

2014 Young Researcher Symposium

PROGRAM

NOVEMBER 20, 2014



 **YRS** YOUNG
RESEARCHER
SYMPOSIUM
2014
BROOKHAVEN NATIONAL LABORATORY

Dear Guest,

Welcome and thank you for participating in the third annual Young Researcher Symposium (YRS). This symposium, organized by the Association of Students and Postdocs (ASAP), is a showcase of the excellent research that is performed by graduate students and postdocs at Brookhaven National Laboratory (BNL). Today the BNL young researcher community will present their recent work through 18 oral presentations and over 50 posters. A career panel and two distinguished lectures will complement this display of work.

In the morning, Dr. Alistair Rogers of the Terrestrial Ecosystem Science & Technology group will give a talk on "Photosynthesis, Earth Systems Models, and the Arctic." In the afternoon, Brookhaven's Deputy Director for Science and Technology, Dr. Robert Tribble, will address the symposium about "Reflections on My Career in Science, Administration and Service to the Nuclear Physics Community." Dr. Martin Schoonen, ALD of Environment, Biology, Nuclear Science & Nonproliferation, will deliver this year's award ceremony and closing remarks.

ASAP is a voluntary organization dedicated to ensuring a high quality of life for young 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 YRS.

The symposium was organized by a group of postdocs whose work and generous donation of time show great dedication to their fellow young researchers. Financial support was provided by the Director's office, ASAP, 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 YRS website.

Thank you for your participation and support for an event that is already becoming a staple of BNL life. We hope that you enjoy your day.

Sincerely,

The ASAP Board



Christina Swinson



Marta Kowalczyk



Benedetto Di Ruzza

9:00 – 9:25	Coffee and pastries Registration Poster hanging	Lobby
9:30 – 9:50	Parallel Oral Sessions	A,B,C
9:50 – 10:10	Parallel Oral Sessions	A,B,C
10:10 – 10:30	Parallel Oral Sessions	A,B,C
10:35 – 11:30	Morning Keynote Address Dr. Alistair Rogers	Auditorium
11:30 – 12:30	Career Panel Greg Recine, Ágnes Mócsy, Simona Rolli, Charles Black, Diane Zhong	B
12:30 – 2:30	Poster Session 12:30 – 1:30: Odd numbered posters 1:30 – 2:30: Even numbered posters Exposition Lunch (on your own)	Lobby
2:30 – 2:50	Parallel Oral Sessions	A,B,C
2:50 – 3:10	Parallel Oral Sessions	A,B,C
3:10 – 3:30	Parallel Oral Sessions	A,B,C
3:35 – 4:30	Afternoon Keynote Address Dr. Robert Tribble	Auditorium
4:30 – 5:00	YRS Closing Remarks Dr. Martin Schoonen Awards Presentation	Auditorium
5:00 – 6:30	Reception	Lobby

ROOM A

Session Chair: Arbin Timilsina

Block copolymer-based design of highly sensitive SERS substrates with enhancement factors exceeding 10 billion

Atikur Rahman (Center for Functional Nanomaterials, BNL)

9:30-9:50 AM

ROOM B

Session Chair: Olivia Donaldson

Application of Modulation Techniques to In Situ X-ray Diffraction

Goknur Tutuncu
(Photon Sciences, BNL)

Computational Investigation of Reversible Hydrogen Storage by Biomimetic Half-Sandwich Cp*Ir(III) Complexes

Mehmed Ertem (Chemistry Department, BNL)

9:50-10:10 AM

ROOM C

Session Chair: Samema Sarowar

Fabrication and Characterization of Smart CNT-based Tips for Synchrotron Assisted STM

Hui Yan
(Photon Sciences, BNL)

Aerosol Absorption Detection using Photothermal Interferometry (PTI)

Paulo Castillo (Environmental Sciences Department, BNL)

Size Resolved measurements of aerosol hygroscopicity and mixing state during Green Ocean Amazon (GoAmazon) 2014

Ryan Thalman (Environmental Sciences Department, BNL)

10:10-10:30 AM

Nanopattern Multi-Well Selenium Detectors: towards realizing large-area avalanche with picosecond time-resolution

