan, M. Ruebhausen, S. Wessel, R. Wepf
10:36AM 14: Evanescent Wave Excitation and Raman Spectroscopy of Bacteriorhodopsin on Gallium Nitride Waveguide Structures Alfons Schulte, Sonya Ortiz, Alfred Keller, April Pope, Yu Guo, Heidi Hockel, Eric Johnson
10:48AM 15: Probing Protein Structural Dynamics Using Microfluidic Diffusional Mixer Based FT-MIR Micro-Spectroscopy Peter Galajda, Robert Austin, Jarmila Gurjarro, Jesus Vega, Cyrus Arian, Aihua Xie

Session B7: Bionanotechnology: Application and Fundamental Aspects of Processes at Nano-scale

DBP DCMP Mon Chair: Zuzanna S. Siwy, Mon rm

- 11:15AM 01: Ion Channels as Nanodevices Robert Eisenberg
11:51AM 02: Fluctuation driven active molecular transport in passive channel proteins [Ioan Kosztin](#)
12:27PM 03: Pressure-driven DNA polymer transport in microfluidic and nanofluidic channels [Derek Stein](#)
1:03PM 04: The Transportation System Inside a Living Cell [Clare Yu](#)
1:39PM 05: Bio-functionalized Nanotube Membranes For DNA Separation [Punit Kohli](#)

Session B13: Focus Session: Spectroscopy of Biomolecules from Isolated Molecules to Cell

Environment II DCP

Mon Chair: Philip Anfinrud Room - 305

- 11:15AM 01: Structure and Interactions of Isolated Biomolecular Building Blocks. [Mattanah de Vries](#)
11:51AM 02: TBA [Martin Jerrold](#)
12:27PM 03: Folding an infinitely long polypeptide into a helical conformation Joel Ireta, Matthias Scheffler
12:39PM 04: The Effect of Terminal Truncation on the Folding Dynamics of Coiled-coil GCN4-p1 [Michelle Bunagan](#), [Lidia Cristian](#), [William DeGrado](#), [Feng Gai](#)
12:51PM 05: Fast Events in Protein Folding following Ultrarapid Mixing [Lisa Lapidus](#), [Kimberly Cooper](#), [Emily Tubmann](#), [David Hertzog](#), [Juan Santiago](#), [Olgica Bakajin](#)
1:03PM 06: Fast diffusive folding dynamics of Tryptophan Zipper peptides [Stephen Hagen](#)
1:15PM 07: Sugars in the gas phase [John Simons](#)
1:51PM 08: 2D IR measurements of the coupling in transmembrane helix dimers [Chong Fang](#), [Lidia Cristian](#), [Alessandro Senes](#), [William Degrado](#), [Robin Hochstrasser](#)
2:03PM 09: Solvent and Peptide Conformational Fluctuations Revealed with Two-Dimensional Infrared Spectroscopy [Ziad Ganim](#), [Andrei Tokmakoff](#)

Session B26: Focus Session: Single Molecule Biophysics: DNA & RNA DBP, DPOLY

Mon Chair: Ching-Hwa Kiang- 323

- 11:15AM 01: Dynamics of molecular motors with finite processivity on heterogeneous tracks [David Nelson](#)
11:51AM 02: DNA electrophoresis in Pluronic F127 [Seungyong You](#), [David Van Winkle](#)
12:03PM 03: Model for passage time of polymer through a pore (weak external forces limit) [Stanislav Kotsev](#), [Anatoly Kolomeisky](#)
12:15PM 04: Driven DNA translocation through thin and long nanopores [Aniket Bhattacharya](#), [William H. Morrison](#)

- 12:27PM 05: Conformational Analysis of Single DNA Molecules Undergoing Entropically Induced Motion in Nanochannels. John Mannion, Christian Reccius, Joshua Cross, Harold Craighead
- 12:39PM 06: The Physics of Nanoconfined DNA Walter Reisner, Keith Morton, Robert Riehn, Yang Mei Wang, Stephen Chou, Jonas Tegenfeldt, Robert Austin
- 12:51PM 07: DNA entropic elasticity for short molecules Jinyu Li, Philip C. Nelson, M. D. Betterton
- 1:03PM 08: Single Molecule Visualization of DNA in Wicking Flows Chad DeLong, David Hoagland
- 1:15PM 09: Abundance of pseudoknots in the RNA world Daniel Aalberts, Evan Miller
- 1:27PM 10: DNA sequencing via transverse electronic transport Johan Lagerqvist, Michael Zwolak, Massimiliano Di Ventra
- 1:39PM 11: Polymer effects in forced passage of DNA and macromolecules through nanopores Francisco Solis
- 1:51PM 12: Mapping the phase diagram of DNA force-induced melting in the presence of DNA intercalators Ioana Vladescu, Micah McCauley, Megan Nunez, Ioulia Rouzina, Mark Williams
- 2:03PM 13: DNA and RNA unzipping using nanopore force spectroscopy Amit Meller, Jerome Mathe, Meni Wanunu, Barak Akabayov, Irit Sagi

Session B28: Experimental Techniques in Biomaterials Science DBP

Mon Chair: Kevin Hewitt Room - 325

- 11:15AM 01: Dual-beam Oscillating Optical Tweezers-Based 3-D Confocal Microrheometer Jing Wang, Chuan Pu, H. Daniel Ou-Yang
- 11:27AM 02: Integrated Fiber-optic Dipping-probe Microfluorometer Robert W. Gammon, Vildana Hodzic, Christopher C. Davis
- 11:39AM 03: Characterization of RNase Immobilization at Surfaces by NEXAFS Xiaosong Liu, Chang-Hyun Jang, Fan Zheng, Astrid Jurgensen, Nicholas L. Abbott, F.J. Himpsel
- 11:51AM 04: Surface-enhanced Raman scattering of a hydrophilic ligand (tiopronin) adsorbed on gold nanoparticles. Joel St.Aubin, Kevin Hewitt
- 12:03PM 05: Employing Grating Couplers in Biosensors Amal Kasry, Wolfgang Knoll
- 12:15PM 06: 15nm diameter upconversion nanophosphors as bio-labels. Shuang Fang Lim, Robert Riehn, Chih-kuan Tung, Robert H. Austin, Nora Khanarian, William S. Ryu, David Tank
- 12:27PM 07: Thermal Stability, and Curvature Dependence of Bovine Serum Albumin on Gold Nanoparticles Using Localized Surface Plasmon Resonance Jonathan Teichroeb, James Forrest, Valentina Ngai
- 12:39PM 08: High Q RF Resonant Cavity for Detecting Biological Tissue Nonlinearities Vildana Hodzic, Robert W. Gammon, Quirino Balzano, Christopher C. Davis
- 12:51PM 09: Micromachined piconewton force sensor for biophysics investigations Steven Koch, Gayle Thayer, Alex Corwin, George Bachand, Maarten de Boer

Session B29: Focus Session: Micro-Organism Motility DBP GSNP

Mon Chair: Udo Erdman, Mon rm - 325

- 11:15 01: Direct measurement of the propulsion efficiency of bacterium Escherichia Coli Suddhashil Chattopadhyay, Radu Moldovan, Chuck Yeung, Xiao-lun Wu
- 11:27AM 02: Modeling the motion of microscale synthetic swimmers Alexander Alexeev, Victor Yashin, Rolf Verberg, Anna Balazs
- 11:39AM 03: Detecting the gravitational sensitivity of Paramecium caudatum using magnetic forces Karine Guevorkian, James M Valles Jr.
- 11:51AM 04: Precise adaptation in chemotaxis through "assistance neighborhoods" Robert Endres, Ned Wingreen
- 12:03PM 05: Cellular individuality in the gradient sensing response of Dictyostelium Azadeh Samadani, Jerome Mettetal, Alexander van Oudenaarden
- 12:15PM 06: How does Dicty find its way? Erin Rericha, Carole Parent, Wolfgang Losert
- 12:27PM 07: Dictyostelium Discoideum Chemotaxis: Threshold for Directed Motion Eberhard Bodenschatz
- 1:03PM 08: Impact of Helicobacter Pylori on Mucus Rheology Jonathan Celli, Sarah Keates, Ciaran Kelly, Bradley Turner, Rama Bansil, Shyamsunder Erramilli
- 1:15PM 09: The effect of viscosity on the contraction of the stalk of Vorticella Convallaria Deependra Kantha, David Van Winkle
- 1:27PM 10: Optimal Foraging Strategy: Angle Matters Udo Erdmann, Sebastian Goller, Igor M. Sokolov, Lutz Schimansky-Geier
- 1:39PM 11: Nonlinear electromagnetic responses of active molecular motors in live cells and organelles Dharmakirthi Nawarathna, Jeffrey Gardner, Gustavo Cardenas, David Warmflash, John Miller, William Widger, James Claycomb
- 1:51PM 12: Mechanism of formin-associated actin filament elongation Dimitrios Vavylonis, David R. Kovar, Ben O'Shaughnessy, Thomas D. Pollard
- 2:03PM 13: Spreading of neutrophils: from activation to migration Helim Aranda-Espinoza, Kheya Sengupta, Lee Smith, Paul Janmey, Daniel Hammer

Session D9: Methods in Nanobiotechnology DBP

Mon Chair: Ido Braslavsky Mon rm- 301

- 2:30PM 01: Nanomechanical Devices for Single Molecule Biophysics Michael Roukes
- 3:06PM 02: Single Molecule Dynamics of Polymers Confined in Nanochannels Robert Austin
- 3:42PM 03: Surface-Mounted Artificial Dipolar Molecular Rotors Josef Michl

- 4:18PM 04: Mapping Protein Transport in Living Cells with Quantum Dots and Spatio-Temporal Image Correlation Spectroscopy [Paul Wiseman](#)
 4:54PM 05: STM Manipulation of Nanoscale Biomolecules [Saw-Wai Hla](#)

Session D13: Focus Session: Spectroscopy of Biomolecules from Isolated Molecules to Cell Environment III DCP

