



NQPI Member Caps Productive Year with Two International Awards

After winning two prestigious awards, publishing 25 academic papers in the last year, including three in *Nature Communications*, and being granted a visiting professorship, one NQPI member will spend his summer traveling to Canada, China and Singapore to conduct research.

Alexander "Sasha" Govorov, a professor of physics and astronomy at Ohio University, was appointed to the Chang Jiang Chair Professorship of the Scholar Program of the Ministry of Education of China for 2014 to 2017. Each year, 100 distinguished professors are appointed to the program.

In May, Govorov will travel to two research institutes in China, the Institute of Semiconductors of the Chinese Academy of Sciences in Beijing and the University of Electronic Science and Technology in Chengdu, to begin collaboration on research projects concerning nanostructures made with lithography and molecular beam epitaxy.

He will then spend June and July in Montreal at the Energy Materials Telecommunications Research Centre at INRS (Institut National de la Recherche Scientifique), one of the top-ranking scientific research institutions in Canada, studying ways to optimize quantum dots made from novel materials.

Govorov is also the recipient of the 2014 Jacques-Beaulieu Excellence Research Chair Award. Created by the INRS Energy Materials Telecommunications Research Centre, this award seeks to foster cutting-edge research in optics, photonics, telecommunications, advanced materials and energy.

"This research center works a lot on solar energy and tailored injecting

rates of carriers. We (Govorov, Federico Rosei and Alberto Vomiero) already have one paper together on solar cells with special properties.

We use nanostructures, namely quantum dots, of certain compositions that are made from special materials. We try to optimize these materials and find materials of the right properties. This is a very challenging task, to make it efficient. Materials don't allow us to create solar cells yet with a high efficiency. It is an unsolved challenge," he said.



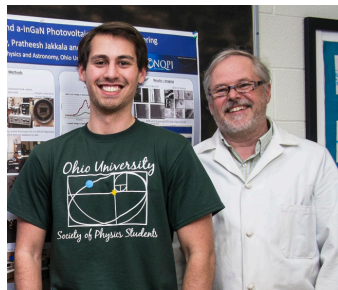
Professor Alexander Govorov will spend this summer on an international research trip. Photo by Jean Andrews.

Finally, Govorov will travel to Singapore in August for a visiting professorship at Nanyang Technological University in Singapore, a research-intensive public university with more than 32,000 students, where he will conduct research on light emitting diode (LED) devices. ✨

NQPI Student Wins 3-Year NSF Graduate Research Fellowship

An NQPI student researcher has received a prestigious National Science Foundation (NSF) graduate research fellowship totaling \$132,000.

Austin Way, an Honors Tutorial College senior majoring in Engineering Physics, is the recipient of a 2014 NSF Graduate Research Fellowship Program (GRFP). Fellows receive a three-year annual stipend of \$32,000, along with an additional \$12,000 a year for educational expenses.



NSF Fellowship Winner Austin Way is shown with his adviser, Physics and Astronomy Professor Martin Kordesch. Photo by Rob Hardin.

GRFP fellowships are awarded to outstanding graduate students pursuing advanced, research-based degrees in NSF-supported science, technology, engineering and mathematics disciplines. NSF received more than 14,000 applications and awarded 2,000 fellowships during the 2014 competition.

Unlike regular graduate assistants, NSF fellows have the freedom to attend any accredited U.S. institution with a graduate program and to pursue

research of their own choosing. Way's research will focus on low-temperature deposition and growth techniques for graphene.

"Graphene is kind of a pet interest of mine. There's a lot of interesting applications for this material, but there's not enough known about the growth side of making large-scale growth cheaply and making it very easy to work with and manipulate. My research proposal was on the fabrication of graphene, so basically using physical vapor deposition and etching to go from an iron-enriched carbon char to a sheet of graphene," he said.

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STUDENT AWARDS

Several NQPI students receive prestigious local awards - pg. 2

TWO-TIME NASA FELLOWSHIP WINNER

Weaver's research holds potential for deep space travel - pg. 3

FAREWELL TO ARTHUR SMITH

Smith reflects on his nine years of service as NQPI director - pg. 4



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Director's Corner



Dear Colleagues,

Greetings! It's my privilege to welcome you to the 11th edition of the newsletter and to update you on the status of the institute. Since being elected director

in February, I have been discussing ways to continue the success of the institute achieved through initiatives such as the Graduate Education and Research Board (GERB), Nano Forum, the institute website, and infrastructure investments such as the helium liquefier facility.

