EARLY CAREER RESEARCHER SYMPOSIUM 2016

ECRS

BROOKHAVEN NATIONAL LABORATORY

December 13, 2016

PROGRAM

LETTER FROM THE ORGANIZERS

Dear Guest,

Welcome and thank you for participating in the fifth annual Early Career Researcher Symposium (ECRS), presented by the Association of Students and Postdocs (ASAP).

This symposium is a showcase of the pioneering research that is performed by graduate students and postdocs at Brookhaven National Laboratory (BNL). Today the BNL early career researcher community will present their recent work through 32 oral presentations and 25 posters. This year we are featuring our first science communication lecture and workshop to assist our participants in engaging a wider audience. As with previous years, we will also have the opportunity to hear from numerous professionals across a wide range of science careers during our career panel discussions. Furthermore, in our keynote lecture, we will hear from Dr. Charles Black, a senior scientist and the director of the Center for Functional Nanomaterials here at BNL. To conclude our day the Deputy Director of Science and Technology at BNL, Robert Tribble will deliver the award ceremony and closing remarks which will be immediately followed by a networking reception for all participants.

The symposium was organized by a group of students and postdocs whose work and generous donation of time show great dedication to their fellow researchers. Financial support was provided by the Director's office and the sponsors listed on the back cover of this program. We encourage you to visit their booths throughout the day and explore the links provided on the ECRS website (https://www.bnl.gov/ecrs2016/sponsors.php). ASAP is an organization dedicated to ensuring a high quality of life for early career researchers at BNL. It is funded by Brookhaven Science Associates and supported by senior staff members. The ASAP board recognizes the importance of professional development to its members and it is in this spirit that we present the ECRS.

Thank you for your participation and support for the ECRS. We hope that you enjoy your day.

Sincerely,

The ASAP Board

Shruti Sharma

Jonathan Gentile

Prithwish Tribedy

Amber Teufel

Krithika Yethiraj

Zheng Zhang

PROGRAM SCHEDULE

8:30-9:00	**Registration** **Poster Hanging** **Breakfast**	Lobby
9:00-10:20	**Parallel Oral Sessions**	A, B, C, Auditorium
10:20-11:20	**Career Panel** Katheen Flint Ehm, PhD Kristy L. Lamb, PhD Li Liu, PhD John Millener, PhD Simona Rolli, PhD Emerson Vernon, MS, MBA	Auditorium
11:20-12:00	**Keynote Address** Dr. Charles (Chuck) Black	Auditorium
12:00-2:00	**Poster Session** **Exposition** **Lunch (on your own)**	Lobby
2:10-3:10	**Social-Science** Science Communication lecture	Auditorium
3:10-3:30	**Coffee Break**	Lobby
3:30-5:00	**Parallel Oral Sessions**	A, B, C, Auditorium
	Social-Science Science Communication workshop	Cafeteria
5:00-5:30	**Closing Remarks** Robert Tribble **Awards Presentation**	Auditorium
5:30-7:00	**Reception**	Lobby