Mon Chair: Megan Spence Room - 305

- 2:30PM 01: Imaging of protein partitioning in plasma membranes with coexisting fluid phases [Tobias Baumgart](#)
 3:06PM 02: Spectroscopic Characterization of ssDNA Brushes D. Y. Petrovykh, A. Opdahl, H. Kimura-Suda, M. J. Tarlov, L. J. Whitman
 3:18PM 03: Detection of beta-Amyloid Peptide Dimer in Solution by Fluorescence Resonance Energy Transfer Jun Han, Erwen Mei, Mei-Ping Kung, Hank Kung, Hai-Lung Dai
 3:30PM 04: Nanolaser Spectroscopy of Genetically Engineered Yeast: New Tool for a Better Brew? Paul L. Gourley, Judy K. Hendricks, Robert K. Naviaux, Michael P. Yaffe
 3:42PM 05: The Influence of Environment on the Reactivity, Dynamics and Spectroscopy of B12 Coenzymes. Roseanne Sension, D. Ahmasi Harris, Elizabeth Carroll, Andrew Stickrath
 3:54PM 06: "Single molecule views of Nature's nano-machines" [Taekjip Ha](#)
 4:30PM 07: Time-Resolving Protein Superstructure Disassembly at the Single Particle Level Jason Puchalla, Kelly Krantz, Julie Viehweg, Hays Rye, Peter Galajda, Robert Austin
 4:42PM 08: Study of DNA uptake locations in single E. coli cells C. Shan Xu, L. Meadow Anderson, Haw Yang
 4:54PM 09: Real-Time, Nonlinear Optical Probe of Molecular Transport across Living Escherichia coli Cell Membranes Jia Zeng, Heather Eckenrode, Hai-Lung Dai
 5:06PM 10: Photon-by-Photon Determination of Emission Bursts from Diffusing Single Chromophores Kai Zhang, Haw Yang
 5:18PM 11: Quantum cooperative process in living cells Robert Finkel

Session D26: Focus Session: Dynamics of Nuclei Acid-Protein Interaction: Single Molecule DBP DPOLY

Mon Chair: Mark C. Williams Mon Rm- 323

- 2:30PM 01: Probing Nucleosome Remodeling by Unzipping Single DNA Molecules [Michelle Wang](#)
 3:06PM 02: Binding Study of T7 Gene 2.5 Protein to Single- and Double--Stranded DNA from Single Molecule Stretching Leila Shokri, Boriana Marintcheva, Charles C. Richardson, Mark C. Williams
 3:18PM 03: Dynamics of Protein-DNA Interactions probed with Laser Temperature-Jump and Time-Resolved FRET Measurements. Serguei Kuznetsov, Paula Vivas, Sawako Sugimura, Donald Crothers, Anjum Ansari
 3:30PM 04: Inferring the in vivo looping properties of DNA. Jose Vilar, Leonor Saiz, Miguel Rubi
 3:42PM 05: DNA kept under tension reveals mechanochemical properties of protein reaction pathways [Gijs Wuite](#)
 4:18PM 06: A Model for Folding and Aggregation in RNA Secondary Structures Vishvesha Guttal, Ralf Bundschuh
 4:30PM 07: Mechanism of gene-regulating protein's diffusion along DNA: hopping vs. sliding Yan Mei Wang, Edward Cox, Robert Austin
 4:42PM 08: Protein jamming on DNA Zeba Wunderlich, Michael Slutsky, Mehran Kardar, Leonid Mirny
 4:54PM 09: Single-molecule Study of Nucleocapsid Protein Chaperoned DNA Hairpin Structural Dynamics Yining Zeng, Gonzalo Cosa, Hsiao-Wei Liu, Christy Landes, Dmitrii Makarov, Paul Barbara, Karin Musier-Forsyth
 5:06PM 10: Mechanism of Nucleic Acid Chaperone Function of Retroviral Nucleocapsid (NC) Proteins Ioulia Rouzina, My-Nuong Vo, Kristen Stewart, Karin Musier-Forsyth, Margareta Cruceanu, Mark Williams
 5:18PM 11: Fis protein induced lambda \$F\$-DNA bending observed by single-pair fluorescence resonance energy transfer Fu Chi-Cheng, Fann Wunshain, Yuan Hanna S.

Session D29: Molecular Machines and Motors DBP GSNP

Mon Chair: Dean Astumian Mon Rm - 326

- 2:30PM 01: Processivity of helicase-induced DNA strand separation M. D. Betterton, F. Julicher
 2:42PM 02: A nanojet: propulsion of a molecular machine by an asymmetric distribution of reaction--products Tanniemola Liverpool, Ramin Golestanian, Armand Ajdari
 2:54PM 03: Twirling of Actin by Myosins II and V John F. Beausang, Harry W. Shroeder, James A. Gilmour, Yale E. Goldman
 3:06PM 04: Synthetic Motors and Nanomachines. [Amar Flood](#)
 3:42PM 05: Track Switching and Crossing by Microtubule Motors. Jennifer Ross, Karen Wallace, Henry Shuman, Erika Holzbaur, Yale Goldman
 3:54PM 06: Collective dynamics of molecular motors pulling on fluid membranes Jaume Casademunt, Otger Campas, Yariv Kafri, Konstantin B. Zeldovich, Jean-Francois Joanny
 4:06PM 07: Entropic pulling: how Hsp70 chaperones translocate proteins through membrane pores Paolo De Los Rios, Anat Ben-Zvi, Olga Slutsky, Abdussalam Azem, Pierre Goloubinoff
 4:18PM 08: Biological motors: Conventional and Unconventional Myosins [Yale E. Goldman](#)
 4:54PM 09: A single polymer Brownian motor Matthew Downton, Martin Zuckermann, Erin Craig, Michael Pliischke, Heiner Linke
 5:06PM 10: Imaging and Manipulation of Nanocars by STM A.J. Osgood, Y. Shirai, Y. Zhao, J.M. Tour, K.F. Kelly
 5:18PM 11: Physical mechanism of the nuclear pore transport. A. Zilman, S. di Talia, M. Magnasco, M. Rout, B. Chait

Session G13: Focus Session: Spectroscopy of Biomolecules from Isolated Molecules to Cell

Environment IV DCP

Tues Chair: Tobias Baumgart room - 305

8:00AM 01: Laser spectroscopy probes of biomolecular conformation: Valley-to-valley searches for molecular-scale mountain passes [Timothy Zwier](#)

8:36AM 02: Ultrafast dynamic exchange of hydrogen bonds [Robin Hochstrasser](#)

9:12AM 03: PS Dynamics and Dephasing Times of Internal Amino Acids in Proteins Robert Austin, Aihua Xie, Britta Redlich, Lex van der Meer

9:24AM 04: Probing the conformation of DNA by time-resolved fluorescence Anita Jones, Robert Neely, Eleanor Bonnist, David Dryden, Dalia Daujotyte, Saulius Grazulis, Saulius Klimasauskas, Thomas Lenz, Elmar Weinhold

9:36AM 05: Conformational Structure Determination of Biomolecules in the Gas Phase using Broadband Fourier Transform Microwave Spectroscopy Brooks Pate, Gordon Brown, Brian Dian, Kevin Douglass, David Pratt, Leonardo Alvarez

9:48AM 06: Probing secondary structures of peptide chains using gas phase laser spectroscopy [Michel Mons](#)

10:24AM 07: Permanent Electric Dipole Moments of Four Tryptamine Conformers in the Gas Phase. A New Diagnostic of Structure and Dynamics. David Pratt, Tri V. Nguyen

10:36AM 08: Thermodynamics of Membrane Proteins: Kinetics Dipti Sharma, Atin Mandel, Jose Arguello, Germano Iannacchione

10:48AM 09: Conformational Isomerism in 1-Heptanal Jonathan M. Fisher, Li-Hong Xu, R.D. Suemran, Brooks Pate, Kevin Douglass

Session G26: Trapping of Nanoscale Biological Objects DBP

Tues Chair: W. E. Moerner Mon Rm - 120

8:00AM 01: The Anti-Brownian Electrokinetic Trap (ABEL trap) [Adam Cohen](#)

8:36AM 02: The ac electrokinetic elongation mechanism of DNA. Christoph Walti, Andre Germishuizen, Paul Tosch, Clemens Kaminski, Giles Davies

8:48AM 03: Tracking-FCS: Correlation Spectroscopy of Individual Particles Andrew Berglund, Hideo Mabuchi

9:00AM 04: Flexible polymers under spherical confinement Angelo Cacciuto, Erik Luijten

9:12AM 05: Dynamic effects in alignment of biological macromolecules for diffraction experiments. D. Starodub, U. Weierstall, K. Schmidt, R. B. Doak, P. Fromme, J. C. H. Spence

9:24AM 06: Directed Cell Assembly with Magnetic Nanowires Edward J. Felton, Marcie Jaffee, Daniel H. Reich, Christopher S. Chen

9:36AM 07: Tracking Protein-coated Particles in 3D. [Enrico Gratton](#)

10:12AM 08: A Device of Tracking a Single Nanometer-Sized Particle in 3D with Nanometer Resolution and Millisecond Response Time. Hu Cang, C. Shan Xu, Daniel Montiel, Haw Yang

10:24AM 09: Nanoscale molecular traps Chia-Fu Chou, Qihuo Wei, Jian Gu, Frederic Zenhausern, Nathan Swami

10:36AM 10: Internal Structure, Fluctuations and Micromechanical Properties of Bovine Arterial Endothelial Cells: An Optical Tweezers Study Carolyn Perretta, Sheena Farrell, Olga Latinovic, H. Daniel Ou-Yang

10:48AM 11: Atomic force microscopy electrostatic nanolithography for proteins study in wiseana iridovirus and barley chromosomes Ewa Rowicka, Olga Mayevska, Sergei Lyuksyutov, Megumi Sasou, Shigeru Sugiyama

Session G29: Physical and Engineering Constraints on the Function of Biological Systems DBP

Tues Chair: Partha Mitra Room - 326

8:00AM 01: A Framework for Globular Proteins [Timothy Lezon](#)

8:36AM 02: Chiral Heterorecognition of Organic Molecules and Inorganic Surfaces Thomas Greber, Richard Schillinger, Joachim Wider, Zeliko Sljivancanin, Bjork Hammer

8:48AM 03: Nucleotide Mutation and Amino Acid Evolution Jose Parra, Bernard Gerstman

9:00AM 04: Quantitative modeling and data analysis of SELEX experiments Marko Djordjevic, Anirvan M. Sengupta

9:12AM 05: Low Temperature IPD AgO Bacterial Static / Bactericidal Coatings for Various Medical Applications Daniel Storey

9:24AM 06: Energy Dependence of Cancer Cell Irradiation Rachel Black

9:36AM 07: Calibration Of A System For Energy Dependence Study Of Cancer Cell Irradiation Ariano Munden

9:48AM 08: [John Doyle](#)

10:24AM 09: Radiation Damage From Mono-energetic Electrons Up to 200 keV On Biological Systems Yuriy Prilepskiy

10:36AM 10: The cost of linearization Danielle Morel, William B Levy

10:48AM 11: Fast noniterative biexponential fluorescence lifetime imaging in the investigation of phagocytosing neutrophils Raluca Aura Niesner

