

**Siemens Competition
2016 Regional Finals**

University of Notre Dame Judges



Paul Helquist, Ph.D., Lead Judge

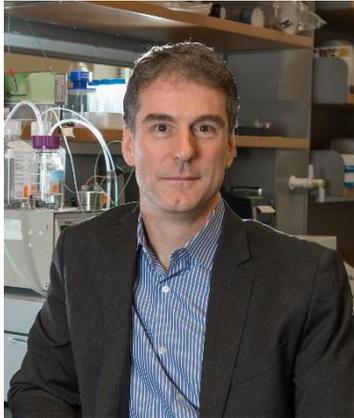
Department of Chemistry and Biochemistry

Professor and Associate Chair

University of Notre Dame

Dr. Paul Helquist received his B.S. degree in chemistry and mathematics at the University of Minnesota. He then earned his M.S. and Ph.D. degrees in organic chemistry at Cornell University followed by postdoctoral research in synthetic organic chemistry at Harvard University with Nobel Laureate E. J. Corey.

Dr. Helquist has been a university faculty member for 42 years. He held a professorship at another university before coming to Notre Dame in 1984. He is a specialist in synthetic organic chemistry and has over 170 publications and patents in the following areas: development of new synthetic methods; design and development of transition metal reagents and catalysts for selective synthetic reactions, including new enantioselective methods; development of new methods for the total synthesis of natural products synthesis and applications to new pharmaceuticals, including antibacterial and antitumor agents and treatments for rare inherited diseases as part of an international network of collaborators in the U.S.A., Europe, and Asia. A therapeutic agent that he has developed is currently being used in an FDA-approved human clinical trial. Dr. Helquist has served as Chair of the Chemistry Board of Examiners for the Graduate Records Examination at the Educational Testing Service, as the Director of the National Science Foundation Workshop for College Teachers of Organic Chemistry, as a consultant to the pharmaceutical industry, and head of an Indiana state-wide program for clinical translational research at Indiana University, Purdue University, and Notre Dame. Since 1981, he has offered special courses on advanced synthetic organic chemistry on 140 occasions at sites throughout the U.S.A., Canada, and Europe under the auspices of the Continuing Education Department of the American Chemical Society and several other sponsors. He teaches organic chemistry and advanced synthetic organic chemistry courses for undergraduate and graduate students at Notre Dame. He has held guest professorships in Sweden and Denmark on several occasions.



Brian M. Baker, Ph.D.

*Department of Chemistry and Biochemistry
Rev. John A. Zahm, C.S.C. Professor of Structural Biology
and Department Chair
University of Notre Dame*

Brian Baker is the Zahm Professor of Structural Biology and the Chair of the Department of Chemistry and Biochemistry in the Notre Dame College of Science. He is also a lecturer in the Department of Surgery at Loyola University Stritch School of Medicine. Dr. Baker received his BS in biochemistry from New Mexico State University and his PhD in physical biochemistry from the University of Iowa, where he studied the biophysics of protein-protein interactions. He completed a postdoc in structural immunology at Harvard University, working with the late Don C. Wiley. He is the scientific great-grandson of Rosalind Franklin and Linus Pauling. Dr. Baker moved to the University of Notre Dame in 2001 to start a lab using biophysical and structural principles to understand and productively manipulate cellular immunity. His research spans fundamental protein biophysics, structural immunology, and cancer immunotherapy. His most recent projects involve using a detailed understanding of molecular recognition in the immune system to generate targeted immunotherapies for cancer and personalized cancer vaccines based on tumor genomes.



Gary H. Bernstein, Ph.D.

*Department of Electrical Engineering
Frank M. Freimann Professor of Electrical Engineering
Associate Director, Center for Nano Science and
Technology
University of Notre Dame*

