Newsletter
Biophysical Society JULY 2016

DEADLINES

2018 Thematic Meeting Proposals

July 15

Elections: Voting Deadline

August 1

Meetings 2016

Mechanobiology of Disease
September 27-30
Singapore

July 11
Late Abstract Submission

Meetings 2017

61st Annual Meeting
February 11-15
New Orleans, Louisiana

October 3
Abstract Submission

January 9
Early Registration

Single-Cell Biophysics: Measurement Modulation, and Modeling
June 17-21
Taipei, Taiwan

March 1
Abstract Submission

March 24
Early Registration

Eric Betzig Named 2017 National Lecturer


Eric Betzig

Eric Betzig, 2014 Nobel Laureate in Chemistry, Howard Hughes Medical Institute, will present the 2017 National Lecture at the Biophysical Society 61st Annual Meeting in New Orleans, Louisiana. The lecture, *Imaging Cellular Structure and Dynamics from Molecules to Organisms*, will take place on Monday, February 13, 2017.

Stephanie DeLuca to Serve as 2016–2017 BPS Congressional Fellow

The Biophysical Society is pleased to announce that BPS member *Stephanie DeLuca* has been selected as the 2016-2017 BPS Congressional Fellow. DeLuca received her PhD in chemical and physical biology from Vanderbilt University and has served as the Science Policy Fellow at the American Chemical Society (ACS) since September 2014. For this next step in her career, she is excited about, "working in a fast-paced, high-stakes environment, where the work I do could have a real impact on people."

DeLuca developed an interest in public policy while in graduate school, which led her to her current position at the ACS. While there, she notes that she has gained a great appreciation for the policy work taking place every day, both on and off Capitol Hill. And with that experience under her belt, she realized that working on Capitol Hill would provide a unique opportunity to learn about how Congress works and how policy is made. "There are many moving parts when it comes to governing a country, and the best way to learn how to contribute is to be a part of the process."


Stephanie DeLuca

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Biophysical Society

The *Biophysical Society Newsletter* (ISSN 0006-3495) is published twelve times per year, January-December, by the Biophysical Society, 11400 Rockville Pike, Suite 800, Rockville, Maryland 20852. Distributed to USA members and other countries at no cost. Canadian GST No. 898477062. Postmaster: Send address changes to Biophysical Society, 11400 Rockville Pike, Suite 800, Rockville, MD 20852.

President's Message

Back in the Day


Suzanne Scarlata

Although I like to think of myself as being young, I'm really not. Lately, as a sign of aging, I find myself telling my students how life was like "back in the day." One of the things that has changed most for me is gender equality. Perhaps I'm more aware of this is because there is a good chance of having a US female president. Perhaps I'm more aware of this because of my recent move to a university that was all male until the 1970s and now has a woman BPS President. Or, perhaps I'm more aware of this because I never had a female professor in college or graduate school and our department has hired two new women faculty.

Now, "back in the day," we (myself and my friends) knew there were women professors around, but we never saw them. In graduate school there was a highly respected female scientist who came to the university as a package with her famous husband (there was a message there). There was only one female scientist in my field (who also came to her university as a package with her famous husband) whose papers I read over and over and I staunchly defended her work, despite knowing little about the methods she used. In graduate school I had many female peers, and we saw woman after woman receive doctorates, but it was unclear where they went after — we rarely, if ever, saw women going into faculty positions or presenting talks at scientific conferences. We knew they were out there and hoped that eventually we would see more of them.

That was "back in the day." Today, of course, women are well-represented in industry, government, academics, and on the programs of BPS meetings The BPS is no longer a Society of white men. *However,* many other meetings and conferences still lack female representation. Some conferences still have one woman out of 30 speakers and feel like they've addressed diversity. They haven't.

While my personal reflections have focused on gender, the same can be said about underrepresented groups on faculty and in scientific programs. There are many reasons why organizers should consider diversity when arranging their programs. Most importantly, new and different people bring new and different ideas and perspectives to a conference. Diverse speakers enhance the science of a program and generate models that are not nearly as probable when the same "old boys" are together. Additionally, meeting sponsors would also like to see diversity in meeting programs since women and individuals from underrepresented groups write grants, buy reagents and instrumentation, and head scientific companies.

Many years ago, the BPS made a commitment to inclusivity and diversity and not at the expense of scientific excellence. This commitment is reflected in the composition of our committees and governance structure. Our committees work hard to educate our membership on issues of diversity and inclusion. Importantly, we make sure that our meeting program reflects our membership in regards to gender, race, geography, and scientific discipline. Our program committee works hard to solicit names and ideas to ensure that the scientific content of our program contains new and exciting work given by a variety of scientists. I appreciate that the organizers of smaller meetings might not know many women or minority scientists in their field. However, there are both women and minority established scientists out there – you just need to know where to look and who to ask. The BPS has two committees that are here to help — the Committee for Professional Opportunities for Women and the Committee on Inclusion and Diversity. I am encouraging meeting organizers to reach out to them for recommendations of speakers who are doing cutting-edge work and who will greatly enhance the quality of their meetings.

Did I mention how fast I could run a 10K "back in the day?"

Biophysicist in Profile

DIERK THOMAS

Dierk Thomas, associate professor in the Department of Cardiology at the University of Heidelberg, grew up near Hamburg, Germany, a city known as "Germany's Gateway to the World," because of its history as one of the busiest ports in Europe. Thomas notes that this bustling city, "shapes a broad horizon and uniquely promotes openness to new perspectives. I enjoyed the time [there] as a child a lot." His parents, an engineer and a school teacher, passed on a scientific perspective to their son, who decided he wanted to be a medical doctor when he grew up. "I thought that being a physician would be the most meaningful and rewarding application of science," he says.