Session H7: Nanopore Biophysics DBP

Tues Chair: Xinsheng Sean Ling Room - 307

11:15AM 01: Interaction of DNA and Proteins with Single Nanopores [John Kasianowicz](#)

11:51AM 02: Force measurements on a DNA molecule inserted into a solid-state nanopore [Cees Dekker](#)

12:27PM 03: Protein unraveling through a single protein nanopore [Liviu Movileanu](#)

1:03PM 04: Detecting Single DNA and Proteins Using a Solid-state Nanopore Device [Jiali Li](#)

1:39PM 05: Microscopic Kinetics of DNA Translocation through Synthetic and Biological Nanopores [Aleksei Aksimentiev](#)

Session H29: Focus Session: Physical Aspects of Morphogenesis: Computational Approaches DBP

Tues Chair: Shane Hutson Room - 326

11:15AM 01: From Genes to Morphogenetic Movements: How Cell-level Modeling Makes such Connections Possible [G. Wayne Brodland](#)

11:51AM 02: Myxobacteria Fruiting Body Formation [Yi Jiang](#)

12:27PM 03: Growth and condensation in the chick limb bud using the Cellular Potts Model [Nikodem Poplawski](#)

12:39PM 04: Quantifying the Intercellular Forces during Drosophila Morphogenesis [Xiaoyan Ma](#), [M. Shane Hutson](#)

12:51PM 05: Mechanisms of Biological Neural Network Development [H.G.E Hentschel](#)

1:03PM 06: Upregulation of Tissue Dynamics in Response to UV Laser Perturbations [Xomalin G. Peralta](#), [Y. Toyama](#), [S. Venakides](#), [D. P. Kiehart](#), [G. S. Edwards](#)

1:15PM 07: Pattern Scaling Achieved by Oppositely Directed Morphogen Gradients [Peter McHale](#), [Wouter-Jan Rappel](#), [Herbert Levine](#)

1:27PM 08: Shape and Size of the Fission Yeast Nucleus are governed by Equilibrium Mechanics [Gerald Lim](#), [Greg Huber](#), [Jonathan Miller](#), [Shelley Sazer](#)

1:39PM 09: A surprising answer in the search for a comprehensive health protection exposure metric for radiofrequency (RF) fields [Marjorie Lundquist](#)

1:51PM 010: Nonlinear Analysis of Electromyography Time Series of Low Back Muscles [Ulrich Zurcher](#), [Kaufman Miron](#), [Paul Sung](#)

Session K7: New Methods and Algorithms for Biomolecular Modeling DBP

Tues Chair: Christopher Roland Room - 307

2:30PM 01: Adaptive Biasing Force Method for Vector Free Energy Calculations [Eric Darve](#)

3:06PM 02: New Distributed Multipole Methods for Accurate Electrostatics for Large-Scale Biomolecular Simulations [Celeste Sagui](#)

3:42PM 03: Flexibility in Biomolecules: Beyond Molecular Dynamics. [Michael Thorpe](#)

4:18 PM 04: Enhanced conformational sampling via novel variable transformations and very large time-step molecular dynamics [Mark E. Tuckerman](#)

4:54PM 05: Reaction Path Reaction path potential for complex biomolecular systems derived from mixed QM/MM methods [Weitao Yang](#)

Session K26: Focus Session: Single Molecule Biophysics I DPB DCMF

Tues Chair: David Nelson ROOM 323

2:30PM 01: Conformational Dynamics of Adenylate Kinase: The Effects of Temperature and Mutation on Friction, Memory, and Reactivity [Lucas Watkins](#), [Karl Duderstadt](#), [Sucharita Bhattacharyya](#), [Haw Yang](#)

2:42PM 02: Single Human Plasma Fibrinogen Molecule Imaging by PEEM and AFM [Xianhua Kong](#), [Jacob Garguilo](#), [Crissy Rhodes](#), [Robert Nemanich](#)

2:54PM 03: Probing the low-resolution dynamics of biopolymers under force [Ruxandra Dima](#), [Changbong Hyeon](#), [D. Thirumalai](#)

3:06PM 04: Motion of single MreB bacterial actin proteins in Caulobacter show treadmilling in vivo [W.E. Moerner](#), [SoYeon Kim](#), [Zemer Gitai](#), [Anika Kinkhabwala](#), [Harley McAdams](#), [Lucy Shapiro](#)

3:18PM 05: Co-operative unfolding of protein domains [Buddhapriya Chakrabarti](#), [Tanniemola B. Liverpool](#), [Alex J. Levine](#)

3:30PM 06: Quantitative analysis of tethered particle motion [Philip Nelson](#), [Chiara Zurla](#), [Darren Segall](#), [Doriano Brogioli](#), [Rob Phillips](#), [David Dunlap](#), [Laura Finzi](#)

3:42PM 07: The Role of Fluctuations in Enzymatic Activity [Steven Chu](#)

4:18PM 08: Protein Unfolding Energy Determined by Jarzynski's Equality [Ching-Hwa Kiang](#), [Nolan Harris](#), [Leiming Li](#), [Yang Song](#), [Wei Liao](#)

4:30PM 09: Protein folding in a force-clamp [Marek Cieplak](#), [Piotr Szymczak](#)

4:42PM 10: Using a Microcantilever Array for Detecting DNA Melting [Sibani Biswal](#), [Digvijay Raorane](#), [Alison Chaiken](#), [Arun Majumdar](#)

4:54PM 11: Exploring the Electrical Conductivity of Cytochrome P450 by Nano-Electrode and Conductive Atomic Force Microscopy [Debin Li](#), [Jianhua Gu](#), [Yewhee Chye](#), [David Lederman](#), [Jarod Kabulski](#), [Peter Gannett](#), [Timothy Tracy](#)

5:06PM 12: Traveling wave tracking of individual molecular motors [Irene Dujovne](#), [M. van den Heuvel](#), [C. Symonds](#), [G. Cappello](#), [Cees Dekker](#)

5:18PM 13: Steering and Trapping Multiple Particles by Feedback Flow Control: Theory and Experiments [Mike Armani](#), [Satej Chaudhary](#), [Roland Probst](#), [Benjamin Shapiro](#)

Session K29: Proteins Structure and Function DBP

Tues Chair: F. A. Ferrone, Room - 326

2:30PM 01: Biochemical Reversal of Aging [John T.A. Ely](#)

2:42PM 02: A Unified Approach to Sickle Hemoglobin Gelation and Phase Separation [F.A. Ferrone](#), [M.U. Palma](#), [M.B. Palma-Vittorelli](#)

- 2:54PM 03: Fluorescence photocycle of GFP studied by trapping phototransformation intermediates Georgi Georgiev, Timothy Sage, Jasper van Thor
- 3:06PM 04: Mechanisms of triggering H1 helix in prion proteins unfolding revealed by molecular dynamic simulation Chih-Yuan Tseng, HC Lee
- 3:18PM 05: Analyzing knots in protein structures Peter Virnau, Mehran Kardar, Leonid Mirny
- 3:30PM 06: Designing novel kinases using evolutionary sequence analysis Areez Mody, Joan Weiner, Lakshman Iyer, Sharad Ramanathan
- 3:42PM 07: Phase Diagram for Urate Oxidase Nathaniel Wentzel, James D. Gunton
- 3:54PM 08: Inter-Domain Dynamics in a Two-Domain Protein Studied by NMR Yaroslav Ryabov, David Fushman
- 4:06PM 09: Thermostability and mechanics of molecular complexes in bacterial signal transduction K. Hamacher, T. Hwa, J.A. McCammon
- 4:18PM 10: Discovering the recognition code bacteria use to sense their environment by tracking co-evolutionary patterns Bacteria typically possess tens of distinct signaling pathways that allow the organism to translate diverse environmental conditions into action Robert White, Terry Hwa, Jim Hoch
- 4:30PM 11: Simple Model of Sickle Hemoglobin Andrey Shirayev, Xiaofei Li, James Gunton
- 4:42PM 12: Fluorescence microscopy studies of the hyperactive antifreeze protein from an insect N. Pertaya, C. L. Di Prinzio, L. Wilen, E. Thomson, J. S. Wettlaufer, C. B. Marshall, P. L. Davies, I. Braslavsky
- 4:54PM 13: Antifreeze Protein Binds Irreversibly to Ice I. Braslavsky, N. Pertaya, C. L. Di Prinzio, L. Wilen, E. Thomson, J. S. Wettlaufer, C. B. Marshall, P. L. Davies
- 5:06PM 14: Self-assembly of type 1 collagen : Interaction between normal and mutant collagen Sejin Han, Wolfnag Losert

Session L7: Flexible Molecular Recognition: The New Paradigm DBP

Tues Chair: Jin Wang Room - 307

- 5:45PM 01: Mis-folding and self-association: opportunities for alternative modes of self-recognition during the folding of TIM barrel proteins [Robert Matthews](#)
- 6:21PM 02: Dynamics of enzymes. Magnetic resonance methods [Dorothee Kern](#)
- 6:57PM 03: Protein kinases/signal transduction: structure/function [Susan S. Taylor](#)
- 7:33PM 04: Flexible protein-protein interactions [Patricia A. Jennings](#)
- 8:09PM 05: Single Molecule Dynamics Reveals the Role of Flexibility in Bio-molecular Recognition [Jin Wang](#)

Session N26: DNA and Protein Analysis with Micro and Nano Fluidics DBP DFD

Wed Chair: Steven Quak Room - 323

- 8:00AM 01: Formation of bi-nanopores in silicon chips Sang Ryul Park, Hongbo Peng, X. S. Ling
- 8:12AM 02: Fabrication of nanopores in wax using laser-induced shrinking Shanshan Wu, Sang Ryul Park, X. S. Ling
- 8:24AM 03: Ion Valence and Solution Temperature Effects on DNA Translocations in Solid-State Nanopores James Uplinger, Daniel Fologea, Jiali Li
- 8:36AM 04: DNA in nanofluidic devices [Robert Riehn](#)
- 9:12AM 05: Nanoscale electrical detection of DNA Chih-kuan Tung, Robert Riehn, Lukas Urban, Ali Yazdani, Robert Austin
- 9:24AM 06: DNA Translocation Dependence on Ionic Solution Concentration in a Solid-State Nanopore Device Brian Thomas, Daniel Fologea, Jiali Li
- 9:36AM 07: DNA size and conformations analysis using a synthetic nanopore Daniel Fologea, James Uplinger, Brian Thomas, Bradley Ledden, Eric Brandin, Daniel Branton, Jiali Li
- 9:48AM 08: Microfluidic Protein Crystallography [Carl Hansen](#)
- 10:24AM 09: Statics and Dynamics of Single DNA Molecules Confined in Nanoslits Po-Keng Lin, Chi-Cheng Fu, Y.R. Chen, Wunshain Fann, C.H. Kuan
- 10:36AM 10: Slowing down DNA translocation using magnetic and optical tweezers Hongbo Peng, Shanshan Wu, Sang Ryul Park, Andrew Potter, X. S. Ling
- 10:48AM 11: Patterned Periodic Nanofilter Array for Continuous-Flow Bimolecular Separation Jianping Fu, Jongyoon Han