PARALLEL ORAL SESSIONS: MORNING

	Room A Session Chair: Jiabao Zheng	Room B Session Chair: Subhash Singha	Room C Session Chair: Dhananjay Ravikumar	Auditorium Session Chair: Prithwish Tribedy
9:00-9:20	**Electrical Properties of PZT Nanofiber** *Richard Galos* Center for Functional Nanomaterials (NC)	**Accessing Gluon Polarization with Di-jets** *Brian S. Page* Physics Department (PO)	**Lipid membrane phononic gaps as an origin of mechanosensitive responses of living cells** *Dima Bolmatov* Photon Sciences (PS)	**Out of Equilibrium Sphalerons and Axial Charge Production** *Mark Mace* Physics Department (PO)
9:20-9:40	**Self-assembly of block copolymers at the polymer-solid interface** *Mani Sen* Center for Functional Nanomaterials (NC)	**Measurement of Direct Photon Cross Section and Longitudinal Double Spin Asymmetry in p+p Collisions at $\sqrt{s}$ = 510 GeV** *Zhongling Ji* Physics Department (PO)	**Sirepo – software framework for X-ray optics simulations** *Maksim S. Rakitin* Photon Sciences (PS)	**Magnetic excitations in the superconductor $La_{2-x}Ca_{1+x}Cu_2O_{6+d}$** *John A. Schneeloch* Condensed Matter Physics and Materials Science Department (PM)
9:40-10:00	**First principles study of the work function shift at the two-dimensional zeolites/ruthenium interface** *Mengen Wang* Center for Functional Nanomaterials (NC)	**J/ψ production in p+p collisions at $\sqrt{s}$ = 500 GeV at STAR experiment** *Qian Yang* Physics Department (PO)	***In-Situ* Synchrotron Investigation for Structural and Chemical Evolution of Cupric Sulfide Additive in Li-S battery** *Chonghang Zhao* Nuclear Science and Technology Department (NE)	**Electromagnon excitations in $TbFeO_3$ antiferromagnet** *Taras Stanislavchuk* National Synchrotron Light Source (LS)
10:00-10:20	**Protein Functionalized Nanopatterned Heterogeneous Surfaces** *Haoyu Wang* Center for Functional Nanomaterials (NC)	**MicroBooNE- A LArTPC Experiment** *Jyoti Joshi* Physics Department (PO)	**A new procedure for the purification of ^{82}Sr using inorganic sieves** *Ali Younes* Collider Accelerator Department (AD)	**New concept of a fixed tune Non-Scaling Fixed Field Alternating Gradient accelerator** *Malek Haj Tahar* Collider Accelerator Department (AD)

PARALLEL ORAL SESSIONS: AFTERNOON

	Room A Session Chair: Mingjie Liu	Room B Session Chair: Irakli Chakaberia	Room C Session Chair: Amber Teufel	Auditorium Session Chair: Krithika Yethiraj
3:30-3:50	**SWAD: Development of Amorphous Selenium Multi-Well Avalanche Photon Counting Detector for Mammograph** *Jann Stavro* Center for Functional Nanomaterials (NC)	**Dark Interactions and Lattice Gauge Theories** *Enrico Rinaldi* Physics Department (PO)	**A Novel One Step Method to Prepare Carboxycellulose Nanofibers from Raw Biomass and their Applications to Remediation for Heavy Metal Ions** *Priyanka Sharma* Chemistry Department (CO)	**Sample environment for *in situ* corrosion studies of zirconium and advanced steel cladding alloys in extreme environments** *Mohamed Elbakhshwan* Nuclear Science and Technology Department (NE)
3:50-4:10	**Invisible glass** *Andreas Liapis* Center for Functional Nanomaterials (NC)	**Studying photon structure at EIC** *Xiaoxuan Chu* Physics Department (PO)	**Water Oxidation Catalysis by $Ru(bda)(X\text{-}py)_2$ and $Ru(bda)(X\text{-}isq)_2$: Structure-Activity Relationship** *Yan Xie* Chemistry Department (CO)	**Synchrotron-based *In Situ* Diagnostic Studies Facilitate Material Design for Safer Lithium Ion Battery Cathode Material** *Enyuan Hu* Chemistry Department (CO)
4:10-4:30	**X-ray Amplification of Meso-scale Structures** *Julien R. Lhermitte* Center for Functional Nanomaterials (NC)	**Measurements of $W^{\pm}$ single spin asymmetries in polarized proton-proton collisions at $\sqrt{s}$=510 GeV at RHIC** *Devika S. Gunarathne* Physics Department (PO)	**Direct measurement of depth-dependent spatial resolution of scintillators at NSLS-II** *Adrian Howansky* Photon Sciences (PS)	**α-MnO_2 Nanofiber Binder-Free Self-Supporting Cathodes for Rechargeable Lithium Batteries: A Design Strategy for High Energy Density and Effective Cathode Recycling** *Altug S. Poyraz* Directorate - Energy Sciences (DC)
4:30-4:50	**Production of $^{72}Se/^{72}As$ in Clinically Relevant Quantities at the BLIP** *Anthony. J. DeGraffenreid* Collider Accelerator Department (AD)	**Cold Electronics Development for Liquid Argon TPCs** *Brian J. Kirby* Physics Department (PO)	**Symbiotic Changes In Nutrient Distribution In The Poplar Rhizosphere Observed With FTIR Imaging** *Tiffany Victor* National Synchrotron Light Source II (LT)	**$Li/Ag_2VO_2PO_4$ Batteries: The Roles of Composite Electrode Constituents on Electrochemistry** *David C. Bock* Directorate - Energy Sciences (DC)