He pursued his doctor of medicine degree at Heidelberg University Medical School, and during a physiology class, he began to think that working on ion channels provided the opportunity to identify regulatory mechanisms in the heart and the other organs that could then be therapeutically targeted. "The professor, *Johann Caspar Rüegg*, realized that biomedical science requires clinical application, and I agreed," Thomas says. "He recommended joining the group of *Johann Kiehn* at the cardiology department as a doctoral student. Thus, with the support of both Johanns, my career in cardiac electrophysiology began."

While in medical school, Thomas spent six months in the Department of Physiology and Biophysics of Case Western Reserve University. In the lab of *Arthur Brown*, he studied regulation of cardiac delayed rectifier potassium channels, publishing several articles on the topic during his time there. "In Dr. Brown's group in Cleveland, *Eckhard Ficker*, who sadly passed away much too early, introduced me not only to cellular mechanisms of cardiac arrhythmia, but also to Major League Baseball, which I have enjoyed ever since," Thomas says.

After earning his MD and completing his doctoral thesis work on the role of human ether-a-go-go-related gene potassium channels in the heart, he continued as an active physician-scientist during his residency at the University of Heidelberg. He then worked as a postdoctoral scholar at the University of Chicago from 2004 to 2007 in the lab of *Steve Goldstein*. "I investigated function and regulation of two-pore-domain ion channels," Thomas says. "My passion for baseball, too, grew further during those years in the 'windy city.'"

He returned to Heidelberg in 2007 to continue his scientific career in molecular and translational cardiac electrophysiology. He completed a clinical fellowship and became an independent research group leader, first as an assistant professor, and later associate professor.

Working as both a physician and a scientist has been the biggest challenge in Thomas's career, but has also been most rewarding. "Being able to provide excellent patient care and cutting edge science requires a great team of highly motivated members that I am proud to be a part of," he says. "With the enthusiastic personal commitment of physicians and scientists, we are in a position where we can treat patients in the electrophysiology operating room and shed more light on molecular mechanisms leading to their heart rhythm disorders at the same time. It is definitely most rewarding to bring together scientific discoveries and clinical findings, providing novel avenues for therapeutic intervention that ultimately improve patient care."

Thomas's colleague *Jules Hancox*, professor of cardiac electrophysiology at the University of Bristol, met him at a conference and was impressed with his presentation. "He and his colleagues had probed protein kinase modulation of the hERG potassium channel, in elegant work that included heroically mutating out all the PKA phosphorylation sites," she recalls. They have seldom worked together, following complementary tracks in their research, but recently collaborated on a review and evaluation of potential novel cardiac ion channel targets for treatment of atrial fibrillation that goes beyond the usual suspects. Hancox admires Thomas's balancing research and patient care. "I never cease to be impressed by how he manages to combine outstanding science with substantial clinical responsibilities," she says. "He is incredibly effective."

(Continued on next page)

Dierk Thomas

Profilee-at-a-Glance

Institution
University of Heidelberg

Area of Research
Mechanisms and treatment of cardiac arrhythmias

Thomas admires his patients who agree to participate in clinical and molecular studies. "Without their generous and most personal contribution we would not be able to pursue patient-focused science the way we are today," he says. "Most of the time that I am not doing science in my lab is dedicated to patient care—which constantly generates new ideas for science, of course."

"Biophysics is capable of providing precise and specific explanations for disease phenotypes in cardiovascular medicine. This is particularly true for inherited arrhythmia syndromes that may predispose to life-threatening arrhythmias and sudden cardiac death," Thomas says. "Biophysical studies have contributed significantly to characterizing specific inherited arrhythmias, to analyzing their underlying cause and mechanism, and to developing specific treatment strategies. Indeed, dysfunctional ion channels underlying inherited arrhythmias would not have been discovered without biophysics—and this is just one example of many in cardiac electrophysiology."

Going forward in his career, Thomas plans to continue working in both clinical and research environments. "Working at the interface between biophysical science and patient care together with my team, I hope to contribute significant mechanistic insights into cardiac arrhythmogenesis that translate into optimized antiarrhythmic therapy," he shares. "Within the biophysical community I will continue to promote the inclusion of clinical disciplines into scientific efforts, to guide and advance scientific knowledge for the long-term benefit of humans."

Stephanie DeLuca to Serve as 2016–2017 BPS Congressional Fellow

(Continued from page 1)

While Capitol Hill may be new to her, DeLuca is confident that her training has prepared her well for the opportunity: "Scientific training is unique, and scientists and engineers are in the minority when it comes to people who work on Capitol Hill. We are trained to feel comfortable with not knowing all the answers, with having to learn new things quickly, and with finding the productive questions that need to be asked—all assets when it comes to policy work. Obtaining my PhD has prepared me well for a career in policy, and I am grateful to the BPS and all those who have helped me be able to accept this opportunity."

After a few weeks of training offered by the AAAS Science and Technology Fellowship Program, in which the BPS Fellow is a participant, DeLuca will work in a congressional office on legislative and policy areas requiring scientific input. She hopes to use her science and technology background in the development of policy. "A congressional member's stance on a policy issue is often nuanced and stems from a variety of factors," says DeLuca. "Science and technology may play a large or small role in any particular issue, and I hope that I can help determine what the role should be."