Session N29: Physical Models of Ion Channel Function DBP

Wed Chair: Bob Eisenberg Room - 326

- 8:00AM 01: The metabolic energy cost of action potential velocity Patrick Crotty, Thomas Sangrey, William Levy
- 8:12AM 02: The Dependence of Ionic Conduction on the Dielectric Properties of Ion Channels Marco Saraniti, David Marreiro, Shela Aboud
- 8:24AM 03: Rocking and Flashing Ratchet Mechanisms of Ion Current Rectification in Asymmetric Nanopores in the Presence of Calcium Zuzanna Siwy, Matthew Powell, Eric Kalman, Bob Eisenberg
- 8:36AM 04: Ion selectivity in the ryanodine receptor and other calcium channels. [Dirk Gillespie](#)
- 9:12AM 05: Modeling Activity: Ions to Hydrophobics in Crowded Biological Solutions Montgomery Pettitt
- 9:24AM 06: Entropy driven insulator-metal crossover in ion channels and water filled nanopores Jingshan Zhang, Alex Kamenev, Boris Shklovskii, Anatony Larkin
- 9:36AM 07: Measurement of gating forces of mechanosensitive channels of large conductance in Escherichia coli Elvis Pandzic, Paul Wiseman, Maria Kilfoil
- 9:48AM 08: Calculating Ion Permeation through Biological Channel Proteins [Rob Coalson](#)
- 10:24AM 09: Morphometric approach to selectivity and gating of ion channels Roland Roth

Session P7: Physics of Transcriptional Regulatory Networks GSNP DBP

Wed Chair: Joshua Socolar, Room - 307

11:15AM 01: Programming bacterial dynamics by synthetic killer circuits [Linchong You](#)

11:51AM 02: Molecules, nonlinearity, and function in regulatory networks. [Nicolas Buchler](#)

12:27PM 03: Combinatorial Regulation in Yeast Transcription Networks [Hao Li](#)

1:03PM 04: Gene expression dynamics during cell differentiation: Cell fates as attractors and cell fate decisions as bifurcations [Sui Huang](#)

1:39PM 05: Network theory and prediction of regulatory switches [Alexei Vazquez](#)

Session P26: Protein Dynamics in Folding and Function DBP DCP

Wed Chair: Robert Callendar ROOM - 323

11:15AM 01: NMR Studies of Enzyme Structure and Mechanism [Albert Mildvan](#)

11:27AM 02: Interference between relaxation and parameters for protein structural determination [Eva de Alba](#)

11:39AM 03: Multiple Quantum Relaxation Probes of Protein Dynamics on Multiple Timescales [Ranajeet Ghose](#)

11:51AM 04: A Plastic Explosive-Degrading Enzyme [Anne-Frances Miller](#)

12:03PM 05: Protein-Protein Interactions during Bacterial Chemotaxis using Methyl TROSY Nuclear Magnetic Resonance. [Damon Hamel](#), [Frederick Dahlquist](#)

12:15PM 06: Structural Basis for Specific Membrane Targeting by the HIV-1 Gag Protein. [Michael F. Summers](#)

12:27PM 07: Vinculin Tail Dimerization and Paxillin Binding [Sharon Campbell](#)

12:39PM 08: Protein dynamics and allostery [Babis Kalodimos](#)

12:51PM 09: Protein Dynamics in an RNA Binding Protein [Kathleen Hall](#)

1:03PM 10: Axial Rotation of Lipids in Membranes [Richard Pastor](#)

1:15PM 11: High Resolution Field Cycling NMR in Biopolymers in Solution: Current and Potential Applications. [Alfred Redfield](#)

Session P29: Biomolecular Structure and Functions DBP

Wed Chair: Suzanna Zsiwy ROOM - 326

11:15AM 01: Interactions between model bacterial membranes and synthetic antimicrobials. [Lihua Yang](#), [Abhijit Mishra](#), [Abhigyan Som](#), [Gregory N. Tew](#), [Gerard C.L. Wong](#)

11:27AM 02: Observation of membrane fusion between individual virus particles and supported lipid bilayers [Laura Wessels](#), [Keith Weninger](#)

11:39AM 03: Simulating Domain Formation and Fusion in Lipid Bilayers [Mark Stevens](#)

11:51AM 04: Lipid Coupling in Asymmetric Supported Lipid Bilayers Revealed by Fluorescence Correlation Spectroscopy [Yan Yu](#), [Liangfang Zhang](#), [Steve Granick](#)

12:03PM 05: Dissipative Particle Dynamics Simulation of Structure Properties of Lipid Micelles [Jinsuo Zhang](#), [Yi Jiang](#)

12:15PM 06: Anomalously Slow Domain Growth in Membranes with Asymmetric Transbilayer Lipid Distribution [Mohamed Laradji](#), [P.B. Sunil Kumar](#)

12:27PM 07: Molecular simulation studies of tail-length effects in mixed-lipid bilayers [James Kindt](#), [Jason de Joannis](#), [Fuchang Yin](#), [Frank Yong Jiang](#), [Hao Wang](#)

12:39PM 08: Stabilization of Model Membrane Systems by Disaccharides. Quasielastic Neutron Scattering Experiments and Atomistic Simulations [Emmanouil Doxastakis](#), [Victoria Garcia Sakai](#), [Satoshi Ohtake](#), [Janna K. Maranas](#), [Juan J. de Pablo](#)

12:51PM 09: Protein crystals on phase-separating model membranes [Ajay Kulkarni](#), [R.M. Kannan](#)

1:03PM 10: Model systems to investigate the effect of cholesterol on the transfection efficiency of lipoplexes [Alexandra Zidovska](#), [Heather M. Evans](#), [Kai Ewert](#), [Cyrus R. Safinya](#)

1:15PM 11: Had a drink last night? How alcohol interacts with biological membranes [Mikko Karttunen](#), [Michael Patra](#), [Emppu Salonen](#), [Emma Terama](#), [Ilpo Vattulainen](#), [Roland Faller](#), [Bryan Lee](#), [Juha Holopainen](#)

1:27PM 12: Solid domain rafts in lipid vesicles and scars [Slava Chushak](#), [Alex Travesset](#)

1:39PM 13: Efficient calculation of mechanical properties of multicomponent phospholipid bilayers with Monte Carlo simulations [Manan Chopra](#), [Emmanouil Doxastakis](#), [Nicholas L. Abbott](#), [Juan J. de Pablo](#)

1:51PM 14: Roughness effect on vesicle adhesion characterised by a novel micropipette-based technique [Marie-Josée Colbert](#), [Adam N. Raegen](#), [Kari Dalnoki-Veress](#), [Cecile Fradin](#)

2:03PM 15: Structure of Cholesterol Helical Ribbons, Self-Assembling Biological Springs. [B. Khaykovich](#), [C. Hossain](#), [A. Lomakin](#), [J. McManus](#), [D. E. Moncton](#), [G. B. Benedek](#)

Session R1: Cytoskeletal Dynamics and Mechanics DCMP DBP

Wed Chair: Gerard Wong ROOM - Ballroom IV

2:30PM 01: Structural organization and dynamics of the cytoskeletal network [Tatyana Svitkina](#)

3:06PM 02: Active Polar Gels: a paradigm for cytoskeletal dynamics [Frank Julicher](#)

3:42PM 03: Elasticity, adhesion and actin based propulsion [Ajay Gopinathan](#)

4:18PM 04: Fluorescent Speckle Microrheology [Margaret Gardel](#)

4:54PM 05: Nonlinear Elasticity in Biological Gels [Cornelis Storm](#)

Session R7: The Experimental and Theoretical Foundations of Evolution DBP Fed FPS

Wed Chair: Herbert Levine, ROOM - 307

2:30PM 01: Evolutionary ecology of E. coli metapopulations in patchy landscapes [Juan Keymer](#)

3:06PM 02: Life has Evolved to Evolve [Michael Deem](#)

3:42PM 03: Can Evolution Be Understood Quantitatively? [Daniel S. Fisher](#)

4:18PM 04: (Fill or move Shapiro up)

4:54PM 05: Genome Evolution in the 21st Century [James Shapiro](#)

Session R21: Focus Session: Biological Hydrodynamics DFD DBP

Wed Chair: Ray Goldstein ROOM - 318

2:30PM 01: Large-scale pattern formation in active particles suspensions: from interacting microtubules to swimming bacteria [Igor Aranson](#)

3:06PM 02: Elastic swimming I: Optimization Eric Lauga, Tony Yu, Anette Hosoi

3:18PM 03: Elastic swimming II: Experiments Tony Yu, Eric Lauga, Anette Hosoi

3:30PM 04: Stress-induced reversal of flagellar propulsion: an ingredient of quorum polarity of *Bacillus subtilis* L. Cisneros, C. Dombrowski, R.E. Goldstein, J.O. Kessler

3:42PM 05: Effects of nonlinear membrane elasticity on capsule recovery Andres Gonzalez-Mancera, Charles Eggleton

3:54PM 06: Rotating states of two-dimensional self-propelling particles Hsuan-Yi Chen, Keung-Tai Leung

4:06PM 07: Balancing energy input and viscous dissipation in the Zooming BioNematic J.O. Kessler, R.E. Goldstein, R. Cortez

4:18PM 08: Multicellularity and the Functional Interdependence of Motility and Molecular Transport C. Solari, S. Ganguly, J.O. Kessler, R. Michod, R.E. Goldstein

4:30PM 09: Flagella-Driven Flows Circumvent Diffusive Bottlenecks that Inhibit Metabolite Exchange Martin Short, Cristian Solari, Sujoy Ganguly, John Kessler, Raymond Goldstein, Thomas Powers

4:42PM 10: Measurement of Flow Patterns and Dispersion in the Human Airways Frank E Fresconi, Ajay K Prasad

4:54PM 11: On small insect flight -- a two-dimensional study Paulo Ferreira de Sousa

5:06PM 12: Wake characteristics of a model ornithopter Alfredo Juarez, Jacob Harlow, James Allen, Paulo Ferreira de Sousa