Amir H. Gordan (Center for Functional Nanomaterials, BNL)

Phase transition of super-cooled quark gluon plasma

Shu Lin
(Physics Department, BNL)

AFTERNOON SESSIONS

ROOM A

Session Chair: Kristine Horvat

Fe(Te,Se): Neutron Scattering, Magnetism, and Superconductivities
John Schneeloch (Condensed Matter Physics and Materials Science Department, BNL)

2:30-2:50 PM

ROOM B

Session Chair:
 Marco Aurelio Liuthevicene Cordeiro

In-situ TEM Studies of Single-Particle Electrochemistry in Solid and Liquid Electrochemical Cells
Khim Karki (Sustainable Energy Technologies Department, BNL)

Sample environment for in situ corrosion studies of zirconium and advanced steel cladding alloys in extreme environments

Mohamed Elbakhshwan
 (Nuclear Science and Technology Department, BNL)

2:50-3:10 PM

Tuning Charge-discharge Induced Unit-cell-breathing for Layer-structured Cathode Materials for Lithium-ion Batteries
Yong-ning Zhou (Chemistry Department, BNL)

3:10-3:30 PM

ROOM C

Session Chair: David Sprouster

The Future Frontier of High Energy Nuclear Physics: eRHIC
Richard Petti
 (Physics Department, BNL)

Diamond-Based Transmission X-ray Imaging Detector — Electronics Design

Wenxiang Ding
 (Instrumentation Division, BNL)

In operando imaging phase transformation evolution of battery materials with hard X-ray microscopy
Jiajun Wang (National Synchrotron Light Source, BNL)

Dr. Alistair Rogers



Dr. Alistair Rogers is a biologist of Biological, Environmental & Climate Sciences Department of Brookhaven National Laboratory. He currently leads the Terrestrial Ecosystem Science & Technology (TEST) Group.

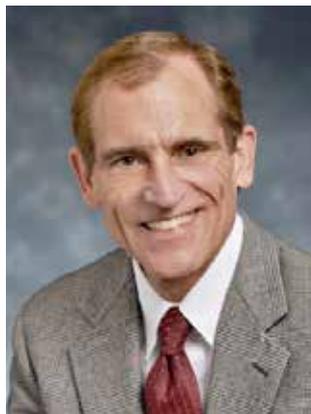
Dr. Rogers began his research career studying the physiological, biochemical and molecular acclimation of plants to growth at elevated CO₂. His research is currently focused on increasing mechanistic understanding of the physiological processes that impact plant responses to global change, and representation of that process

knowledge in Earth System Models. He is also interested in whole plant carbon and nitrogen interactions, source-sink balance, and the manipulation of carbon and nitrogen partitioning to improve biofuel feedstocks.

Dr. Rogers is a member of the editorial advisory board of *Global Change Biology*. He is also a member of the Geophysical Union, the American Society of Plant Biologists and the Ecological Society of America. He received the Outstanding Mentor Awards from the Department of Energy, Office of Science, Undergraduate Research Programs in 2002, 2004, and 2009.

Dr. Rogers received a bachelor's degree of science from the University of Wales, UK with a double major on Biochemistry and Botany in 1994. He earned his Ph.D. in Biology at the University of Essex, UK in 1998.

Dr. Robert Tribble



An experimental physicist with a broad range of topics, Dr. Robert 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.

Dr. 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).

Dr. Tribble has served as a member or chair of numerous committees for the American Physical Society (APS) and Nuclear Science Advisory Committee (NSAC) for DoE and NSF. 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, and is now chair of the International Union of Pure and Applied Physics Working Group 9. 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 and building support for an achievable path to maintain U.S. leadership in this field.

Dr. Greg Recine



Dr. Recine is the Director of Physical Sciences, Sustainability, and Engineering (PSS&E), assisting in promoting societal education concerning the challenges and opportunities facing humanity in the PSS&E arena, both near and long term. Prior to joining the Academy, Greg was a member of the Physics & Engineering Physics faculty of Fordham University and holds a Research

Professor appointment at NYU's Polytechnic School of Engineering. Dr. Recine holds a B.S. in Physics from Rennsselear Polytechnic Institute, a M.S. in Electrical Engineering from Manhattan College, a Ph.D. in Physics from Stevens Institute of Technology and held a joint postdoctoral appointment at the University of Virginia and North Carolina State University. His area of expertise is computational physics and his recent work has focused on the design of nanoscale chemical/biological sensors and devices.