KEYNOTE SPEAKER

Dr. Charles (Chuck) Black

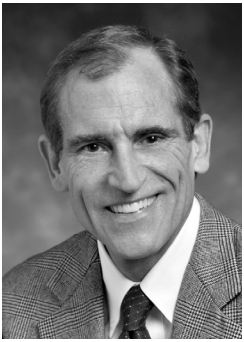
Dr. Charles (Chuck) Black is a Senior Scientist and Director of the Center for Functional Nanomaterials, a national scientific user facility operated at Brookhaven National Laboratory by the Department of Energy. The CFN has a dual mission of carrying out a world-leading program of internal research and being a preeminent nanoscience user facility. Each year the CFN supports more than 500 users from research groups around the world.

Prior to becoming Director in 2016, Dr. Black was Group Leader for the CFN Electronic Nanomaterials group for nine years, leading a research program exploring the use of nanostructured material architectures for solar energy conversion. His research interests include employing self-assembly based methods for constructing solar nanomaterials.

From 1996 to 2006, Dr. Black was a Research Staff Member at the IBM Thomas J. Watson Research Center in Yorktown Heights, New York. His research at IBM investigated using polymer self-assembly for fabrication of high-performance semiconductor electronics. During his career Dr. Black has also performed experimental research in low-temperature scanning tunneling microscopy, single-electron tunneling devices, superconductivity in metal nanoparticles, nanocrystal-based electronic devices, and ferroelectric non-volatile memories.

Dr. Black earned his Ph.D. degree in Physics from Harvard University in 1996, and has a B.S. degree in Physics and Mathematics from Vanderbilt University in 1991. He has authored more than 80 scientific publications and conference proceedings, and four chapters of books. He currently holds 46 US Patents. Dr. Black is a Member of the Board of Directors of the Materials Research Society, a Fellow of the American Physical Society, and a Senior Member of the IEEE.

CLOSING REMARKS



Robert Tribble

Robert Tribble is the Deputy Director for Science and Technology at Brookhaven National Laboratory. An experimental physicist whose work spans a broad range of topics, Tribble has conducted groundbreaking research exploring fundamental symmetries, the Standard Model, nuclear structure and reactions, nuclear astrophysics, and proton spin. He is widely credited with developing new tools and techniques that have advanced the field, and has also served as a member or chair of numerous long-range planning committees for the American Physical Society (APS) and the Nuclear Science Advisory Committee (NSAC, an advisory committee for the Department of Energy and National Science Foundation).

Tribble earned his B.S. with honors in Physics from the University of Missouri, Columbia (1969), and his Ph.D. from Princeton University (1973). He joined the Texas A&M University faculty in 1975, served as Department Head of Physics 1979-87, and has served as Director of the Cyclotron Institute since 2003. His numerous honors and awards include being named an Alfred P. Sloan Fellow (1976-80), a Fellow of the American Physical Society (1982), an honorary doctorate from Saint Petersburg State University, Russia (2009), and various awards recognizing his excellence in teaching and research.