5:18PM 13: Vertical hovering of a symmetric flapping model Makoto Ima, Tatsuo Yanagita

Session R26: Focus Session: Counterion Dynamics in Charged Biopolymer Systems DBP, DPOLY

Wed Chair: Alex Traveset ROOM - 323

2:30PM 01: Counterion liquids between biological polyelectrolytes [Gerard Wong](#)

3:06PM 02: Bjerrum Pairing Correlations at Charged Interfaces Alex Traveset, David Vaknin

3:18PM 03: Charged Polymers in Electric Fields [Roland Netz](#)

3:54PM 04: Migration of DNA on electrically inhomogeneous surfaces Eric Petersen, Bingquan Li, Vladimir Samuilov, Xiaohua Fang, Jonathan Sokolov, Miriam Rafailovich

4:06PM 05: Evidence for High Conductivity in the Pili of *Geobacter sulfurreducens*: "Nano-wires" in a Prokaryotic Electron Transport Chain? Kevin D. McCarthy, Gemma Reguera, Teena Mehta, Julie S. Nicoll, Xinyu Wang, Mark T. Tuominen, Derek R. Lovley

4:18PM 06: Dynamical Transition of the Protein Observed in Terahertz Dielectric Response Jing-Yin Chen, Joseph Knab, Andrea Markelz

4:30PM 07: Terahertz dielectric response dependence on protein melting and hydration Yunfen He, J.R. Knab, B. Shah, A.G. Markelz

4:42PM 08: Inorganic Surface and Structure Adhesion of Amino Acids and Peptides LaRue Dunkleberger, Robert Willett, Loren Pfeiffer

4:54PM 09: Interactions between the HIV-TAT transduction domain and cell membranes Abhijit Mishra, Gerard Wong

5:06PM 10: Temperature Effects on Threshold Counterion Concentration to Induce Aggregation of fd Virus Qi Wen, Jay Tang

5:18PM 11: Ion Distribution around DNA: Can Transitions Be Observed? Kurt Andresen, Lisa Kwok, Xiangyun Qiu, Hye Yoon Park, Jessica Lamb, Lois Pollack

Session R28: Focus Session: Biological Networks: Structure, Dynamics and Function DBP

Wed Chair: Chao Tang ROOM - 325

2:30PM 01: Unraveling Biological Design Principles Using Engineering Methods: The Heat Shock Response as a Case Study [Hana El-Samad](#)

3:06PM 02: Network growth models and genetic regulatory networks Joshua Socolar, David Foster, Stuart Kauffman

3:18PM 03: Bistability of the naturally induced lactose utilization system of *Escherichia coli* Jelena Stajic, Michael Wall

3:30PM 04: Origins of sloppiness in biological models. Joshua Waterfall, Fergal Casey, Ryan Gutenkunst, Kevin Brown, Christopher Myers, James Sethna

3:42PM 05: Function Constrains Topology. Chao Tang, Wenzhe Ma, Qi Ouyang

3:54PM 06: Stability tuned: Analysis of a gene network with counteracting feedback loops. Murat Acar, Attila Becskei, Alexander van Oudenaarden

4:06PM 07: The social cost of partisanship Sam Seaver, Robert Malmgren, Andre Moreira, Daniel Diermeier, Luis Amaral

4:18PM 08: Differentiation at the single cell level: slow, noisy, and out of control [Michael Elowitz](#)

4:54PM 09: The Structure of Parasites in Food Webs Christopher Warren, Mercedes Pascual

- 5:06PM 10: Quantitative study of gene regulation mediated by small RNA Erel Levine, Thomas Kuhlman, Zhongge Zhang, Terence Hwa
- 5:18PM 11: Quantitative Dissection of a Bacterial Promoter: Cooperativity, Sensitivity, and Combinatorial Control Thomas Kuhlman, Zhongge Zhang, Milton Saier, Terence Hwa

Session R29: Biomolecular Structure and Function DBP

Wed Chair: Sonya Bahar ROOM - 326

- 2:30PM 01: The Impact of Cholesterol on Lateral Organization in a Three-Species Non-Equilibrium Model of a Biomembrane Andrew P. Paradis, Susan R. McKay, Samuel T. Hess
- 2:42PM 02: Lipid Bilayers and Titanium: Controlling Surface Adsorption Linda S. Hirst, Emily Parker, Noel C. MacDonald, Cyrus R. Safinya
- 2:54PM 03: Growth and Morphology of Solid-like Domains in Binary Giant Lipid Vesicles Paul Beales, Vernita Gordon, Zhijun Zhao, Stefan Egelhaaf, Wilson Poon
- 3:06PM 04: Laser Tweezer Deformation of Giant Unilamellar Vesicles Cory Poole, Jozsef Meszaros, Kumar Senthil, Wolfgang Losert
- 3:18PM 05: Nanoscale characterization of solid-supported phospholipid multilayer films Wilfred Ngwa, Andrew Gao, Tania Cubano, Kezheng Chen, Alok Sahgal, Weili Luo
- 3:30PM 06: A quasi-elastic neutron scattering study of the stabilization of freeze-dried cholesterol-containing DPPC liposomes by trehalose V. Garcia Sakai, M. Doxastakis, A.S. Reddy, J. de Pablo, J.K. Maranas
- 3:42PM 07: A Density Functional Theory Study of the Non-local Correlations between Nucleic Acid Base Pairs Valentino R. Cooper, Timo Thonhauser, David C. Langreth
- 3:54PM 08: Formation of Swollen Micelles and Invert Swollen Micelles: A Computer Simulation Study Hongxia Guo, Monica Olvera de la Cruz
- 4:06PM 09: Low Temperature Orbital Paramagnetism in B-DNA Michael J. Harrison
- 4:18PM 10: Kinetic Modelling of Transcription Elongation Daibhid O'Maoileidigh, Vasisht Tadigotla, Anirvan Sengupta, Vitaly Epshtein, Richard Ebricht, Evgeny Nudler, Andrei Ruckenstein
- 4:30PM 11: Understanding spontaneous sharp bending of DNA Chongli Yuan, Elizabeth Rhoades, Lynden Archer
- 4:42PM 12: The role of stacking interactions in the folding dynamics of DNA hairpins Marta Sales-Pardo, Jon Widom, Luis Amaral
- 4:54PM 13: Thermodynamic Model of Transcription Elongation Vasisht Tadigotla, Daibhid O'Maoileidigh, Anirvan Sengupta, Vitaly Epshtein, Richard Ebricht, Evgeny Nudler, Andrei Ruckenstein
- 5:06PM 14: The role of telomere dynamics in aging and cancer Krastan Blagoev, Edwin Goodwin
- 5:18PM 15: Optical Investigation of the Phases of Liquid Crystals of Nanoscale Duplex DNA Giuliano Zanchetta, Michi Nakata, Tommaso Bellini, Noel Clark

Session T7: Physics, Chemistry and Biology of the Hydrophobic Effect DBP

Wed Chair: Chao Tang ROOM - 307

- 5:45PM 01: The Hydrophobic Effect ab initio [Je-Luen Li](#)
- 6:21PM 02: Hydrophobic Effects as Seen in Lattice Models [Benjamin Widom](#)
- 6:57PM 03: Hydrophobicity at small and large length scales [David Chandler](#)
- 7:33PM 04: Modeling water, hydrophobic interactions, and polymer collapse [Thomas Truskett](#)

Session U17: Physics and imaging in medicine DBP

Thurs Chair: Steven Avery ROOM - 313

- 8:00AM 01: Careers in Medical Physics and the American Association of Physicists in Medicine [Howard Amols](#)
- 8:48AM 02: International Standardization of the Clinical Dosimetry of Beta Radiation Brachytherapy Sources: Progress of an ISO Standard [Christopher Soares](#)
- 9:24AM 03: Medical Physics Graduate Program At An HBCU [Paul Gueye](#)

Session U26: Focus Session: Cytoskeletal Dynamics GSNP DBP DPOLY

Thurs Chair: Christina Marchetti ROOM - 323

- 8:00AM 01: Isotropic, nematic and polarized states in active motor-filament solutions Aphrodite Ahmadi, M. Cristina Marchetti, Tanniemola B. Liverpool
- 8:12AM 02: Rheology of active polymer solutions M. Cristina Marchetti, Tanniemola B. Liverpool
- 8:24AM 03: Thermally Controlling the Polymeric Cytoskeleton in Living Cells Chao-Min Cheng, Philip LeDuc
- 8:36AM 04: How to detect single cancer cell? Nadine Pernodet, Jessica Fields, Lenny Slutsky, Taylor Bernheim, Kaustabh Ghosh, Shouren Ge, Miriam Rafailovich
- 8:48AM 05: The Effects of Chronological Age on the Cellular Mechanics of Human Dermal Fibroblasts Z. Pan, V. Hung, S. Kambampati, S.R. Ge, M. Rafailovich, K. Ghosh, R. Clark, Y.J. Liu, T. Nakamura, X.Z. Shu, G. Prestwich
- 9:00AM 06: Interplay between crosslinkers and dynamic molecular motor-induced instabilities in the moderation of biopolymer organization David Smith, David Humphrey, Falko Ziebert, Walter Zimmermann, Josef Kl{as
- 9:12AM 07: The mechanics of cell protrusion [Gaudenz Danuser](#)
- 9:48AM 08: Tensile Force Generation by Actin-Myosin Networks Anders Carlsson
- 10:00AM 09: Simulation of Actin-Polymerization Near Moving Surface Kun-Chun Lee, Andrea Liu

- 10:12AM 10: The Physics of Filopodia (or The Physics of Philopodia) Jen Schwarz, Ajay Gopinathan, Kun-Chun Lee, Andrea Liu, Louise Yang
- 10:24AM 11: Lipid-Protein Nanotubes with Open or Closed Ends, Microtubules Bundles and Inverted Tubulin Nanotubes Uri Raviv, Daniel J. Needleman, Miguel A. Ojeda-Lopez, Youli Li, Herb P. Miller, Leslie Wilson, Cyrus R. Safinya
- 10:36AM 12: The mechanics of cell crawling over a flat surface Baldomero Alonso-Latorre, Javier Rodriguez-Rodriguez, Alberto Aliseda, Rudolf Meili, Richard Firtel, Juan Lasheras
- 10:48AM 13: Micromechanical Properties of Endothelial Cell Cytoskeleton Meron Mengistu, Linda Lowe-Krentz, H. Daniel Ou-Yang