Dr. Ágnes Mócsy



Dr. Mócsy is a tenured professor at Pratt Institute and guest researcher at BNL. After her Ph.D. from the University of Minnesota, a postdoc at the Niels Bohr Institute, a Humboldt Fellowship in Frankfurt, she spent three years with the RIKEN BNL theory group. She made groundbreaking contributions in finite temperature

QCD and is an expert on quarkonium in nuclear collisions as probe of the quark-gluon plasma. She is a passionate advocate for the sciences giving public lectures, lobbying Congress on behalf of Nuclear Sciences, and developing projects where art students work with scientists to unfold a richer vision of nature. These include the animated video "Sound of the Little Bang", an Op-Doc "Smashing Matters", and "Glamorous Gluons", an art exhibit on display in the Physics Department.

Dr. Simona Rolli



Dr. Simona Rolli is a Program Manager at the US Department of Energy, in the Office of Science, Office of High Energy Physics. She is overseeing federally funded programs in theoretical high energy physics and experimental particle physics, carried out at National Labs and public and private universities. She moved to

DOE in March 2011, after a fifteen year career in particle physics.

Continues on next page

Dr. Simona Rolli continued from previous page

She obtained her Ph.D. in theoretical particle physics from the University of Pavia, Italy, in 1996 and spent most of her career at Fermilab, as a member of the Tevatron CDF Collaboration and at CERN as a member of the ATLAS Collaboration at the Large Hadron Collider. She has more than 900 publications in peer-reviewed journals.

She is a member of the Particle Data Group Collaboration, an international collaboration charged with summarizing Particle Physics, as well as related areas of Cosmology and Astrophysics, publishing the Review of Particle Physics.

Dr. Charles Black



Dr. Black earned a Ph.D. in physics from Harvard University in 1996. He then worked as a research staff member at the IBM Thomas J. Watson Research Center in Yorktown Heights, NY, from 1996 until 2006. Black joined the Center for Functional Nanomaterials (CFN) at Brookhaven Lab in 2006, where he is a scientist and group leader for Electronic Materials. He has authored more than 60 published scientific papers, and currently holds 25 U.S. patents.

His research interests include incorporating nanostructured materials and self-assembly approaches into thin-film photovoltaic and photoelectrochemical devices. He is responsible for nanofabrication, materials synthesis, and thin-film materials and devices capabilities of CFN.

Dr. Diane Zhong



Dr. Zhong is an analytical scientist II at BASF corporation. She earned her Ph.D. in chemistry from University of Washington in 2012, and then joined BNL as a research associate until August 2014. She also served one year in 2013 as a vice president of BNL association of students and postdocs (ASAP).

She is an inorganic chemist with seven years experience developing metal oxide semiconductors for energy-related applications. She has strong background in inorganic material synthesis and characterization, including ALD, CVD, sol-gel, chemical bath deposition, electrodeposition, chemical etching, SEM/EDX, XRD, AFM, ICP-MS, ellipsometry, UV-vis, photocurrent action, magneto-optical, and Raman spectroscopies. She pioneered research on composite catalyst / semiconductor photoanodes with initial report on cobalt catalyst-modified iron oxide cited over 200 times since 2009.