Much of my role will involve supporting the already successful programs and collaborations that have developed over the years. There will also be many new opportunities, including the proposed Interdisciplinary Science Facility, which will clearly impact NQPI members as well as provide an opportunity for a shared facility for NQPI as a whole. As a member of the initial planning committee, I am in a good position to advocate for the interests of NQPI and its members.

Recently, the College of Arts & Sciences has undertaken an initiative to create Curricular Themes that will "provide a vehicle for revitalizing student understanding and enthusiasm for Ohio University's breadth of knowledge requirements while improving the coherence of the curriculum." Members of the institute are currently involved in the theme, "From Fire to iPhone: The Technological Human." We will continue to look for ways to involve the institute in this curricular development.

One of the comments made in the most recent review of the institute was that improvement could be made in broader involvement of the members. I would like to help as many members as possible take full advantage of NQPI's resources, which will strengthen the institute and advance NQPI in new and exciting directions.

Lastly, I would like to thank Art Smith for his dedicated service as director of NQPI for the past 9 years. It is because of Art's tireless work for the institute that I can say that the state of the institute is strong. Thanks, Art!

Eric Stinaff, NQPI Director

NanoBytes

Grants and Announcements

NQPI will host the fifth Spin-Polarized Scanning Tunneling Microscopy International Conference at Huron, Ohio, from July 15-19. For more information, visit www.spstm.org.

Alexander Govorov received \$140,000 from Rice University to study coherent effects in hybrid nanostructures for lineshape engineering of electromagnetic media.

Martin Kordesch was awarded \$45,000 from National Nanomaterials Inc. to study a field emission X-ray source for blood decontamination.

Savas Kaya held the grand opening of the interactive nanoscience laboratory, the nano stUdio, in March.

Gang Chen and Eric Masson were promoted to the rank of associate professor and received tenure during the 2013-2014 academic year.

For a full list of grants as well as publications, please visit www.ounqpi.org.

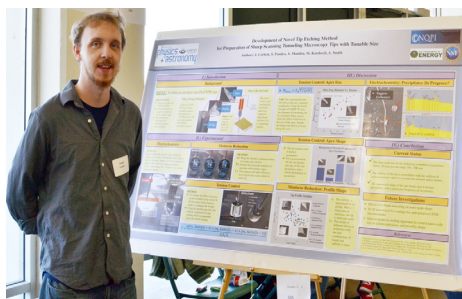
NQPI Student Researchers Bring Home Local Awards



The winners of the CMSS/NQPI Joint Poster Session are: 1st row, L to R, Maj, S., & Johnson, S. 2nd row, L to R, Khadka, S., & Aleithan, S. 3rd row, L to R, Asmar, M., & Thota, R. 4th row, L to R, Krupa, S., & Schleich, K. 5th row, L to R, Mandru, A., Stinaff, E., & Amro, R. Last row, L to R, Wang, L., Alam, K., & Pandya, S.

NQPI's student researchers won several awards during April at the Condensed Matter and Surface Science Program (CMSS)/NQPI Joint Poster Session and Ohio University's Student Expo competition.

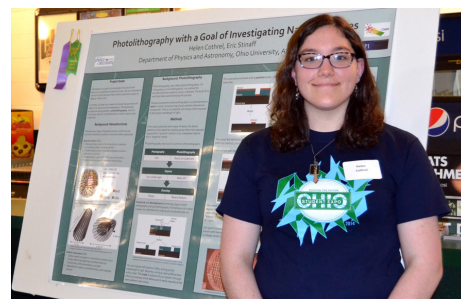
Forty-two posters were presented during the CMSS/NQPI Joint Poster Session. The winners are pictured to the left.



Joseph Corbett, a physics Ph.D. student, presents his second place poster on the development of a novel tip etching method for scanning tunneling microscopy at the 2014 Student Expo.

The following NQPI students also won awards during Ohio University's 2014 Student Expo: Helen Cothrel, Komal Garg, Chandrasiri Ihalawela, Andrada-Oana Mandru, Ameneh Mohammadalipour, Vedasri Vedharathinam, Santosh Vijapur, and Austin Way; 1st place; and Joseph Corbett; 2nd place.

For a complete list of winners, visit www.ounqpi.com/articles. ✨



Helen Cothrel, an undergraduate physics student, received first place for her presentation on the investigation of nanostructures using photolithography at the 2014 Student Expo.