DeLuca is also looking forward to making connections with people, learning about other areas of policy in a Capitol Hill context, such as energy, the environment, public health, education, and/or foreign policy, and gaining insight into the nuances of legislating that are not apparent from her current perspective. While her plans for after the fellowship are not set yet, she is definitely interested in continuing to work in science policy, whether on the Hill, at a federal agency, or a policy-oriented organization.

The Society's leadership began providing support for the fellowship in 2014 in recognition that public policy increasingly impacts scientific research, and basic science literacy is increasingly needed to develop responsible policy. Through the fellowship, the Society's leaders hope to provide a bridge between scientists and policymakers.

The AAAS Science and Technology Fellowship program, which is in its 43rd year, brings almost 300 scientists to Washington, DC, to work both on Capitol Hill and in federal agencies, providing scientific expertise to policymakers while learning about the policy process. This is the second year that the BPS has participated in the program.

Biophysical Society Thematic Meetings

2017 Meetings

Single Cell Biophysics: Measurement, Modulation, and Modeling

Taipei, Taiwan | June 17–21, 2017

Conformational Ensembles from Experimental Data and Computer Simulations

Berlin, Germany | August 25–29, 2017

Emerging Concepts in Ion Channel Biophysics

Mexico City, Mexico | October 10–13, 2017

For additional information visit biophysics.org/**ThematicMeetings**

Apply to be the 2017-2018 BPS Congressional Fellow!

Are you interested in working on Capitol Hill and learning more about science policy?

The BPS is now accepting applications for the 2017-2018 Fellowship year. All members who have obtained their PhD and are eligible to work in the United States may apply.

Application deadline: December 15, 2016

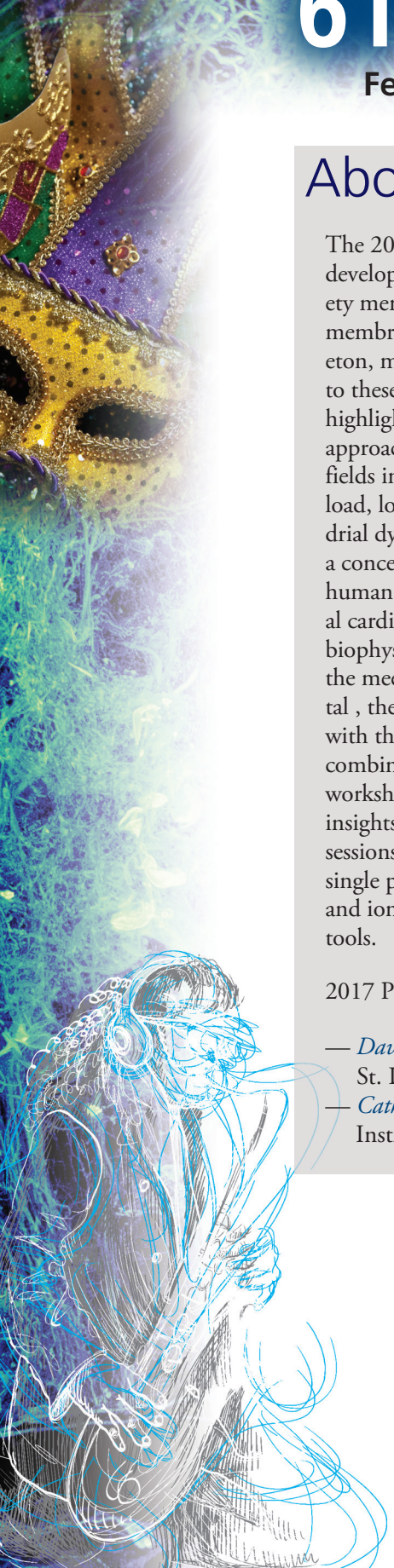
Visit www.biophysics.org for additional information.

By the Numbers

Did you know that 36% of BPS members work in countries outside of the US?
BPS members reside in over 60 different countries.

61ST Annual Meeting

February 11–15, 2017 • New Orleans, Louisiana



About the Program

The 2017 Annual Meeting program was developed based on the interests of Society members in the biophysics of proteins, membranes, channels, transporters, cytoskeleton, motors, and nucleic acids. In addition to these core interest areas, the meeting will highlight the contributions of biophysics approaches to emerging biological research fields including epigenomics and mechanical load, long non-coding RNAs, and mitochondrial dynamics and transport. We have made a concerted effort to address the biophysics of human disease with sessions on computational cardiology, cancer cell biophysics, and the biophysics of malaria parasites. Throughout the meeting, sessions will include experimental , theoretical, and computational studies, with the overall goal of enhancing these combined approaches to biophysics. Evening workshops will focus on providing practical insights into advanced methodologies, with sessions on analysis of biological networks, single particle cryoEM, imaging of voltage and ions, and precision chemical biology tools.