1. **Nikea :A user-focused data analysis toolbox for all X-ray techniques**
*Sameera Abeykoon, Eric Dill, Thomas Caswell, Gabriel Iltis, Li Li, Stuart Wilkins**
2. **Structural and functional study of a Proteasome Assembly Chaperone 2 homologue in Mycobacterium tuberculosis**
*Lin Bai, Tong Wang, Hongjun Yu, Huilin Li**
3. **Preparation and Characterization of Photolabile Nanomaterials for Organic Photovoltaics**
*Deokkyu Choi, Pawel Majewski, Kevin Yager, Robert B. Grubbs**
4. **Diamond-Based Transmission X-ray Imaging Detector - Electronics Design**
*Wenxiang Ding, Tianyi Zhou, Mengjia Gaowei, Erik Muller, Jen Bohon, John Smedley, Gianluigi De Geronimo**
5. **Synchrotron X-Ray diffraction characterization to elucidate oxidation of advanced steel cladding alloys; APMT and Alloy-33**
*Mohamed Elbakhshwan, Simerjeet Gill, Raul Rebak, Lynne Ecker**
6. **Ferro-orbital order and unexpected phonon scattering in the iron chalcogenide superconductor family**
*David Fobes, Igor A. Zalizniak, Zhijun Xu, Genda Gu, John M. Tranquada**
7. **Rotational angular momentum dependence of inelastic rate constants for CN-Ar and CN-He collisions**
*Damien Forthomme, Paul J. Dagdigan, Hua-Gen Yu, Gregory E. Hall**
8. **Growth of Turbostratic Graphene on Ni (111) through Physical Vapor Deposition**
Joseph A. Garlow, Lawrence Barrett, Yimei Zhu, Javier F. Pulecio
9. **Understanding the Misfolding Pathway in a Cell Culture Model of ALS Using Real-time FTIR Imaging**
Paul Gelfand, Randy Smith, David R. Borchelt, Lisa M. Miller
10. **New Insight in the Metabolon Formation of P450s in Lignin Biosynthesis**
*Mingyue Gou, Xuebin Zhang, Chang-Jun Liu**
11. **Synthesis and optical behavior in nanoscale novel luminescent CdSe QDs – rare earth activated metal oxide composite heterostructure**
*Jinkyu Han, Lei Wang, Stanislaus S. Wong**
12. **An Improved Ratio-based (IRB) Batch Effects Removal Algorithm for Cancer Data in a Co-analysis Framework**
Shuchu Han, Hong Qin, Dantong Yu
13. **Discovering Disproportionation Reaction in Sodium-Ion Batteries**
Kai He, Yongning Zhou, Peng Gao, Liping Wang, Nathalie Pereira, Glenn G. Amatucci, Kyung-Wan Nam, Xiao-Qing Yang, Yimei Zhu, Feng Wang, Dong Su
14. **Improved Mechanical Behavior with Multicomponent Nanocomposite Hydrogels**
Wendy Ham, Surita R. Bhatia
15. **Investigating Carbon Dioxide and Methane Hydrate Growth Using X-ray Computed Microtomography**
Kristine Horvat, Devinder Mahajan, Keith Jones
16. **The effect of chloride anions on the formation and reactivity of nanoporous silver catalysts for CO₂ electroreduction**
*Yu-Chi Hsieh, Sanjaya D. Senanayake, Yu Zhang, Wenqian Xu, Dmitry E. Polyansky**