Weaver Wins NASA Fellowship Two Years in a Row

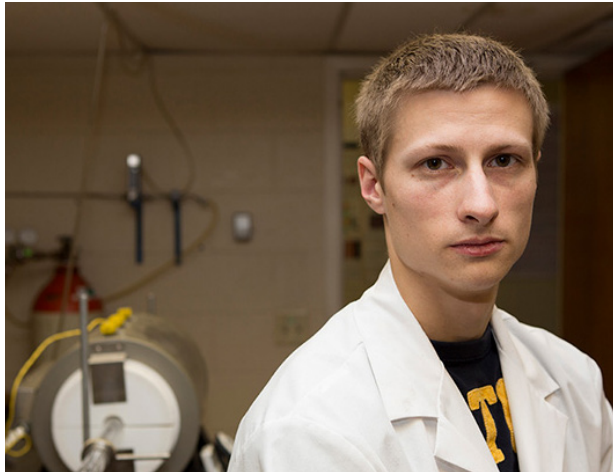
NASA has set a goal of humans setting foot on Mars during the 2030s. One day, that interplanetary space voyage could be made safer by the research of an Ohio University student.

Matt Weaver, a senior electrical engineering major in the Russ College of Engineering and Technology, is the two-time recipient of NASA's Space Technology Research Fellowship. The grant is awarded to student research with significant promise to contribute to NASA's goal to create innovative space technologies.

Weaver has been conducting nanoengineering research with NQPI Member Wojciech Jadwiszczak, an associate professor of electrical engineering, for three years. They are developing a boron nitride-based nanomaterial, a phosphor that will generate deep ultraviolet light (UV), which can be used in water treatment and sterilization.

NASA's interest in this project comes from the potential benefits to deep space travel. In essence, the light disrupts the DNA of living organisms, like viruses and bacteria, which prevents them from reproducing. The new phosphor could one day replace

mercury, a neurotoxin that is used in fluorescent lamps to recycle wastewater into clean water. The new phosphor could allow water to be treated without the potentially harmful effects of mercury-based technology, which would be far safer for astronauts in deep space travel.



Matt Weaver, a senior electrical engineering major, conducts research with potential benefits for deep space travel. Photo by Rebecca Miller/Russ College.

"If a mercury-based, ultraviolet lamp breaks and it vents mercury when you are in the middle of space, and you have nowhere to go, you are in trouble," Weaver explained. "On top of that, mercury lamps are more susceptible to

ionization energy that is found in deep space travel. Humans do not have the layers of atmosphere to protect us from ionization energy in space like we do on Earth. Boron nitride is not as susceptible to ionization, so the risk is lessened."

This research is still in the development phase, where Weaver has been using a ball mill purchased with his \$4,000 in NASA fellowship money and additional funding from Russ College to learn how to produce a higher quality boron nitride in a more efficient and cost effective way.

In order to create the phosphor, the researchers grind boron nitride (BN) down to a manageable nanoscale, mix the material with ethanol to produce an "ink" that is then heated. The heat converts the material into a crystalline material, the BN phosphor, which produces UV light under impact excitation.

The group has also been testing four possible applications to substrates to determine which one will be used to create the phosphor materials for testing in the deep UV-spectrum. This technology may one day be used to replace mercury in fluorescent lamps. ✨

Way, from page 1

Way's Ohio University research has focused on fabrication techniques for amorphous Indium Gallium Nitride and amorphous silicon solar cells using a sputtering method, and whether these techniques can create reasonable solar cell efficiency.

"Austin was interested in solar cells from the first day I met him. He is enthusiastic and positive in the lab. He is always thinking about the experiment and finding ways to improve the process or get around obstacles. I am very proud of Austin," said Physics and Astronomy Professor Martin Kordesch, who served as Way's thesis adviser.

Way will begin research in June with Assistant Professor Michael Arnold at the University of Wisconsin-Madison, where he will begin studies for a Ph.D. in Material Sciences and Engineering this fall. ✨

Andrew DiLullo Wins Second NQPI Outstanding Dissertation Award

NQPI is proud to announce Andrew DiLullo as the second recipient of the Outstanding Dissertation Award. He will receive a \$500 prize for his dissertation entitled "Manipulative Scanning Tunneling Microscopy and Molecular Spintronics."