2017 Program Co-Chairs

— *David Piston*, Washington University, St. Louis
— *Catherine A. Royer*, Rensselaer Polytechnic Institute

Symposia

Protein Folding Mechanisms

Susan Marqusee, University of California, Berkeley, Chair
Ashok Deniz, Scripps Research Institute
Olga Dudko, University of California, San Diego
Bertrand Garcia-Moreno, Johns Hopkins University

Proteins In Vivo: From the Ribosome Through the Chaperone to the Native State

Silvia Cavagnero, University of Wisconsin-Madison, Chair
Ruben Gonzalez, Columbia University
Adrian Elcock, University of Iowa
Marina Ramirez-Alvarado, Mayo Clinic

Protein Dynamics and Allostery

Martin Weik, Insitut de Biologie Instructionale, France, Chair
Josh Wand, University of Pennsylvania
Donald Hamelberg, Georgia State University
Angela Gronenborn, University of Pittsburgh

Membrane Protein Biogenesis

Charles Sanders, Vanderbilt University, Chair
Trevor Lithgow, Monash University, Australia
Sheena Radford, University of Leeds, United Kingdom
Bil Clemons, Caltech

Single Molecule Membrane Protein Dynamics

Hugo Sanabria, Clemson University, Chair
Janice Robertson, University of Iowa
Ehud Isacoff, University of California, Berkeley
Katharina Gaus, University of New South Wales, Australia

TRP Channels

Sharona Gordon, University of Washington, Chair
David Julius, University of California, San Francisco
Carmen Domene, Kings College, United Kingdom
Vera Moiseenkova-Bell, Case Western Reserve University

Biophysics in the Big Easy

Transporters

Hassane Mchaourab, Vanderbilt University, Chair
Merritt Maduke, Stanford University
Nancy Carrasco, Yale University
Harel Weinstein, Weill Cornell Medical College

Channel Gating Mechanisms

Katherine Henzler Wildman, University of Wisconsin-Madison, Chair
Youxing Jiang, University of Texas Southwestern Medical Center
Toby Allen, RMIT University, Australia
Anna Moroni, University of Milan, Italy

Catalyzed Membrane Fusion and Fission

Phyllis Hanson, Washington University School of Medicine, Chair
Frederick Hughson, Princeton University
Vadim Frolov, Ikerbasque, the Basque Foundation for Science, Spain
Felix Rey, Institut Pasteur, France

Mechanotransduction to Physiology

Jörg Grandl, Duke University Medical Center, Chair
Ellen Lumpkin, Columbia University
Ardem Patapoutian, Scripps Research Institute
Amanda Patel, University of Nice, France

Computational Cardiology

Adam Hill, Victor Chang Institute, Australia, Chair
Blanca Rodriguez, University of Oxford, United Kingdom
Natalia Trayanova, Johns Hopkins University
Colleen Clancy, University of California, Davis

Destroying the Cytoskeleton

Jennifer Ross, University of Massachusetts Amherst, Chair
Gary Brouhard, McGill University, Canada
Laurent Blanchoin, Institut de Biotechnologies de Grenoble, France
Linda Wordeman, University of Washington

Biophysics of the Cytoskeletal-Membrane Interface

Michael Kozlov, Tel Aviv University, Israel, Chair
Gregory Voth, University of Chicago
Cecile Sykes, Institut Curie, France
Dorit Hanein, Sanford Burnham

Anomolous Dynamics in Biological Systems

Diego Krapf, Colorado State University, Chair
Cécile Fradin, McMaster University, Canada
Ralf Metzler, University of Potsdam, Germany
Yuval Garini, Bar-Ilan University, Israel

Epigenomic Changes Driven by Biomechanical Load

Andrew McCulloch, University of California, San Diego, Chair
Alexandra Zidovska, New York University
Michael Poirier, Ohio State University
Andrew Spakowitz, Stanford University

RNA Structures and Dynamics

Sarah Woodson, Johns Hopkins University, Chair
Anna Marie Pyle, Yale University
Tamar Schlick, New York University
David Lilley, University of Dundee, United Kingdom

Mitochondrial Dynamics and Transport

Robert Balaban, NHLBI, NIH, Chair
David Chan, Caltech
Karen Davies, Max Planck Institute, Germany
Elizabeth Jonas, Yale Unviersity

Biophysics of lncRNA

Gregor Neuert, Vanderbilt University, Chair
Stirling Churchman, Harvard University
Mitchell Guttman, Caltech
Luca Giorgetti, Friedrich Miescher Institute of Biomedical Research, Switzerland

Biophysics of Malaria Parasites

Paula da Fonseca, MRC Laboratory of Molecular Biology, United Kingdom, Chair
Ulrich Schwarz, Heidelberg University, Germany
Leann Tilley, The University of Melbourne, Australia
George Karniadakis, Brown University

Cancer Cell Biophysics

Alissa Weaver, Vanderbilt University, Chair
Jianhua Xing, Virginia Tech
Katarzyna Rejniak, Moffit Cancer Center
Leah Edelstein-Keshet, University of British Columbia, Canada

Public Affairs

New Overtime Rules to Impact Postdoctoral Pay

In May, the White House issued new rules for overtime pay that will impact both researchers employing postdocs and postdocs alike. The ruling makes, with some exceptions, everyone who earns under $47,476 per year eligible for overtime pay regardless of their duties. This includes most postdoctoral researchers (rules may be different for those who primarily teach—less common in biomedical research than in other disciplines). On the same day, National Institutes of Health (NIH) Director *Francis Collins* and Department of Labor Secretary *Thomas Perez* discussed the impact of this ruling on postdoctoral fellows in a Huffington Post Blog. In that post, Collins announced that the NIH will be raising postdoctoral National Research Service Award recipients' salaries to above that threshold, and encouraged Principal Investigators (PIs) to follow suit. The post explains why it would be very difficult to pay postdoctoral fellows hourly, thus the decision for the pay raise.

While this is good news for the postdoctoral community, it will require PIs to re-examine their budgets if they are currently paying postdocs less than the new threshold amount. PIs in the middle of a multi-year grant period will have to shift funds. The new rule takes effect December 1, giving the research community six months to work out the details.