Tribble has served as a member or chair of numerous committees for the APS and NSAC. He led the development of the most recent NSAC Long Range Plan for Nuclear Science, served on a recent Global Science Forum panel that evaluated the state of nuclear physics facilities around the world, was a member and is now chair of the International Union of Pure and Applied Physics Working Group 9, and was a member of the National Research Council decadal survey for nuclear physics, NP2010. Most recently, he chaired an NSAC subcommittee charged with making recommendations for achieving the vision of the Long Range Plan under constrained budget scenarios. In that capacity he played a key role in communicating the importance of the U.S. Nuclear Science program—including research that takes place at Brookhaven Lab's Relativistic Heavy Ion Collider—and building support for an achievable path to maintain U.S. leadership in this field.

CAREER PANEL SPEAKERS

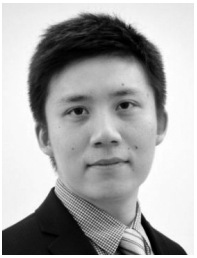
Dr. Kathleen Flint Ehm

Kathleen Flint Ehm, Ph.D., is Director of the Office for the Integration of Research, Education, and Professional Development at Stony Brook University, which includes directing the Office of Postdoctoral Affairs. Dr. Flint Ehm has over a decade's experience in postdoctoral policy and professional development, including issues related to responsible conduct of research training for postdocs, program and policy development, and fostering the advancement of postdoc women in academic science. She came to Stony Brook from the National Postdoctoral Association in Washington, DC, where she spent six years as the project manager for grant-funded initiatives. Previous to that she served as the Assistant Director of the Reinvention Center at Stony Brook, a national center focused on enhancing undergraduate education at research universities. In 2004, she spent a year in residence at the National Science Foundation where she was a Science and Technology Policy Fellow sponsored by the American Association for the Advancement of Science. There she specialized in issues concerning early-career scientists and helped manage one of NSF's newest postdoctoral fellowship programs. An astronomer by training, Dr. Flint Ehm was a Postdoctoral Fellow at Gemini Observatory North and a Carnegie Fellow at the Carnegie Institution of Washington's Department of Terrestrial Magnetism. She holds a Ph.D. in Astronomy and Astrophysics from the University of California, Santa Cruz, and a B.S. in Math and Astronomy from the University of Arizona.

Kristy Lamb

Kristy Lamb is a STEM Career Advisor at St John's University in Queens, NY. She works with undergraduate and graduate students in the basic sciences on all aspects of career development and planning, and also teaches a science course for non-science majors. Dr. Lamb earned a PhD in Genetics from Yale University in 2012, with a focus on DNA repair. During graduate school and post-doctoral studies at Weill Cornell Medical College, she was active in the administration of Women in Science and mentoring programs. She was also active in science advocacy with the American Society for Biochemistry and Molecular Biology. She is a Master Mentor with the New York Academy of Sciences Global STEM Alliance program. Based on her passion for development of sciences, Dr. Lamb joined St John's University Career Services in 2014. She is committed to the development of a diverse and well-prepared scientific workforce.

CAREER PANEL SPEAKERS



Dr. Li Liu

Dr. Li Liu is an Assistant Director for Technology and Business Development with Center for Biotechnology (CFB). Li provides technology commercialization and business development service to facilitate new venture creation and support emerging company growth. Dr. Liu is also a core member of Long Island Biosciences Hub (LIBH), which is formed after the NIH Research Evaluation and Commercialization Hub (REACH) award. Li manages the technology development fund to invest in promising therapeutics, diagnostics, medical device, research tool and healthcare IT project across Stony Brook University, Cold Spring Harbor Laboratory, Brookhaven National Laboratory, and Feinstein Institute for Medical Research and help the innovations into the commercial sector via a startup company, licensing opportunities, and/or a strategic partnership. Dr. Liu received his B.S. in Chemistry from Fudan University (China, 2007) and Ph.D. in Chemistry from Stony Brook University (2012).