Prof. Gary H. Bernstein received his B.S. degree in electrical engineering at the University of Connecticut in 1979 and his M.S. in electrical engineering at Purdue University in 1981. He earned his Ph.D. in electrical engineering doing research in nanofabrication of quantum devices in 1987 followed by a year of postdoctoral research, all under the direction of Prof. David K. Ferry. Professor Bernstein has been on the faculty at Notre Dame since 1988. In 1992, Bernstein was awarded a White House Presidential Faculty Fellowship, one of only 15 given to engineering faculty nationwide. In 2010 he was appointed to the Freimann Chair of Electrical Engineering. Bernstein has worked in a variety of areas including electron beam lithography for nanofabrication, quantum

device fabrication and testing, microwave devices and circuits, microfluidics, and microelectronics packaging. Currently, his main interests are in nanomagnetism for computing and nanoantennas for infrared light detection. Bernstein was co-founder in 2009 of Indiana Integrated Circuits, LLC, a Notre Dame spinout company devoted to commercializing Bernstein's origination of Quilt Packaging, a novel technique to make heterogeneous integration of microelectronics systems feasible. Bernstein is co-inventor of 11 patents and co-author on more than 250 publications. Bernstein received the Innovation Excellence Award from the Indiana Economic Development Center and Forbes Summit Group in 2014, and the 1st Source Commercialization Award in 2016. Bernstein is the recipient of a Kaneb Center Teaching Award and Departmental Teacher of the Year Award.



Joel Boerckel, Ph.D.

*Department of Aerospace and Mechanical Engineering
Assistant Professor
University of Notre Dame*

Dr. Joel Boerckel is currently Assistant Professor of Aerospace and Mechanical Engineering at the University of Notre Dame, where his laboratory is focused on engineering functional vascularized tissues and understanding fundamental mechanobiology of tissue growth and remodeling. Current research in his lab includes investigation of stem cell and protein delivery for bone defect regeneration, mechanical stimuli as regulators of tissue differentiation and regeneration, experimental and computational evaluation of neovascular growth and remodeling, and identification of novel mechanisms regulating cellular mechanotransduction. Dr. Boerckel earned his B.S. in mechanical engineering from Grove City College, and his M.S. and Ph.D. in mechanical engineering from Georgia Institute of Technology.



Merlin Bruening, Ph.D.

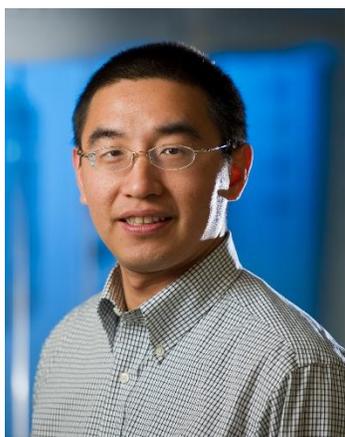
*Department of Chemical and Biomolecular Engineering
Professor
University of Notre Dame*

Dr. Merlin Bruening graduated with B.S. and M.S. degrees from Brigham Young University and received his Ph.D. from the Weizmann Institute of Science (1995), where under the direction of Abraham Shanzer and David Cahen he studied modification of semiconductor surfaces. His

postdoctoral research with Richard Crooks (Texas A&M University) examined the growth of hyperbranched polymer films.

From 1997-2016, Dr. Bruening was a faculty member in the Department of Chemistry at Michigan State University, where he focused on creating ultrathin films for applications in separations and analysis. This past summer, he joined the Department of Chemical and Biomolecular Engineering at Notre Dame. His specific research areas include development of multilayer polyelectrolyte films as ion-separation membranes, room-temperature growth of polymer brushes, examination of the catalytic selectivity of nanoparticles as a function of their size, and modification of porous membranes for protein isolation or digestion prior to mass spectrometry analysis. One of his membranes is now a commercial product sold by Takara/Clontech for purifying His-tagged proteins.

Dr. Bruening has published 130 peer-reviewed papers and received the 2016 Benedetti-Pichler Award for his research in microchemistry.



Haifeng Gao, Ph.D.

*Department of Chemistry and Biochemistry
Assistant Professor
University of Notre Dame*

Dr. Haifeng Gao received his Ph.D. degree in Polymer Chemistry at Carnegie Mellon University in 2008 before a 2-year postdoctoral research in organic photovoltaics and polymer light emitting diodes at University of California Berkeley. Dr. Gao has been on the faculty at Notre Dame since 2011. His current research focuses on the design and synthesis of functional polymer nanostructures for applications in polymer catalysis, solar energy transformation and polymer membrane separation. Dr. Gao has co-authored more than 70 peer-reviewed papers, 6 book chapters and his publications so far have been cited for more than 4000 times. Dr. Gao is the recent recipient of 2014 Army Young Investigator Program (YIP) award and 2016 NSF CAREER award. Dr. Gao has organized three Notre Dame Annual Soft Polymer Materials Symposia (2014-2016) and actively participate in local outreach programs for high school and community college students.



Lance Hellman, Ph.D.