Session U28: Focus Session: Biological Hydrodynamics DBP DFP

Thurs Chair: Steve Quake ROOM - 325

- 8:00AM 01: Fluidic control over cell proliferation and chemotaxis. [Alex Groisman](#)
- 8:36AM 02: The Conformation of Clathrin Triskelia in Solution Matthew L. Ferguson , Kondury Prasad , Dan L Sackett , Hacene Boukari , Eileen M. Lafer , Ralph Nossal
- 8:48AM 03: A macromolecular model for the endothelial surface layer James Harden , Darina Danova-Okpetu , Gary Grest
- 9:00AM 04: Simulation of metachronal wave in a model of pulmonary cilia Sorin Mitran
- 9:12AM 05: On the Evolution of Voltage Gated Ion Channels [Michael Brenner](#)
- 9:48AM 06: Optimization of Anguilliform Swimming Stefan Kern , Petros Koumoutsakos
- 10:00AM 07: Flow measurement in an in-vitro model of a single human alveolus Sudhaker Chhabra , Ajay Prasad
- 10:12AM 08: Transport and collective dynamics in suspensions of swimming particles Michael Graham , Juan Hernandez
- 10:24AM 09: Computational Modeling of Microfluidic Rapid-Mixing Device Used in Infrared Micro-Spectroscopy Mark Dickens , Jarmila Guizarro , Aihua Xie

Session U29: Focus Session: Nonequilibrium Fluctuation in Biomolecules and Artificial Nanodevices DBP DPOLY

Thurs Chair: Ioan Kosztin ROOM - 326

- 8:00AM 01: DNA's Liaison with RNA Polymerase – Physical Consequences of a Twisted Relationship Igor Kulic, Phil Nelson
- 8:12AM 02: Enhanced Fano factor in a molecular transistor coupled to phonons and Luttinger-liquid leads So Takei, Yong Baek Kim, Aditi Mitra
- 8:24AM 03: Active-thermodynamics: motion and structural phases of cell membranes Nir Gov
- 8:36AM 04: Least dissipation principle for single molecule dynamics [R. Dean Astumian](#)
- 9:12AM 05: Multi-scale dynamics and relaxation of a tethered membrane in a solvent by Monte Carlo simulations Ras Pandey, Kelly Anderson, Barry Farmer
- 9:24AM 06: Ion distribution inside a nanopore in the presence of a polyelectrolyte Lei Guo, Erik Luijten
- 9:36AM 07: Measuring the direction of coupling between biological oscillators Jorge Brea, Alexander Neiman, David Russell
- 9:48AM 08: Applications of the ratchet effect at nano- and mesoscopic scales [Boldizsar Janko](#)
- 10:24AM 09: On-Chip Integration of Cell-Free Gene Expression Amnon Buxboim, Margherita Morpurgo, Maya Bar-Dagan, Veronica Frydman, David Zbaida, Roy Bar-Ziv
- 10:36AM 10: Modeling Electric Fields of Peripheral Nerve Block Needles. Kenji Hirose, Nobuhiko Kobayashi
- 10:48AM 11: "Burnt Bridge" Mechanism of Molecular Motor Motion Tibor Antal, Paul Krapivsky

Session V7: Noise in Biological Systems GSNP DBP

Thurs Chair: Alex van Oudenaarden ROOM - 307

- 11:15AM 01: Fluctuation-adaptation relation in bacterial chemotaxis [Philippe Cluzel](#)
- 11:51AM 02: Noise effects in bacterial motor switch [Yuhai Tu](#)
- 12:27PM 03: Noise limitations on E. Coli cell division accuracy [Herbert Levine](#)
- 1:03PM 04: Physical Limits to Biochemical Signaling [Sima Setayeshgar](#)
- 1:39PM 05: Gene expression noise and robustness of signaling in bacterial chemotaxis [Victor Sourjik](#)

Session V17: Medical Physics Panel Discussion DBP

Thurs Chair: Paul Gueye ROOM - 313

PANEL

- NSBP (Paul Guèye and Steven Avery),
 NIH/NIBIB (Richard Baird),
 NIST (Christopher Soares),
 AAPM (Howard Amols),
 ASTRO (Prabhakar Tripuraneni)
 Jefferson Lab (Stan Majewski and Drew Weisenberger).

Session V26: Cellular Biomechanics DBP DPOLY

Thurs Chair: Dapne Manoussaki ROOM - 323

- 11:15AM 01: Difference in cellular mechanics of cancer and normal cervical cells as seen with the AFM Igor Sokolov, Swaminathan Iyer, Venkatesh Subba-Rao, Craig Woodworth

- 11:27AM 02: The Penetration of Titanium Dioxide Nanoparticles: From Dermal Fibroblasts to Skin Tissue Lauren Sipzner, Jaimie Stettin, Zhi Pan, Xiaohua Fang, Wilson Lee, Nadine Pernodet, Miriam Rafailovich
- 11:39AM 03: Curvature-induced microphase separation and lipid polar localization in cell membranes - II Kerwyn Huang, Ranjan Mukhopadhyay, Ned Wingreen
- 11:51AM 04: Curvature-induced microphase separation and lipid polar localization in cell membranes - I Ranjan Mukhopadhyay, Kerwyn Huang, Ned Wingreen
- 12:03PM 05: Using Optical Tweezers to Study Cell Mechanics during Airway Reopening Huseyin Yalcin, Jing Wang, Samir Ghadiali, H. Daniel Ou-Yang
- 12:15PM 06: Probing subcellular force transduction with magnetic soft actuator arrays Alexandre Anguelouch, Stuart Kirschner, Daniel Reich, Nathan Sniadecki, Christopher Chen
- 12:27PM 07: Establishing threshold toxicity for introducing magnetic nanoparticles into HeLa and HEK 293 cells Kezheng Chen, Weili Luo, Pappachan Kolattukuty
- 12:39PM 08: Modeling cell -- extracellular matrix mechanical interactions during in vitro network formation Daphne Manoussaki
- 12:51PM 09: Axon growth and dynamics in 3D collagen gels Ryan McAllister, Will Rosoff, Jeffrey Urbach
- 1:03PM 10: Investigating the glycocalyx using atomic force microscopy Rebecca Boren, Adam Rafi, Jessica Farrell, Antonio Peramo, W. Garrett Matthews
- 1:15PM 11: Local structure in diatom biosilica probed by synchrotron x-ray diffraction Michael DiBiccari, Seo-Young Kwak, Geoffrey Hind, Elaine DiMasi
- 1:27PM 12: Bundle Buckling and Nesting Model of Striated Pattern Formation in Microtubule Solutions Yongxing Guo, Yifeng Liu, James Valles, Jay Tang

Session V29: Nonlinear Phenomena & Pattern Formation in Biology DBP DCOMP

Thurs Chair: Igor Aronson ROOM - 326

- 11:15AM 01: Thermally activated escape rate for a Brownian particle in a double-well potential for all values of the dissipation William Coffey, Yuri Kalmykov, Sergey Titov
- 11:27AM 02: The spectra of spiral wave breakup Dwight Barkley, Paul Wheeler
- 11:39AM 03: Pattern Formation without Patterning Proteins in Cyanobacteria Jun Allard, Andrew Rutenberg
- 11:51AM 04: Experimental studies of large-scale collective swimming in dense suspensions of bacteria Andrey Sokolov, Igor Aranson, Raymond Goldstein, John Kessler
- 12:03PM 05: Fiber optical measurements of electrical activity in canine ventricular preparations Amgad Squires, Gisa E. Luther, Michael Enyeart, Robert F. Gilmour, Eberhard Bodenschatz, Stefan Luther
- 12:15PM 06: Motion artifact removal in the optical mapping of cardiac tissue Gisa E. Luther, Amgad Squires, Michael W. Enyeart, Robert F. Gilmour, Eberhard Bodenschatz, Stefan Luther
- 12:27PM 07: Compact Dynamical Equations for Brain Activity Jong Won Kim, Peter A. Robinson
- 12:39PM 08: Pattern recognition through collective behaviour in neural networks Jan R. Engelbrecht
- 12:51PM 09: Modeling of Protein Subcellular Localization in Bacteria Xiaohua Xu, Rahul Kulkarni
- 1:03PM 10: Quantitative measures for mitotic spindle pattern formation structures Stuart Schaffner, Jorge Jose
- 1:15PM 11: Stability and Perturbation Analysis on a Model of Cell Chemotaxis Colin McCann, Ron Skupsky, Wolfgang Losert, Ralph Nossal
- 1:27PM 12: Raman Correlation Spectroscopy Edward Van Keuren, Maki Nishida
- 1:39PM 3: A New Paradigm for Nanoparticle Biosensing: Magnetically Driven Critical Phase Slipping Brandon H McNaughton, Raoul Kopelman
- 1:51PM 14: Sum frequency generation microscopy for imaging chirality Na Ji, Kai Zhang, Haw Yang, Yuen-Ron Shen
- 2:03PM 15: Upconversion-Detected Ultrafast Two-Dimensional Infrared Spectroscopy Kevin Kubarych, Manuel Joffre

Session W7: Physics of Cell Elasticity, Interactions and Tissue Formation DBP DPOLY

Thurs Chair: Philip Nelson RPP< - 307

- 2:30PM 001: Nucleation and growth of cell contacts [Daniel Riveline](#)
- 3:06PM 02: Integrin activation and cell adhesion by mechanical forces [Robijn Bruinsma](#)
- 3:42PM 03: Cell morphologies depend on substrate rigidity. [Paul Janmey](#)
- 4:18PM 04: Physics of adhesion and elasticity of biological cells [S.A. Safran](#)
- 4:54PM 05: Cell mechanics and human disease states [Subra Suresh](#)

Session W26: Biological Photophysics DBP

Thurs Chair: J. Timothy Sage ROOM - 323

- 2:30PM 01: Direct Observation of Thymine Dimer Repair in DNA by Photolyase [Dongping Zhong](#)
- 3:06PM 02: Near-infrared femtosecond laser assisted cell membrane permeabilization Cheng Peng, Robert Palazzo, Ingrid Wilke
- 3:18PM 03: [Vasan Venugopalan](#)
- 3:54PM 04: DFT calculation of photo-induced charge transfer in organic molecule Mark Pederson, Tunna Baruah
- 4:06PM 05: Structural colours in blue-banded bee Jones Wan, Lixiin Dai, Jensen Li, Kwok-Kwong Fung, Che-Ting Chan
- 4:18PM 06: Wavelength-Dependent Conformational Changes of Collagen in Mid-IR Ablation M. Shane Hutson, Yaowu Xiao, Mingsheng Guo