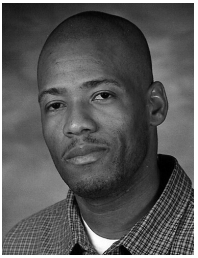
John Millener

John Millener is a BNL guest scientist who retired after 37 years with the Nuclear Theory Group. He is a shell-model theorist who came to BNL to do structure calculations for light nuclei in support of experimental work being performed at the Tandem van de Graaf facility. He also became part of an extended theoretical effort to support experimental studies of hypernuclei at the Brookhaven AGS. This work has continued to the present in support of experimental programs at Jefferson Laboratory on the electroproduction of hypernuclei and at J-PARC where the Hyperball-J is being used to study gamma-ray transitions in Lambda hypernuclei. Since 2002, he has been an associate editor handling papers on theoretical nuclear structure for Physical Review C. John earned a D.Phil in 1972 in theoretical nuclear physics as a Rhodes scholar at the University of Oxford. He spent four more years at Oxford on an IBM research fellowship before joining the nuclear theory group at BNL. He is a fellow of the American Physical Society.

CAREER PANEL SPEAKERS

Dr. Simona Rolli

Dr. Simona Rolli is a Program Manager at the U.S. Department of Energy, Office of Science, Office of High Energy Physics. She is managing federally funded programs in theoretical and experimental High Energy Physics (HEP), carried out at National Laboratories and public and private universities. With a typical yearly budget of about $800M, the Office of High Energy Physics sustains the entire HEP infrastructure in the U.S. (Energy, Cosmic and Intensity frontier experiments, Accelerator R&D, Detector R&D and Theoretical Research). Dr. Rolli moved to DOE in March 2011, after a fifteen-year career in particle physics. She obtained her Ph.D. in theoretical particle physics, in 1996, in Italy and moved to the United States, where she spent most of her scientific career at Fermi National Accelerator Laboratory (Fermilab), as an experimental Research Scientist. She co-authored more than 1000 publications in peer-reviewed journals. She is a member of the Particle Data Group Collaboration, an international collaboration charged with summarizing Particle Physics results, as well as related areas of Cosmology and Astrophysics, publishing the Review of Particle Physics.



Emerson Vernon

Emerson Vernon is a staff engineer in the Instrumentation Division at Brookhaven National Laboratory. He develops specialized mixed signal monolithic circuits for a wide range of radiation detectors for medical imaging, photon science, and homeland security applications. These circuits, also known as application specific integrated circuits (ASIC), contain several hundred thousand transistors in an area of a few square millimeters and provide many channels of low-noise charge amplification and signal processing. He received the Engineering Award for his contributions in developing custom electronics that make modern high-density and high-functionality detectors possible. Emerson is a licensed professional engineer who is currently a Ph.D. candidate in the microelectronics program at Stony Brook University. He earned his MBA from Stony Brook University in 2013, and is MS and BS from Howard University in 2002 and 2004 respectively.