Biophysical Society Opposes Increase in SBIR Set Aside

The Biophysical Society joined 77 other professional societies and research institutions in sharing its opposition to increasing the set-aside for the Small Business Innovation Research (SBIR) Program and the Small Business Technology Transfer (STTR) program, as proposed in bill HR 4783, to Congress. The societies undersigned a letter sent to the House Science, Space and Technology Committee, as well as the House and Senate Armed Services Committee, which were considering legislation that the SBIR/STTR bill might be attached to.

The SBIR program is a competitive program that encourages domestic small businesses to engage in federal research and development (R&D) that has the potential for commercialization. Each federal agency that has an extramural research and development budget over $100 million is required to allocate 2.8% of its budget to this program. NIH (as part of the Department of Health and Human Services), National Science Foundation (NSF), NASA, and the Department of Energy (DOE) all qualify and have a SBIR program. The reauthorization bill would increase the SBIR set-aside from 3.2% in 2018 to 6% in 2016.

The STTR program is a competitive program that funds collaborations between small businesses and research institutions in Phase I or Phase II, with the goal of spurring innovation, and encouraging the commercialization of innovations arising from federally funded research. Agencies with federal R&D budgets in excess of $1 billion participate in the program. This includes the NIH, NSF, NASA, and DOE. The bill would increase the STTR set-aside from 0.45% to 1.0% over six years.

The letter sent to Congress noted that while the signing organizations agree that small businesses are a vital piece of the scientific research community in the United States, increasing the mandatory set aside for these programs will decrease the research opportunities available to investigators at colleges and universities, nonprofit research institutes, and other research organizations, especially at a time when future funding levels for research are very uncertain. The letter also suggested that the best way to examine the SBIR program is through the regular authorization process. The SBIR program is currently authorized through September 2017.

White House Launches National Microbiome Initiative

The White House Office of Science and Technology Policy (OSTP), in collaboration with federal agencies and private-sector stakeholders, announced May 13 a new National Microbiome

Initiative (NMI). The aim of the initiative is to advance understanding of microbiomes in order to aid in the development of useful applications in areas such as health care, food production, and environmental restoration. The initiative includes a combined federal agency investment of more than $121 million in FYs 2016 and 2017, including the NIH investing an extra $20 million into microbiome research in grants in FYs 2016-2017 with a particular emphasis on multi-ecosystem comparison studies and investigation into design of new tools to explore and understand microbiomes.

Specifically, the NMI will have three goals, which were developed through a year-long fact-finding process that involved federal agencies, non-government scientists, and a broad community of citizens. These goals are:

1. Supporting interdisciplinary research to answer fundamental questions about microbiomes in diverse ecosystems;

2. Developing platform technologies that will generate insights and help share knowledge of microbiomes in diverse ecosystems and enhance access to microbiome data; and

3. Expanding the microbiome workforce through citizen science and educational opportunities.

In addition, non-governmental stakeholders and institutions announced new commitments of more than $400 million in financial and in-kind contributions that support the NMI's overarching goals.

These include:

- The Bill and Melinda Gates Foundation will invest $100 million over four years to investigate and develop tools to study human and agricultural microbiomes.

- The Juvenile Diabetes Research Foundation will invest $10 million over five years to address microbiome research related to type 1 diabetes.

- The University of California, San Diego, is investing $12 million in the Center for Microbiome Innovation to enable technology developers to connect with end users.

- One Codex is launching a public portal for microbiome data, allowing for researchers, clinicians, and other public health professionals to have more access to microbiome data.

- The BioCollective, LLC, along with the Health Ministries Network, are investing $250,000 toward building a microbiome data and sample bank and engaging underrepresented groups in microbiome research.

- The University of Michigan, with support from the Howard Hughes Medical Institute and Procter and Gamble, will invest $3.5 million in the Michigan Microbiome Project to provide new research experiences for undergraduate students.

Grants and Opportunities

Science & SciLife Prize for Young Scientists

Objective: To encourage the best and brightest to continue in their chosen fields of research.

Who May Apply: Entrants must have been awarded their PhD between January 1, 2014, and December 31, 2015. The research described in the entrant's thesis must fall within one of four Subject Tracks, which can be viewed online. The prize will only recognize work that was performed while the entrant was a graduate student.

Deadline: August 1, 2016

Website: http://www.sciencemag.org/prizes/scilifelab/rules

Biomechanics and Mechanobiology (BMMB)

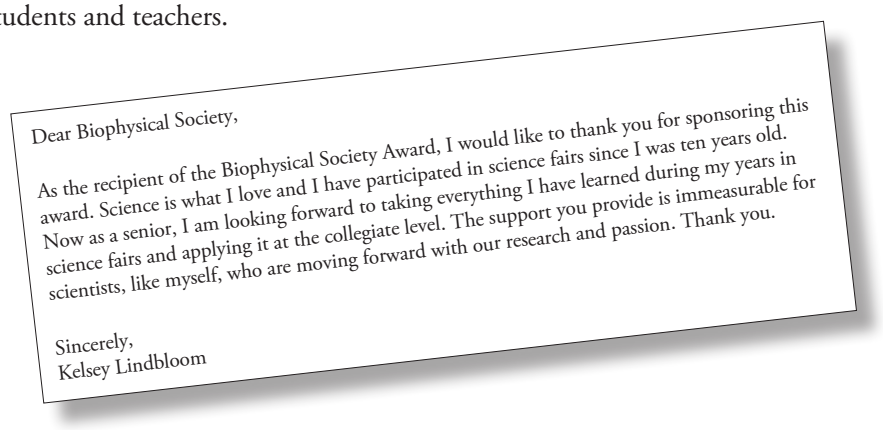
Objective: To support fundamental research in biomechanics and mechanobiology. The program encourages the consideration of diverse living tissues as smart materials that are self-designing. Funded projects may include theoretical, computational, and experimental approaches.