- 4:30PM 07: Novel protection mechanisms against singlet oxygen formation by the Chl a molecule in the cytochrome b_6/f_6 complex of oxygenic photosynthesis Sergei Savikhin, Hanyoung Kim, Naranbaatar Dashdorj, Huamin Zhang, Jiusheng Yan, William Cramer
- 4:42PM 08: Electrostatic Steering of Functional Dynamics in GFP J. Timothy Sage, Georgi Y. Georgiev, Jasper J. van Thor
- 4:54PM 09: Terahertz Dielectric Response of Photoactive Yellow Protein (PYP): Influence of Conformational-Vibrational State during Photocycle and Hydration Effects Joseph Knab, Jing-Yin Chen, Wouter Hoff, Andrea Markelz
- 5:06PM 10: Novel Photo-Protecticon Mechanisms in Chlorosomes from Green Sulfur Bacterium Chlorobium Tepidum Hanyoung Kim, Sergei Savikhin, Hui Li, Julia Maresca, Donald Bryant
- 5:18PM 11: Hydration Dependence of Energy Relaxation Time for Cytochrome C Shuji Ye, Jing-Yin Chen, Joseph R. Knab, Andrea Markelz

Session W29: Biological Networks and System Biology DBP

Thurs Chair: Alexander Neiman ROOM - 326

- 2:30PM 01: Self-Organization of Networks Via Synchrony-Dependent Plasticity Jack Waddell, Michal Zochowski
- 2:42PM 02: Phase reduction analysis of coupled neural oscillators: application to epileptic seizure dynamics Daisuke Takeshita, Yasuomi Sato, Sonya Bahar
- 2:54PM 03: Effect of Delays and Network Topology in Spatiotemporal Pattern Formation Rhonda Dzakpasu, Michal Zochowski
- 3:06PM 04: Inhibitory Synaptic Coupling and Spatiotemporal Synchrony in a Neural Model Roxana Contreras, Sonya Bahar
- 3:18PM 05: Attentional modulation of stimulus competition in a large scale model of the visual pathway Calin Buia, Paul Tiesinga
- 3:30PM 06: Specificity, promiscuity, and the structure of complex information processing networks Christopher Myers
- 3:42PM 07: Modeling of signal transduction in bacterial quorum-sensing Andrew Fenley, Suman Banik, Rahul Kulkarni
- 3:54PM 08: Sloppiness is universal in systems biology: making predictions nonetheless Ryan Gutenkunst, Fergal Casey, Joshua Waterfall, Kevin Brown, Christopher Myers, James Sethna
- 4:06PM 09: Inference and analysis of gene-regulatory networks in the bacterium B.subtilis Claire Christensen, Anshuman Gupta, Reka Albert, Costas Maranas
- 4:18PM 10: Sensitivity-based approach to optimal experimental design in a receptor trafficking and down regulation model Fergal Casey, Joshua Waterfall, Ryan Gutenkunst, Kevin Brown, Christopher Myers, James Sethna
- 4:30PM 11: Stochasticity in the Expression of λ and its Affect on λ phage Infection Emily Chapman, Xiao-Lun Wu
- 4:42PM 12: Control of lineage stability and its role in resolving cell fates Aryeh Warmflash, Aaron Dinner
- 4:54PM 13: Role of finite-size fragments in analysis of DNA replication John Bechhoefer, Haiyang Zhang
- 5:06PM 14: Stochastic dynamics of macromolecular-assembly networks. Leonor Saiz, Jose Vilar
- 5:18PM 15: Selective advantage for sexual reproduction Emmanuel Tannenbaum

Session W30: Focus Session: Biopolymers at Interfaces DPOLY DBP

Thurs Chair: Darrin Pochan ROOM - 327

- 2:30PM 01: Studies in Biological-Materials Interfaces. Christopher Ober
- 3:06PM 02: Universality Classes and Unusual Thermodynamics of Unbinding Transitions of Semi-flexible Polymers Confined to a Surface Leonardo Golubovic, Lianghai Gao
- 3:18PM 03: Polymer confinement and bacterial gliding motility Junhwan Jeon, Andrey Dobrynin
- 3:30PM 04: Direct Observation of Biaxial Confinement of a Semi-flexible Filament in a Channel M.C. Choi
- 3:42PM 05: Conformation of Lysozymes Confined to nano Particles Yuying Wei, R. Kenneth Marcus, Dvora Perahia
- 3:54PM 06: Interaction forces and surface morphology of microtubule-associated protein tau Kenneth Rosenberg, Jennifer Ross, Eric Feinstein, Stuart Feinstein, Jacob Israelachvili
- 4:06PM 07: Surface Plasmon Resonance Studies of Polysaccharide Self-Assembly on Cellulose Abdulaziz Kaya, Alan R. Esker, Wolfgang G. Glasser
- 4:18PM 08: Assembly artificial proteins and conjugated porphyrins for biomolecular materials Ting Xu, Joe Strzalka, Shixin Ye, Sophia Wu, Jiayu Wang, Thomas P. Russell, Michael Therien, J. Kent Blasie
- 4:30PM 09: Structural Transitions of F-actin Polyelectrolyte Bundles in the Presence of Strongly Size-mismatched Cations Robert Coridan, Lori K. Sanders, Wujing Xian, Gerard C. L. Wong
- 4:42PM 10: Defect Induced Morphologies of Biopolymer Bundles Ajay Gopinathan, Mark Henle, Uri Raviv, Daniel Needleman
- 4:54PM 11: Polyamine Induced Bundling of F-actin Glenna Z. Sowa, David S. Cannell, Emil Reisler, Andrea J. Liu
- 5:06PM 12: The fluctuating-rod limit of semiflexible biopolymers Ashok Prasad, Yukoh Hori, Jan'ke Kondev
- 5:18PM 13: Statistical and Mechanical Properties of Semiflexible Polymers in an External Field Ya Liu, Bulbul Chakraborty

Session Y1: Engineering Biomolecules and Circuits by Rational Design and Genetic Selection DCOMP DBP

Fri Chair: Michael Elowitz, Ballroom IV

- 8:00AM 01: Molecular Evolution of Gene Expression in E. coli Terry Hwa
- 8:36AM 02: Tinkering with Genetic Networks In Vivo Calin Guet

- 9:12AM 03: Directed Evolution of Bacterial Chemoreceptors [Mark Goulian](#)
9:48AM 04: Building a cellular oscillator from metabolic and cell signaling components [James Liao](#)
10:24AM 05: An artificial cell based on gene expression in vesicle [Vincent Noireaux](#)

Session Y26: Focus Session: Physics of Physiological Systems DBP

Fri Chair: Peter Jung ROOM - 323

- 8:00AM 01: Electrical Wave Propagation in a Minimally Realistic Fiber Architecture Model of the Left Ventricle\ Xianfeng Song, Sima Setayeshgar
8:12AM 02: Scaling behavior and a Markov model for ventricular fibrillation generated by ectopic beats Harold Hastings, Steven Evans, Alex Zaharakis, Christian Hilaire
8:24AM 03: Indeterminacy and Image Improvement in Snake Infrared ``Vision" J. Leo van Hemmen
8:36AM 04: Diffusion Weighted MRI and MRS to Differentiate Radiation Necrosis and Recurrent Disease in Gliomas Lars Ewell
8:48AM 05: Modeling the statistics of elementary calcium release events Ghanim Ullah, Peter Jung
9:00AM 06: Calcium Signaling enhancement during oocyte maturation Peter Jung, Ghanim Ullah, Khaled Machaca
9:12AM 07: Functional Complexity of Biological Networks [Eshel Ben-Jacob](#)
9:48AM 08: A model for the volume regulatory mechanism of the Airway Surface Layer Michael Lang, Michael Rubinstein, C. William Davis, Robert Tarran, Richard Boucher
10:00AM 09: Development of dielectric biosensors for diagnostic applications Christopher Bassey
10:12AM 10: Analytical model of induced transmembrane potentials in cells and organelles Vijayanand Vajrala, James Claycomb, John H. Miller, Jr.
10:24AM 11: Phase locking in driven integrate-and-fire neuron models Christopher Bedell, Jan R. Engelbrecht
10:36AM 12: The Influence of Environment Geometry on Injury Outcome: I. Cervical Spine Saami J. Shaibani
10:48AM 13: Flux Analysis of Hypoxia Response Network. Yihai Yu, Rahul Simha, Frank Turano, Chen Zeng

Session Y29: Focus Session: Noise and Fluctuation in Biological Systems DBP

Fri Chair: Peter Jung ROOM- 326

- 8:00AM 01: How stability can lead to variability: An example from eukaryotic gene expression Gabor Balazsi, William Blake, Farren Isaacs, Kevin Murphy, James J. Collins
8:12AM 02: How stability can lead to variability: Induction timecourse of a eukaryotic gene William Blake, Gabor Balazsi, Farren Isaacs, Kevin Murphy, Yina Kuang, David R. Walt, James J. Collins
8:24AM 03: Origins of extrinsic variability in eukaryotic gene expression Dmitri Volfson, Jennifer Marciniak, William J. Blake, Natalie Ostroff, Lev S. Tsimring, Jeff Hasty
8:36AM 04: Noisy cellular decision-making: from temporal to spatial choices [Alexander van Oudenaarden](#)
9:12AM 05: Absolute Rate Theories of Epigenetic Stability Aleksandra M. Walczak, Jose N. Onuchic, Peter G. Wolynes
9:24AM 06: Noise and correlations in genes silenced by small RNA. Terence Hwa, Erel Levine
9:36AM 07: A model for codon position bias in RNA editing Ralf Bundschuh, Tsunglin Liu
9:48AM 08: From Asymmetric Exclusion Processes to Protein Synthesis Jiajia Dong, Beate Schmittmann, Royce K.P. Zia
10:00AM 09: Intrinsic Fluctuations, Robustness and Tunability in Signaling Cycles. Joseph Levine, Hao Yuan Kueh, Leonid Mirny
10:12AM 10: The Nature of Memory Objects in the Brain [Pierre-Gilles de Gennes](#)
10:48AM 11: Resource allocation in neural networks for motor control J. Milton, J. Cummins, J. Gunnoe, M. Tollefson, J.L. Cabrera, T. Ohira