POSTERS

1. Understanding polarization asymmetry and precise tuning of the built-in bias in $PbTiO_3$ based superlattice thin films
   Hsiang C. Hsing, Simon Divilov, Joe Garlow, Mohammed H. Yusuf, John Bonini, Joe Bennett, Yimei Zhu, Premala Chandra, Karin M. Rabe, Xu Du, Maria V. Fernandez Serra, Matthew Dawber*
2. *In situ* investigation of ion reconfiguration in ionic liquids under bias potential with low-energy electron and photoelectron microscopy
   Wattaka Sitaputra, Dario Stacchiola, James F. Wishart, Feng Wang, Jerzy T. Sadowski*
3. Layer-by-layer Assembly of Patchy Particles as a Route to Complex Lattice Structures
   *Niladri Patra and Alexei V. Tkachenko**
4. 2D-Zeolite for the Argon Trap
   Nusnin Akter, JianQiang Zhong, Mengen Wang, John Kestell, Ira Waluyo, Dario Stacchiola, Deyu Lu, Taejin Kim, J. Anibal Boscoboinik*
5. Time-Resolved Energy Transfer from Isolated Perovskite Nanocrystals to Single Layer Graphene
   Jia-Shiang Chen, Tennyson L. Doane, Huidong Zang, Mathew M. Maye*, and Mircea Cotlet*
6. Ionic Liquid Hybrid Electrolytes Optimize Conductivity versus Stability in Mg-ion Batteries
   Paul F. Smith, Matthew M. Huie, Christina A. Cama, Jiefu Yin, Amy C. Marschilok*, Kenneth J. Takeuchi*, Esther S. Takeuchi*
7. Synthesis of Copper Birnessite, $Cu_xMnO_y \cdot nH_2O$ with Crystallite Size Control: Impact of Crystallite Size on Electrochemistry
   Yue-Ru Li, Christopher J. Pelliccione, Amy C. Marschilok*, Esther S. Takeuchi*, and Kenneth J. Takeuchi*
8. Ligand cooperativity in CO_2 reduction by Group VII tricarbonyl complexes
   Ken Ngo, Meaghan McKinnon, David Grills*, Jonathan Rochford*
9. Manganese-Promoted Rhodium Nanocatalysts for Ethanol Production from CO Hydrogenation
   Pamela C. Carrillo, Michael G. White*
10. Near-infrared spectroscopy of ethynyl radical, C_2H.
    Anh T. Le, Gregory Hall*, Trevor Sears*
11. New Methods for Understanding Stacking Disorder in Honeycomb-Layered Batteries
    Liang Yin, Jue Liu, Jeffrey Ma, Shouhang Bo, Lijun Wu, Xiqian Yu, Seong-Min Bak, Jianming Bai, Yimei Zhu, Clare Grey*, Xiao-Qing Yang*, Peter Khalifah*

12. Parking Lot Delineation Using a Convolutional Neural Network
Daniel Cisek, Jedidiah Dale, Susan Pepper, M. Mahajan, Shinjae Yoo*

13. Ultrafast electron diffraction study of ab-plane dynamics in high-Tc superconducting $Bi_2Sr_2CaCu_2O_{8+d}$
Tatiana Konstantinova, Alexander H. Reid, Lijun Wu, Hermann A. Durr, Xijie Wang and Yimei Zhu*

14. Rate Dependent Multi-Mechanism Discharge of $Ag_{0.50}VOPO_4 \cdot 1.8H_2O$: Insights from *in-situ* Energy Dispersive X-ray Diffraction
Matthew M. Huie, David C. Bock, Zhong Zhong, Andrea M. Bruck, Jiefu Yin, Esther S. Takeuchi*, Kenneth J. Takeuchi*, Amy C. Marschilok*

15. Magnesium Birnessite as Cathode of Rechargeable Batteries: Study of Crystallite Size Effect And Cation Diffusion (Li^+, Na^+, Mg^{2+})
Jiefu Yin, Esther S. Takeuchi*, Kenneth J. Takeuchi*, Amy, C. Marschilok*

16. Improved Electrochemistry of Lithium Vanadium Oxide ($Li_{1.1}V_3O_8$) coated with Amorphous Lithium Phosphorous Oxynitride (LiPON): Impact of Material Morphology and Interfacial Structure
Qing Zhang, Andrew K. Kercher, Gabriel M. Veith, Varun Sarbad, Alexander B. Brady, Jing Li, Eric Stach, Robert Hull, Kenneth J. Takeuchi, Esther S. Takeuchi, Nancy J. Dudney*, and Amy C. Marschilok*

17. Redox chemistry of Li/$CuFe_2O_4$: A study of the Cu^{2+}/Cu^0 and Fe^{3+}/Fe^0 interconversions using X-ray absorption spectroscopy
Christina A. Cama, Christopher J. Pelliccione, Alexander B. Brady, Jing Li, Eric A. Stach, Jiajun Wang, Jun Wang, Esther S. Takeuchi*, Kenneth J. Takeuchi, and Amy C. Marschilok*