17. **Dynamical artifacts in Bragg coherent diffractive imaging**
Wen Hu, Xiaojing Huang, Li Li, Yong S. Chu, Hanfei Yan
18. **Diverse Power Iteration Embeddings and Its Applications**
Hao Huang, Shinjae Yoo, Dantong Yu, Hong Qin
19. **Phase retrieval with the transport-of-intensity equation in an arbitrarily-shaped aperture by iterative discrete cosine transforms**
Lei Huang, Chao Zuo, Weijuan Qu, Anand Asundi, Mourad Idir
20. **Bright Muon Beams for Future High Energy Physics Experiments**
Hisham Kamal Sayed, J. S. Berg, R. B. Palmer
21. **First-Principles Approach for Energy Level Alignment at Aqueous Semiconductor Interfaces**
Neerav Kharche, James T. Muckerman, Mark S. Hybertsen
22. **Atomic-scale physics of the d-form factor density wave in underdoped cuprate high-temperature superconductor**
*Chung Koo Kim, Kazuhiro Fujita, Mohammad H. Hamidian, Stephen D. Edkins, Inhee Lee, Hidenori Takagi, Hiroshi Eisaki, Shin-Ichi Uchida, Michael J. Lawler, Eun-Ah Kim, Subir Sachdev, J. C. Séamus Davis**
23. **Seeking the Source of Dramatic Conductivity Enhancement of $\text{Ag}_2\text{VO}_2\text{PO}_4$**
Kevin C. Kirshenbaum, David C. Bock, Amy C. Marschilok, Kenneth J. Takeuchi, Esther S. Takeuchi
24. **Theoretical investigation of hydrogen production by ruthenium complexes with a proton-responsive ligand: Spectroscopy and thermochemistry**
Marta Kowalczyk, Lele Duan, Etsuko Fujita, James T. Muckerman
25. **Collisionally-Mediated Singlet-Triplet Crossing in $\tilde{a}^1\text{A}^1 \text{CH}_2$ revisited: (010) coupling**
Anh T. Le, Gregory Hall, Trevor Sears
26. **DNA-assisted photoinduced charge transfer between a cationic polyphenylene vinylene and a cationic fullerene**
Zhongwei Liu, Young Il, Park, Cheng-Yu Kuo, Young-Shin Park, Hsinghan Tsai, Jennifer Mar-tinez, Andrew Shreve, Prahlad Kumar Routh, Mircea Cotlet, Hsing-Lin Wang
27. **CMOS Lifetime Study at 300K and 77K**
Jie Ma, Shaorui Li, Veljko Radeka, Gianluigi De Geronimo
28. **Oxidation of nanoscale Au-In alloy particles**
Cristina Medina, Eli Sutter, Peter Sutter
29. **Improving the photocatalytic H_2 and O_2 evolution from water of reduced titania (TiO_{2-x}) by hydrogenated graphene**
*Thuy-Duong Nguyen-Phan, Si Luo, Wenqian Xu, Eric A. Stach, Dmitry E. Polyansky, Sanjaya D. Senanayake, Etsuko Fujita, José A. Rodriguez**
30. **Dynamic Tuning of DNA Grafted Nanoparticle Superlattices using a Molecular Intercalator**
Suchetan Pal, Yugang Zhang, Oleg Gang

31. **Cloud Detection and Tracking for Solar Forecast using Sky Imagers**
Zhenzhou Peng, Shinjae Yoo, Dong Huang, Dantong Yu
32. **Study of a Mini-Drift GEM Detector with Chevron Readout Design**
*Michael Phipps, Bob Azmoun, Martin Purschke, Craig Woody**
33. **Controlling the Metal-Insulator Transition Path of VO₂ with Epitaxial Strain**
Nicholas F. Quackenbush, Hanjong Paik, Darrel G. Schlom, Louis F. J. Piper
34. **Considering exotic electronic systems hydrodynamically**
T. J. Reber, J.D. Rameau, H.-B. Yang, S. Campbell, S. Akhanjee, G. Gu, P.D. Johnson
35. **Chaperoning Bacterial Pili Assembly and Secretion**
Samema Sarowar, David Thanassi, Huilin Li
36. **Avalanche Amorphous Selenium Photo Sensor for Medical Imaging**
James R. Scheuermann, Amir H. Goldan, Ming Lu, Olivier Tousignant, Wei Zhao
37. **Tuning the reactivity of molecular water oxidation catalysts**
David W. Shaffer, Javier J. Concepcion
38. **Thermodynamics of open strange and charm hadrons at the freezeout**
Sayantana Sharma, Alexei Bazavov, Heng-T. Ding, Prasad Hegde, Olaf Kaczmarek, Frithjof Karsch, Edwin Laermann, Yu Maezawa, Swagato Mukherjee, Hiroshi Ohno, Peter Petreczky, Christian Schmidt, Wolfgang Soeldner, Mathias Wagner*
39. **Optimizing Circuit Allocation for Bandwidth Reservations in Dynamic Virtual Circuit Networks**
Li Shi, Sushant Sharma, Dimitrios Katramatos, Dantong Yu
40. **Structural characterization of nano-precipitates in irradiated reactor pressure vessel steels**
D. J. Sprouster, J. Sinsheimer, S. Ghose, E. Dooryhee, P. Wells, Y. Wu, G. R. Odette, M. A. Sokolov, L. E. Ecker
41. **Frequency-Comb Referenced Spectroscopy in the $\nu_1 + \nu_3$ Combination Band of Acetylene**
Sylvestre Twagirayezu, Matthew J. Cich, Trevor J. Sears, Christopher P. McRaven, Damien Forthomme, Gregory E. Hall*
42. **Optimizing Bioenergy Production by Imaging Nutrient Exchange in the Plant Root Rhizosphere using Infrared Microspectroscopy**
Tiffany W. Victor, Natalie A. Delpratt, Leland J. Cseke, Lisa M. Miller
43. **Anomalous Disorder-Induced Band Gap Widening in Lone Pair Active Semiconductors**
Matthew J. Wahila, Zachary Lebens-Higgins, Shawn Sallis, Louis F. J. Piper, Keith T. Butler, Christopher Hendon, Aron Walsh
44. **Conversion of $[\text{Ru}(\text{bpy})(\text{tpy})(\text{OH}_2)]^{2+}$ to $[\text{Ru}(\text{bpy})(\text{tpy})\text{H}]^+$**
*William M. Ward, Dmitry E. Polyansky**
45. **Adsorption Characteristics and Size/Shape Dependence of Pt Clusters on CdS Surface**
Shangmin Xiong, Eric B. Isaacs, Yan Li
46. **Unravelling the Catalytic Structure-Activity relationship using in situ methods: Redox-Mediated Reconstruction of Copper during Carbon Monoxide Oxidation**
Fang Xu, Kumudu Mudiyansele, Ashleigh E. Baber, Markus Soldemo, Jonas Weissenrieder, Michael G. White, Darío J. Stacchiola