Session Y30: Focus Session: Biopolymers I: Phase Transitions DPOLY DBP

Fri Chair: Jose Onuchic ROOM 327

- 8:00AM 01: Temperature and Pressure effects on folding/unfolding of proteins [Angel Garcia](#)
8:36AM 02: The energy landscape for folding and function [Jose Onuchic](#)
9:12AM 03: RNA folding inside a virus capsid and dimensional reduction. Rouzbeh Ghafouri, Robijn Bruinsma, Joseph Rudnick
9:24AM 04: On the Melting Transition of RNA David Schwab, Robijn Bruinsma
9:36AM 05: Trapping and Condensing DNA at the Air/Water Interface Jaime Ruiz-Garcia
9:48AM 06: Insight into the Helix-to-Coil Transition in DNA Boualem Hammouda
10:00AM 07: Diffusion of Isolated DNA molecules: dependence on length and topology Rae M. Robertson, Stephan Laib, Douglas E. Smith
10:12AM 08: Mobility of DNA on supported lipid bilayers Chakradhar Padala, Richard Cole, Sanat Kumar, Ravi Kane
10:24AM 09: Electrophoresis of DNA on a disordered two-dimensional substrate Cynthia J. Olson Reichhardt, Charles Reichhardt
10:36AM 10: Kinetic Modeling of Designed Signaling DNA Aptamers Issei Nakamura, Razvan Nutiu, Jasmine Yu, Yingfu Li, An-Chang Shi
10:48AM 11: AFM Imaging of Counterion-Induced Phase Transition of Biological Polyelectrolyte Network on a Photopolymer Containing Azo-Dye Taiji Ikawa, Osamu Watanabe, Youli Li, Cyrus Safinya

Session Z4: Biopolymers DPOLY DBP

Fri Chair: Ranganabujab Kannan ROOM - 308

11:15AM 01: Bonds that strengthen under force [Viola Vogel](#)

11:51AM 02: Looking for steps of individual enzymes moving along DNA [Thomas Perkins](#)

12:27PM 03: Thermodynamics and Structure of Polymerizing Actin [Sandra Greer](#)

1:03PM 04: Synthetic and Biopolymer Gels - Similarities and Difference. [Ferenc Horkay](#)

1:39PM 05: Cellular Force, and Geometry Sensing (Over Time) Can Detect Matrix Rigidity: Local Modules Produce Global Signals [Michael Sheetz](#)

Session Z7: Synchrony and Complexity in Brain Activity and Function DBP

Fri Chair: Michael Zochowski & Eshel Ben-Jacob ROOM - 307

11:15AM 01: Analysis of Direct Recordings from the Surface of the Human Brain [Vernon L Towle](#)

11:51AM 02: Astrocytes, Synapses and Brain Function: A Computational Approach [Suhita Nadkarni](#)

12:27PM 03: Neuronal Spatiotemporal Pattern Discrimination: The Dynamical Evolution of Seizures [Steven Schiff](#)

1:03PM 04: Measuring complexity and synchronization phenomena in the human epileptic brain [Klaus Lehnertz](#)

1:39PM 05: Detection of phase and lag synchrony as an adaptive measure of asymmetric neuronal interactions [Michael Zochowski](#)

Session Z26: Radiation Therapy and Medical Imaging Techniques DBP

Fri Chair: Paul Gueye ROOM - 323

11:15AM 01: Monte Carlo study of interseed attenuation and tissue composition effect for clinical cases of prostate permanent implants. Jean-Francois Carrier, Luc Beaulieu

11:27AM 02: Effects Of The Inhomogeneity of Brachytherapy Sources In Cancer Treatments Nnenna Onumah

11:39AM 03: Absolute Dose Distribution Measurements Of Beta Sources Using A Scintillating Fiber Based Detector Lawrence Tynes

11:51AM 04: An Active Mammosite For Breast Brachytherapy Thomas Cudjoe

12:03PM 05: Calibration Of An Active Mammosite Using A Low Activity Sr-90 Radioactive Source Jacquelyn Winston

12:15PM 06: Modelization For Electromagnetic Electron Scattering at Low Energies for Radiotherapy applications. Vahagn Nazaryan, Paul Gueye

12:27PM 07: Fully Complex Magnetoencephalography Jonathan Simon, Yadong Wang

12:39PM 08: Multi-Active Catheters For Real Time Dose Distribution Measurements In Prostate Brachytherapy Treatments Carlos Velasco

12:51PM 09: Speckle Patterns in Coherence Domain Biomedical Imaging Ping Yu

1:03PM 10: Clinical implementation of proton Monte Carlo dose calculation. Harald Paganetti, Hongyu Jiang, Shashidhar Kollipara, Hanne Kooy

1:15PM 11: A Universal Scaling of Proton Energy Deposition in Biological Materials Dan Fry, Wilfred Sewchand, John O'Connell

1:27PM 12: Feasibility Study Of Kaon Therapy Solomon Sahle

1:39PM 13: Low Energy Experimental Elastic Cross Sections for Medical Physics Application Michael Epps

1:51PM 14: Wavelet assessment of cerebrospinal compensatory reserve and cerebrovascular pressure reactivity M. Latka, M. Turalska, W. Kolodziej, D. Latka, B. West

2:03PM 15: Convolution Product And Lyapunov Stability In Medical Imaging Leslie Upton

Session Z28: Methods of Statistical Physics, Population Dynamics and Epidemiology DBP GSNP

Fri Chair: Vadim Smelyanskiy ROOM - 325

11:15AM 01: Mathematical Modeling of the Dynamics of Salmonella Cerro Infection in a US Dairy Herd Prem Chapagain, Jo Ann Van Kessel, Jeffrey Karns, David Wolfgang, Ynte Schukken, Yrjo Grohn

11:27AM 02: Desynchronization and spatial effects in multistrain diseases Leah Shaw, Lora Billings, Ira Schwartz

11:39AM 03: Improved Epidemic Path Predictability in Complex Networks Markus Loecher, Jim Kadtko

11:51AM 04: The scaling laws of human travel - A message from George [Dirk Brockmann](#)

12:27PM 05: Prediction and predictability of global epidemics: the role of the airline transportation network Vittoria Colizza, Alain Barrat, Marc Barthelemy, Alessandro Vespignani

12:39PM 06: Success of mutants in an evolutionary game in finite populations Tibor Antal, Istvan Scheuring

12:51PM 07: Invasion of mutants in an evolutionary process on a graph. Vishal Sood, Tibor Antal

1:03PM 08: Seeing beyond invisible with noise: application to populational biology Dmitry Luchinsky, Vadim Smelyanskiy

1:15PM 09: Eigen model with general fitness functions and degradation rates Chin-Kun Hu, David B. Saakian

1:27PM 10: Combining a total cell population growth and cell population dynamics in the presence of anti-cancer agents Mitra Shojania Feizabadi

1:39PM 11: Epidemic models on dynamic contact networks Claire Christensen, Reka Albert, Brian Grenfell

Mon March 13-Fri March 17	ROOM	307	323	325	326	12.1	other rooms
Mon 1		A7 Bacterial flagellar dynamics, polymorphism, and conformational spread	A26: Biomolecular computation		A29:Techniques in biophysics		A13 FS:Spectroscopy of Biomolecules: from Isolated Molecules to Cell Environment (DCP) RM305
Mon 2		B7:Bionanotechnology – application and fundamental aspects of processes at nano-scale (DCMP)	B26: Single Molecule Biophysics:DNA & RNA (DPOLY)	B28:Techniques in biomaterials science	B29:FC:Microorganism Motility (G SNP)		B13 FS:Spectroscopy of Biomolecules: from Isolated Molecules to Cell Environment (DCP) RM305
Mon 3		D9:Methods in Nanobiotechnology ROOM 301	D26 FS:Dynamics of nucleic acid-protein interactions: single molecules to biological system (DPOLY)		D29 FC:Molecular Machines and Motors (G SNP)		D13 FS:Spectroscopy of Biomolecules: from Isolated Molecules to Cell Environment (DCP) RM305
Mon E			xxxxxx-		xxxxxx-		
Tues 1			G26 FC:Trapping of Nanoscale Biological Objects (rm 120)		G 29FS:Physical & Engineering Constraints on Biological Systems		G13 FS:Spectroscopy of Biomolecules: from Isolated Molecules to Cell Environment (DCP) RM305
Tues 2		H7: Nanopore Biophysics:			H29 FC:Physical Aspects of Morphogenesis: Computational Approaches		
Tues 3		K7: New Methods and Algorithms for Biomolecular Modeling	K26 FS: Single Molecule Biophysics I		K29: Proteins: structure and function		
Tues E		L7: Flexible Molecular Recognition: The New Paradigm	xxxxxx-		DBP business meeting		
Wed 1			N26 FS: DNA and Protein Analysis with Micro and Nano-Fluidics (DPOLY&DFD)		N29 FS:Physical Models of Ion Channel Function		
Wed 2		P7: Physics of transcriptional regulatory networks (G SNP)	P26 FS:Biomolecule dynamics in folding and function (DCP) REDFIELD		P29 Biomolecule: structure and function I		
Wed 3		R7:The Experimental and Theoretical Foundations of Evolution (FEd; FPS)	R26:FS:Counterion Dynamics in Charged Biopolymer Systems (DPOLY)	R28:Biological Networks: Structure, Dynamics & Function	R29:Biomolecule: structure and function		R1 SYMP:Cytoskeletal Dynamics (G SNP&DPOLY&DCMP) Ballroom IV R21 FC:Biological Hydrodynamics (DFD) Rm 318
Wed E		T7: Physics, Chemistry, and Biology of the Hydrophobic Effect					
Thurs 1			U26 FS: Cytoskeletal Dynamics (G SNP DPOLY)	V28 FS: Biological hydrodynamics (DFD)	U29 FS:Nonequilibrium Fluctuations in Biomolecules and Artificial Nanodevices (DPOLY)		U17:Physics and Imaging in Medicine RM 313
Thurs 2		V7:Noise in Biological Systems (G SNP)	V323 Cellular biomechanics	moved V28!	V29: Nonlinear phenomena & pattern formation in biology (DCMP)		V17: Medical Physics Panel RM 313
Thurs 3		W7: Physics of Cell Elasticity, Interactions and Tissue Formation (DPOLY)	W26 FS:Biological Photophysics		W29:Biological Networks and Systems Biology		W30 FS: Biopolymers at interfaces (DPOLY) RM327
Thurs E			xxxxxx-		xxxxxx-		
Fri 1		Y1: Engineering biomolecules and circuits by rational design and genetic selection (DCMP) Ballrm IV	Y26 FC:Physics of physiological systems		Y29 FC:Noise and Fluctuations in Biological Systems (DPOLY)		Y30 FC:Biopolymers I: Phase Transitions A. GARCIA (DPOLY) RM327
Fri 2		Z7: Synchrony and complexity in brain activity and function	Z26:Radiation Therapy and Medical imaging Techniques	Z28 FS:Methods of Statistical Physics in Population Dynamics & Epidemiology (G SNP)			Z4 FS: Biopolymer (DPOLY) RM308

Session 1: 8:00
 Session 2: 11:15
 Session 3: 2:30
 Eve: 5:45