Deadline: September 15, 2016

Website: https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13523

Science Fairs

For the eighth consecutive year, the Biophysical Society's science fair program has given awards to students with outstanding biophysics-related projects, as determined by local Society members who volunteered as judges at the events. In 2016, the Biophysics Award was given to 36 students across the United States. The science fair initiative, sponsored by the Public Affairs Committee, encourages the teaching and learning of STEM subjects, as well as raises interest in and awareness of biophysics among high school students and teachers.



Dear Biophysical Society,

As the recipient of the Biophysical Society Award, I would like to thank you for sponsoring this award. Science is what I love and I have participated in science fairs since I was ten years old. Now as a senior, I am looking forward to taking everything I have learned during my years in science fairs and applying it at the collegiate level. The support you provide is immeasurable for scientists, like myself, who are moving forward with our research and passion. Thank you.

Sincerely,
Kelsey Lindbloom

2016 Science Fairs were held in the following locations:

Alameda County Science & Engineering Fair
Arizona Science and Engineering Fair
Brush High School Science Fair
Calumet Regional Science Fair
Chico Science Fair
Colorado Science & Engineering Fair
Connecticut Science & Engineering Fair
Delaware Valley Science Fair
Georgia Science & Engineering Fair
George Washington Carver Science Fair
Greater East Alabama Regional Science and Engineering Fair (GEARSEF)
Greater San Diego Science & Engineering Fair
Hawaii State Science and Engineering Fair
Hoosier Science and Engineering Fair
Intel Northwest Science Expo
Iowa State Science & Technology Fair
Lafayette Regional Science & Engineering Fair
Long Island Science & Engineering Fair
Longs Peak Science & Engineering Fair
Massachusetts Region III Science Fair
Montana Science Fair
Montgomery County Science Fair
NE Colorado Regional Science Fair
Nevada Science Fair
New Haven Science Fair
New Mexico Highlands University Regional Science Fair
New York City Science and Engineering Fair
Northeastern Indiana Tri-State Regional Science Fair
Sacramento Regional Science & Engineering Fair
San Luis Valley Regional Science Fair
Santa Barbara Science Fair
Santa Cruz County Science & Engineering Fair
University of New Mexico Stem-H Center
University of Southern Indiana's Tri-State Science and Engineering Fair
Western Colorado Regional Science Fair
Worcester Regional Science & Engineering Fair

The Biophysical Society would like to thank the Society members who volunteered to judge at their local science fairs this year! If you are interested in having BPS sponsor an award at your regional or state fair in 2017 or have questions, please visit http://www.biophysics.org/AboutUs/Volunteer/ScienceFairs/tabid/2284/Default.aspx.

Biophysical Journal

Know the Editors

Kalina Hristova
Johns Hopkins University

Editor, Membranes

Kalina Hristova

Q: What are you working on?

We are working to uncover biophysical principles that underlie protein-membrane interactions, as well as protein-protein interactions in cellular membranes. In one project, we are developing methods to probe the stoichiometry and stability of protein complexes in biological membranes using Forster resonance energy transfer (FRET). We design our experiments such that receptor concentrations are varied over a wide range, and we measure concentrations in the plasma membranes, along with the FRET efficiencies. Thus, we can assess what type of oligomer provides the best description of the data, calculate the dimeric/oligomeric fractions, calculate the association constants in the plasma membrane, and monitor structural changes that occur due to ligand binding or pathogenic mutations. This year, we published a new methodology called Fully Quantified Spectral Imaging FRET that allows us to make such measurements in live cells. This method increases the precision of the FRET measurements by utilizing two-photon excitation and the acquisition of complete emission spectra.

We are using these methods to study the activation of receptor tyrosine kinases, which are known to transduce biochemical signals via lateral interactions in the plasma membrane. Our recent work has revealed novel mechanistic knowledge about their mode of activation in response to ligand. In the past, the ligands were believed to be absolutely required for receptor dimerization. We have shown, however, that the receptors form dimers in the absence of ligand, and that ligand binding triggers structural changes in the dimers which increase the kinase activity. Thus, the mode of activation is more complex than originally thought. We are beginning to understand how the recognition of different ligands by a receptor is accomplished. For some receptors, the transmembrane helices sense the identity of the ligand and adopt ligand-specific dimer configurations that correlate with different activity levels.

In a different project, we are working to understand the interactions between novel classes of peptides and biological membranes. Some of these peptides have very intriguing biophysical properties, which we are characterizing. We hope that we can eventually use these peptides to deliver drugs to cells, or across the blood-brain barrier.

Q: What excites you most about your research?

It is relatively easy to acquire beautiful binding curves for soluble proteins, but it has always seemed impossible to do so for membrane proteins. My dream was to develop methodologies that make such measurements feasible for membrane proteins. Dedicated and talented lab members have now made my dream a reality. When we were finally able to analyze membrane protein interaction data from live cells, we saw that the data follow binding curves that can be predicted based on the law of mass action, yielding apparent equilibrium constants. For us, this was a discovery, and a very exciting one. The membrane proteins we study control cell growth and differentiation and are implicated in many diseases, and this discovery suggested that cellular responses in health and disease can be understood and predicted based on quantitative maps of protein interaction strengths.