*Department of Chemistry and Biochemistry
Research Scientist I
University of Notre Dame*

Dr. Lance Hellman received two B.S. degrees. The first from the University of South Carolina in biology, followed a year

later with one in cytotechnology from the Medical University of South Carolina. He then worked in the laboratory of community based hospitals prior to earning his Ph.D. from the University of Kentucky in Biochemistry. He then did his postdoctoral research at the University of Notre Dame with Dr. Brian Baker. Dr. Hellman has been a Research Scientist I at the University of Notre Dame since 2013. He is a specialist in the structural guided design of T-cell receptors. His research focuses around modulating the affinity of cytotoxic T-cell receptors that recognize malignant melanoma and in the field of cancer immunotherapy. He is knowledgeable in a variety of biophysical and biochemical techniques, along with retroviral work using human cell lines. Dr. Hellman's research has resulted in 20 publications in scientific journals and two patent applications that are pending. He has numerous collaborations both domestically and internationally. Dr. Hellman was also an Adjunct Assistant Professor at Indiana University South Bend in the Department of Chemistry and Biochemistry.



Reginald Hill, Ph.D.

*Archibald Assistant Professor of Cancer Biology
Department of Biological Sciences
Harper Institute for Cancer Research
University of Notre Dame*

Dr. Hill attended Florida A&M University and obtained a B.S. in biology with a focus in molecular biology. He then continued his education at UNC-Chapel Hill by obtaining a PhD in genetics and molecular biology in the lab of Dr. Terry Van Dyke, where he designed and created a new transgenic mouse model of prostate cancer that demonstrated the important role the microenvironment plays in tumor progression. As a Damon Runyon postdoctoral fellow with Dr. Hong Wu at UCLA, he chose to focus on pancreatic adenocarcinoma (PDAC), an under-researched disease with a high mortality rate, poor prognosis, and few therapeutic options. He developed mouse models to recapitulate the complexities of human PDAC in order to uncover new therapeutic strategies that could be translated to the human disease.

Dr. Hill has been on the faculty at Notre Dame since 2012. His lab utilizes genetic models to address fundamental questions about how cell autonomous (e.g. genetic alteration) and cell non-autonomous (e.g. inflammation) mechanisms affect pancreatic cancer development. His focus is to uncover the central mechanisms through which the microenvironment aids tumor initiation, progression, and therapeutic resistance. A better understanding of these processes will not only help the development of more effective treatments for pancreatic cancer, but can be expanded to applications in a wide range of other diseases.

Most recently, Dr. Hill's laboratory has shown that the increased expression of GRP78, the master regulator of the ER stress response, is critical for resistance to gemcitabine in PDAC. Moreover, they identified an inhibitor of GRP78, IT-139, that can overcome GRP78 mediated gemcitabine resistance *in vitro* and *in vivo*. Collectively, their data show that GRP78 expression promotes chemoresistance in PDAC and therapeutic strategies blocking the activity of GRP78 increase the efficacy of currently available therapies.



Laurie Littlepage, Ph.D.

*Campbell Family Assistant Professor of Cancer Research
Department of Chemistry and Biochemistry
University of Notre Dame*

Dr. Laurie Littlepage received her Ph.D. in Cell and Developmental Biology from Harvard University and postdoctoral training at the University of California, San Francisco. She received a B.S. in Biochemistry and a B.S. in Molecular Biology from the University of Texas at Austin.

Littlepage has been the Campbell Family Assistant Professor of Cancer Research at the University of Notre Dame in the Department of Chemistry and Biochemistry and in the Harper Cancer Research Institute since 2012. She also is an Associate Member of the Indiana University Melvin and Bren Simon Cancer Center, Breast Cancer Research Program. She was awarded the Indiana CTSI Young Investigator Award. The long-term goal of her research is to identify predictive markers and therapeutic strategies to treat and overcome metastasis and resistance to treatment of breast and prostate cancer. Her lab uses integrated biological approaches to understand how poor prognostic cancer evolves over time within physiological microenvironments and in response to treatment to defy and circumvent current therapies, both in the mammary gland and at the metastatic site. Through her research, she uses a combination of xenograft models, cell culture and organotypic culture models, and systems biology approaches. One project involves the transcription factor and oncogene ZNF217, which is amplified in 20-30% of all human breast cancers and is associated with poor prognosis and resistance to conventional therapy. Her team identified the drug triciribine as a drug that inhibits Zfp217-induced tumor burden *in vivo*. This study was the first paper to propose a role for ZNF217 in promoting metastasis, a role in expanding a stem/progenitor cell population, and the identification of a drug that can destroy these tumors. Her lab subsequently identified triciribine followed by paclitaxel as an effective treatment schedule for tumors that overexpress Zfp217. These preclinical experiments are the basis of the design of current ongoing Phase II clinical trials in metastatic breast cancer patients. Her research has been supported with grants from the National Cancer Institute/National Institutes of Health,