18. Investigation of Electron Transfer and Ion Transport Issues in Rechargeable Metal Ion Batteries
Jianping Huang, Altug S. Poyraz, Seung-Yong Lee, Lijun Wu, Yimei Zhu, Amy C. Marschilok*, Kenneth J. Takeuchi*, Esther S. Takeuchi,*

19. Evolution from monodomain to polydomain in ferroelectric superlattices and thin films
Rui Liu, Benjamin Bein, and Matthew Dawber*

20. Ultra-high-speed Serial Micro Crystallography at NSLS-II
Yuan Gao, Weihe Xu, Evgeny Nazaretski, and Martin R. Fuchs*

21. Local modulation of carrier density in graphene-ferroelectric field effect transistors through flexoelectric switching
Anna Gura, Mohammed H. Yusuf, Xu Du, Matthew Dawber*

22. Application of Phase Change Material to Increase Solar Panel Efficiency
Kyle D. Rose Sr., Mohan D. Aggarwal*

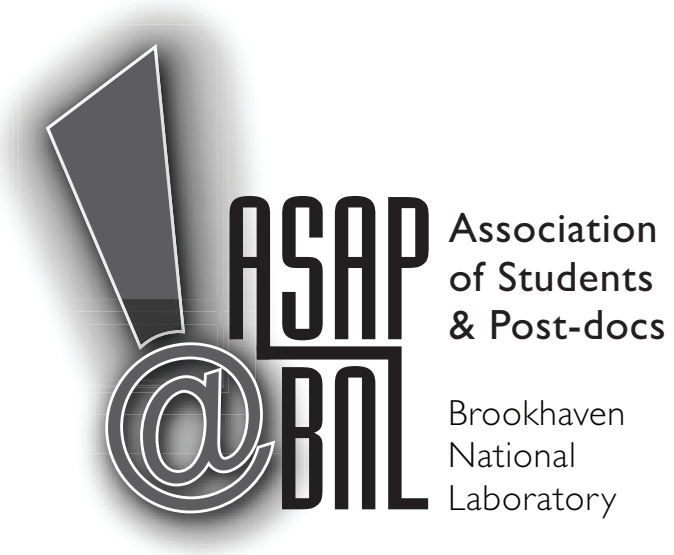
POSTERS

23. ***In Situ* XRD and Ex Situ XAS Study of Magnetite Nanoparticle Electrochemistry**
Christopher J. Pelliccione, David C. Bock, Amy C. Marschilok, Kenneth Takeuchi, Esther S. Takeuchi*

24. **Precision nanoimplantation of nitrogen vacancy centers into diamond photoniccrystal cavities and waveguides**
Jiabao Zheng, Marco Schukraft*, Tim Schröder, Sara L. Mouradian, Michael Walsh, Matthew E. Trusheim, Hassaram Bakhru, Dirk Englund

25. **Mechanistic considerations in water oxidation catalysis by ruthenium bipyridine- dicarboxylate and ruthenium bipyridine-phosphonate-carboxylate complexes**
David W. Shaffer, Yan Xie, Javier J. Concepcion*

NOTES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THANK YOU

Rick Backofen
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Andrea Dehler
Joanne Delles
Ray Dumont
Kathleen Flint Ehm
Liz Flynn
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Kristy Lamb
Li Liu
John Millner
Maria Ohlsen
Danielle Pontieri
Neil Robinson
Simona Rolli
Will Safer
Ted Sampieri
David Shaffer
Roger Stoutenburgh
Robert Tribble
Emerson Vernon
Karen Walsh
Chris Weaver
Chelsea Whyte
Stan Wong

Special thanks to all of the scientists that served as judges for the poster and oral sessions.

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