Our projects focused on peptide-lipid interactions are also very exciting, as the membrane-active peptides that we work with have unique properties that are not found in nature. Some of the peptides have been discovered through high-throughput screening for specific functions. The mechanism of their action, however, is not well understood and appears very complex. Each new experiment brings new surprises, new questions, and new pursuits.

Career Center

Postdoc to Faculty: Setting Up a Lab

At the 60th Annual Meeting in Los Angeles, California, the Early Careers Committee sponsored a panel discussion on setting up your lab as new faculty. Panel members *Slav Bagriantsev*, Yale University; *Sudha Chakrapani*, Case Western Reserve University; *Susy Kohout*, Montana State University; and *Bert Tanner*, University of Washington, answered attendee questions about their experiences establishing their labs. Much of the discussion is summarized below.

Q: In the first year or two, do you have to do a lot of experiments yourself?

You will likely be hands-on for quite some time while you are training people on what you need done and how you need the experiments to be conducted.

Q: What do you look for in students or postdocs you're hiring? What are red flags to look for?

Take personal recommendations seriously when considering candidates. Call referees and talk to them about the student or postdoc, rather than just relying on a letter. This may give you a better idea of their skill set and working style.

Think carefully about what you put into a job ad; consider what skills will be complementary to your own skill set. If you can, bring the candidate you are considering on site for a day to see how he/she interacts with you and your existing lab members.

Q: How do you know someone has not exaggerated their skill set if you cannot afford to bring them to your lab to meet them in person?

Advertise the position on the BPS job board in order to reach good candidates. Meet up with candidates at a conference, if possible, so that you will have some face-to-face interaction. If this isn't possible, interview over Skype. Ask specific questions and ask candidates to give a talk to you over Skype; this will give you a better idea of their skill set—and personality.

Be ruthlessly critical so that you end up with the right people around you. Do not rush to get someone in the position because you will end up wasting time if you train someone who ends up being wrong for the job. Being a PI is a really hard job, and your goal is to find the best people for your lab.

Q: During the application process, should you put forward just one research path?

Yes, because hiring committees will be thinking about your fundability when considering if you would be successful in the position. You should also present your broader, more wide-ranging ideas in your chalk talk.

Q: How important is your fit within the department?

When you are in an interview, you should be interviewing the department too, and trying to figure out if it is somewhere you would want to work. See if you can envision growth for yourself and your career in that department and institution. Do not cater your research plan to a specific department; be true to your actual plan.

Consider the location of the institution as well. Do not apply to universities in places you wouldn't want to live and work.

Q: How did you negotiate your start-up package?

You can get estimates from companies on what equipment you will need so that you will know how much start-up money will be necessary to get your research done. Work with the department on what you need right away and what can be delayed. The department wants you to succeed, so they may be willing to work with you on budget.

If they say no to your requests, do not take it personally, but do not accept an offer where you will not be able to succeed.

Q: I am a graduate student starting in a new PI's lab. What can I do to help make it successful?

Your success is tied to your PI's, therefore working together and focusing on research is important, especially at the beginning. Ask your PI this question, because she/he can give you the best answer. Starting out together will be a busy and exciting time in the lab!

Q: Do you have a mentor in your department?

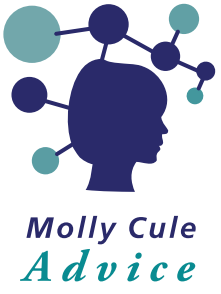
Some departments have formalized programs, in which you can select or are assigned a mentoring committee. Whether or not you have such a program, it is helpful to have someone you can meet with periodically and discuss how things are going. You can also talk to colleagues who are a few years ahead of you, as they may have insight having recently faced some of the same struggles.

Q: Do you have any advice for current postdocs on what to do to equip themselves for faculty careers?

Write down your research proposal and chalk talk now. A well thought out research proposal goes a long way—it can make up for a lackluster publication record. Practice how to package ideas to get other people excited about your research, and how to communicate the larger implications of your research.

Being a PI is a ton of work, but it is a great job to have.

Molly Cule



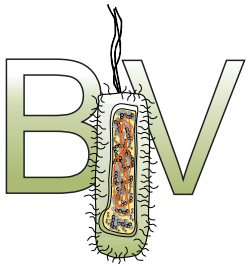
How to Talk to Your Program Officer

Working with your program officer is a critical component of grantsmanship and successful funding applications. I recognize that some people can feel anxious about contacting their program officers, but there is no cause for anxiety if you come prepared. Almost all program officers are available to speak with you about your grant directions and ideas, applications and revisions, and they want to see your best work funded. Program officers are approachable, constructive, and interested in your success because it benefits their grant portfolio—the research directions that their agency gets to fund. However, it is important to be prepared and respectful of the myriad duties associated with their job when you approach them.

Preparation and planning are critical to optimize your time in conversation with your program officer, and help ensure that you are not wasting your time or theirs. You should always contact them via email first. In this email, you should ask to set up a time to talk (perhaps even offer some times that work well for you) and introduce the specific topics, questions, or ideas that you want to discuss. As you prepare for your conversation, you should have a list of objectives and goals that you want to achieve during your conversation, regarding your grant revisions or your upcoming grant submissions. You should send them your specific aims page or summary statements ahead of time, so that you are not surprising them or trying to communicate over the phone difficult ideas that they may be hearing about for the first time. Building a working relationship with your program officer can take some time, but it ultimately will benefit the successful funding of your research.