American Cancer Society, Indiana CTSI, Mary Kay Foundation, St. Joseph's Regional Medical Center, and Walther Foundation. She actively serves the cancer research community. She is a longtime advocate of mentoring, particularly for women and underrepresented minorities. She has designed mentoring programs, consulted with universities, and served on panels to advocate for and to expand mentoring opportunities.



Grant J. Mathews, Ph.D.

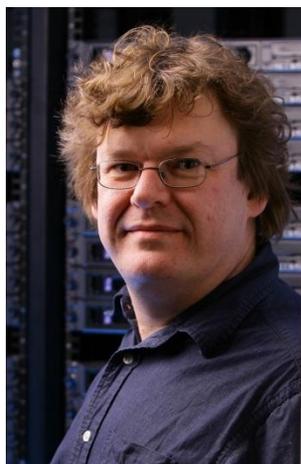
Department of Physics

Professor

Director, Center for Astrophysics

University of Notre Dame

Dr. Grant J. Mathews is a professor in the Department of Physics at the University of Notre Dame and Director of the Center for Astrophysics at Notre Dame (CANDU). He received his B.S. from Michigan State University and his PhD from the University of Maryland. After post-doctoral positions at the University of California, Berkeley and the California Institute of Technology, he joined the Physics Division of Lawrence Livermore National Laboratory obtaining the position as Group Leader in Astrophysics. He joined the University of Notre Dame in 1994 where he is currently the Director of the Center for Astrophysics. He has published over 250 papers in technical research journals and has presented over 390 colloquia, invited talks, and national and international conferences on topics in theoretical astrophysics and cosmology. He has also co-authored books on relativistic hydrodynamics and observational astronomy. He has served on various review panels for astrophysics proposals to the DoE, NSF and NASA and has served as a Siemens competition judge. His research areas include studies of black hole formation, neutron star mergers, supernovae, galaxy formation and evolution along with studies of the big bang. He most recently has taught graduate and undergraduate classes in astronomy, the general theory of relativity, quantum field theory, astrophysics, and cosmology.



Olaf Wiest, Dr. rer. nat.

Department of Chemistry and Biochemistry

Professor and Associate Chair

University of Notre Dame

Dr. Wiest received his Diplom and doctorate in chemistry at the University of Bonn (Germany), working on mechanistic and

synthetic organic chemistry. He did postdoctoral research on computational chemistry at UCLA with Ken Houk as a Feodor Lynen Fellow of the Alexander von Humboldt Stiftung.

Dr. Wiest joined the Department of Chemistry and Biochemistry at the University of Notre Dame in 1995 where he teaches organic and computational chemistry to undergraduate and graduate students. He is also a visiting professor at Peking University, Shenzhen Graduate School. His research area is the application of computational methods to a wide range of problems to organic, metalorganic, and biochemistry, often in combination with experimental studies in Prof. Wiest's laboratories or in the laboratories of one of over 20 collaborators on three continents. His more than 150 publications cover the development of a method for the prediction of stereo selectivity in transition metal catalyzed reactions, enzyme mechanisms, and the development of new drugs for rare and neglected diseases, including malaria and Niemann Pick type C. The later studies have led to an ongoing FDA approved clinical trial for this deadly inherited disease that mostly afflicts children. He also collaborates with a number of researchers at Notre Dame and elsewhere to provide computational support for a number of drug discovery projects, especially in epigenetics, and area that studies how gene expression is controlled.

Dr. Wiest is an Associate Editor of The Journal of Organic Chemistry, the premier journal in the field published by the American Chemical Society. He has been a permanent member of study section on computational biophysics at the National Institutes of Health, as well as a number of review panels for the National Science Foundation and international research foundations. He has been a consultant for to the pharmaceutical industry and has been recognized as a Dreyfus Teacher-Scholar. He is also an elected fellow of the American Association for the Advancement of Science.