47. **Solar Irradiance Forecasting using Total Sky Imager and Numerical Weather Prediction**
Jin Xu
48. **A MEMS-based device used for alignment and manipulation of MLL x-ray focusing optics**
*Weihe Xu, Kenneth Lauer, Hui Yan, Yong S. Chu, Evgeny Nazaretski**
49. **A near complete crystal structure of the Mycobacterial proteasomal ATPase Mpa provides insight into its function**
Shaoqing Yang, Lin Bai*, Weili Zhang, Defeng Li, Tao Wang, Huilin Li*
50. **Synthesis and characterization of random and block copolymers for surface-patterning applications**
Daniel H. Yi, Charles T. Black, Robert B. Grubbs
51. **Simulation of Beam-Induced Plasma in Gas Filled Cavities**
Kwangmin Yu, Roman V. Samulyak, Katsuya Yonehara, Ben Freemire, Albin Tollestrup, Moses Chung
52. **Core-Shell Nanocatalysts Synthesized by Atomic Layer Coating in Ethanol for Fuel Cell Applications**
Yu Zhang, Yu-Chi Hsieh, Dong Su, Vyacheslav Volkov, Rui Si, Lijun Wu, Yimei Zhu, Wei An, Ping Liu, Ping He, Siyu Ye, Radoslav R. Adzic, Jia X. Wang
53. **Kelch Repeat F-box Proteins Regulate Phenylpropanoid Biosynthesis via Controlling the Turnover of Phenylalanine Ammonia-Lyase**
*Xuebin Zhang, Mingyue Gou, Chang-Jun Liu**
54. **Large bulk resistivity and superconductivity induced by the In substitution into the topological crystalline insulators (Pb,Sn)Te**
Ruidan Zhong, John A. Schneeloch, John M. Tranquada, Genda Gu

Thank You

Sam Aronson	Justin Eure	Greg Recine
Rick Backofen	Liz Flynn	Alistair Rogers
Charles Black	Pete Genzer	Simona Rolli
Noel Blackburn	Erin Gettler	Thomas Roser
Tiffany Bowman	Joseph Gettler	Theodore Sampieri
Scott Bronson	Doon Gibbs	Martin Schoonen
Terrence Buck	Adrian Gozar	Roger Stoutenburgh
Chris Carter	James Green	Robert Tribble
CEGPA	Colleen Michael	Chris Weaver
Ruth Comas	Ágnes Mócsy	Stan Wong
Joanne Delles	Danielle Pontieri	Diane Zhong
James Dickerson	Alex Reben	

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

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