Subgroups

BIV



Our subgroup is invested in understanding the behavior of large biomolecules in cells. A lot of exciting work has been going on, and here we highlight an impressive study by *Julia Mahamid* et al. from the *Baumeister* laboratory at the Max Planck Institute of Biochemistry in Germany.[1] They used cutting-edge technology in cryo-electron tomography and single-particle reconstruction to study the nuclear peripheries of individual HeLa cells.

The authors not only provided a beautiful tomographic image of the nuclear periphery acquired with molecular detail, but also showed in-situ single-particle reconstruction of individual ribosomes and nuclear pore complexes. Reconstructions revealed the locations of polysomes and free ribosomes, as well as the width of the nuclear pore complex, which is important for gene expression regulation. All this information was provided within the context of the cellular ultrastructure, including membranes, microtubules, and the endoplasmic reticulum.

The authors obtained sufficient contrast from individual protein complexes in situ by using a Volta phase plate, which improves contrast by interfering the dark field and bright field radiation, much like a Zernicke phase plate would in optical phase contrast microscopy. They overcame the challenge of obtaining a signal from a difficult-to-access region inside the cell by using a focused ion beam to machine a thin lamella from cells preserved under cryogenic conditions. These improvements in contrast and resolution were only possible in conjunction with modern single-particle reconstruction algorithms and state-of-the-art direct electron detectors.

As computational and imaging technologies continue to improve, increasingly less averaging will be necessary to acquire high-resolution, three-dimensional reconstructions of cells that reveal individual protein complexes. We are excited to see how the field progresses and the knowledge it will continue to provide on the inner workings of the cell.

—*Rayna Addabbo*, Biopolymers in Vivo Graduate Student Representative

—*Maxim Prigozhin*, Biopolymers in Vivo Postdoctoral Fellow Representative

[1]*Julia Mahamid*, *Stefan Pfeffer*, *Miroslava Schaffer*, *Elizabeth Villa*, *Radostin Danev*, *Luis Kuhn Cuellar*, *Friedrich Förster*, *Anthony A. Hyman*, *Jürgen M. Plitzko*, *Wolfgang Baumeister*, 2016, Visualizing the molecular sociology at the HeLa cell nuclear periphery. Science. 351(6276): 969–972, doi: 10.1126/science.aad8857

Student Center

Rayna Addabbo

Rayna Addabbo
Biophysics Graduate Program

University of
Wisconsin-Madison

Q: What made you decide to study biophysics?

I became interested in biophysics as an undergraduate at Rutgers University where I had the opportunity to work in *Jean Baum's* research group. There, I was first introduced to important biophysical topics like protein folding and gained a deep appreciation for the beautiful complexity of biology. My undergraduate studies made me realize how much I was drawn to techniques that offer high-resolution information. Because of this, I decided to pursue my PhD under the guidance of *Silvia Cavagnero* at the University of Wisconsin-Madison where I am using fluorescence spectroscopy to study protein folding of ribosome-bound nascent chains.

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Members in the News

Stefan W. Hell, Max Planck Institute and Society member since 1998, was elected to become a foreign associate of the National Academy of Sciences.

Ian Wilson, Scripps Research Institute and Society member since 2007, was elected to become a foreign associate of the National Academy of Sciences, and also named a Fellow of the American Academy of Microbiology.

Four BPS members have been elected to become members of the National Academy of Sciences:

Robert Glaeser, University of California, Berkeley, and Society member since 1979.

Michael F. Summers, University of Maryland, Baltimore County, and Society member since 2000.

Susan Marqusee, University of California, Berkeley, and Society member since 1997.

Joseph DeRisi (not pictured), University of California, San Francisco, and Society member since 2016.

Two BPS members have been named Fellows of the American Academy of Microbiology:

Craig Cameron, Pennsylvania State University and Society member since 2012.

Edward Marcotte, University of Texas at Austin and Society member since 2011.

Biophysical Society

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UPCOMING EVENTS

September

September 7–11

Genetic & Animal Models for Ion Channel Function in Physiology and Disease
Woods Hole, MA, USA
http://www.sgpweb.org/

September 11–16

EBSA Biophysics Course on: Membrane and Lipid-Protein Interactions
Montpellier, France
http://biophysics.wix.com/montpellier

October

October 4–6

Advances in Biophysical Methods for Protein Characterisation
Palermo, Italy
https://www.eventbrite.co.uk/e/advances-in-biophysical-methods-for-protein-characterisation-conference-registration-21306502322

October 26–30

Translational Vaccinology for Global Health
London, United Kingdom
https://www.keystonesymposia.org/index.cfm?e=web.Meeting.Program&meetingid=1471

November

November 8–12

Phytobiomes: From Microbes to Plant Ecosystems
Santa Fe, New Mexico
https://www.keystonesymposia.org/index.cfm?e=web.Meeting.Program&meetingid=1472

November 14

14 Annual Nathan W. Shock Aging Symposium
Baltimore, Maryland
https://calendar.nih.gov/app/MCalInfoView.aspx

December

December 4–8

Cellular Stress Responses and Infectious Agents
Santa Fe, New Mexico
https://www.keystonesymposia.org/index.cfm?e=web.Meeting.Program&meetingid=1414

Please visit www.biophysics.org for a complete list of upcoming events.