DiLullo is currently a post-doctoral researcher in the Electronic and Magnetic Materials and Devices Group at Argonne National Laboratory in Illinois. DiLullo received his Ph.D. in Physics from Ohio University in 2013, where he worked with Saw-Wai Hla, a physics professor who served as DiLullo's dissertation adviser.

"Andrew has shown an incredible ability to adjust in different working environments and produce groundbreaking results in every place he has been doing research during his Ph.D.

study. He has produced a top rate Ph.D. thesis work in international standard," Hla said.

DiLullo was nominated by Physics Professor Sergio Ulloa. To be eligible for this award, the student must work in one of NQPI's groups, and the dissertation must fall within the scope of NQPI research, be submitted within the academic year under consideration, and be nominated by a dissertation committee member who is also an NQPI member. ✨



*Andrew DiLullo
Photo by Rob Hardin*

Smith Bids Farewell to Time as NQPI Director

After nine years of dedicated service, Arthur Smith, a professor of physics and astronomy, has stepped down as director of NQPI. Eric Stinaff, an associate professor of physics and astronomy, was elected the new director in February.

When Smith was first named director in 2005, NQPI was in its infancy as an institute, having just begun its fourth year of operation.

"Since there was hardly anything going on in terms of institute activity when I became director, almost everything NQPI is doing today was not happening then. There was no science reporting for the institute. There was no institute office. Only a minimal website existed. There was no newsletter, no Nano Forums, and not nearly the level of collaboration that we've had between members over the past nine years," he said.

Smith, who has been an NQPI member since its creation in 2001, describes his time as director as "one of the largest sustained efforts with which I've ever been involved."

One of his major goals was to increase research support through external grants, and his effort was rewarded after receiving a \$2.5 million, five-year grant by the NSF's Partnerships for

International Research and Education (PIRE) program in 2007. This grant allowed him to continue studies on understanding electron spin at the nanoscale, along with fellow physics professors Saw-Wai Hla, Sergio Ulloa and Nancy Sandler.

NQPI has seen many other accomplishments over the past nine years, including being awarded \$169,000 in



Physics and Astronomy Professor Arthur Smith reflects on his time as NQPI director. Photo by Rob Hardin.

annual base funding from Ohio University's Graduate Education and Research Board (GERB) and hosting the fifth Nanoscale Spectroscopy & Nanotechnology/second Spin-Polarized Scanning Tunneling Microscopy International Conference in 2008. NQPI is once again hosting SP-STM-5 from July 15-19 in Huron, Ohio.

Out of all of Smith's achievements as director, one of the most important was providing OU with a reliable source of liquid helium, a very important (and very expensive) material used to cool cryogenic systems.

The helium liquefier facility in the Clippinger Research Annex was completed in 2011 and cost approximately \$800,000 to build. In 2013 alone, the liquefier facility delivered over 11,000 liquid liters of helium at a cost of less than \$2 per liter, providing a savings of \$250-\$300k that supports a number of the institute's largest grants.

"We have an amazing helium liquefier facility that is paying back already. The liquefier is a crowning achievement that Art had a huge part in getting accomplished. It is something that will enhance research for many years," Stinaff said.

Now that Smith is no longer the director, he is spending his newly found free time working at his two research labs and bringing in additional funding for the institute. As for NQPI, Smith hopes that his successor can bring the institute to its full potential.

"My main wish is that NQPI will ultimately realize its ambition of becoming known worldwide as a top place for nanoscience research," he said. ✨

NQPI Welcomes New Member Katherine Cimatu

As a child in the Philippines, Katherine Cimatu promised her grandfather that she would become a medical doctor. After realizing that she did not share her late grandfather's dream, she embarked on a new scientific path as a chemist.

Cimatu, who joined Ohio University as an assistant professor of chemistry for the 2013-2014 school year, was recently elected the newest member of NQPI in April. She was nominated by Eric Masson, an associate professor of chemistry.



Katherine Cimatu

"I am looking forward to having scientific discussions with NQPI members and performing collaborative experiments with other research groups. I am also interested in helping my students grow with NQPI resources," she said.

Her research interests include sum frequency generation (SFG) spectroscopy, a second-order nonlinear laser spectroscopy technique used to analyze surfaces and interfaces. As a graduate student at the University of Houston, she built the first working imaging SFG microscope that can be applied to different systems with her adviser, Steven Baldelli, in 2004.

Cimatu plans to improve her work by building a multi-modal instrument that combines SFG spectroscopy with atomic force microscopy. The desired result is a near-field broadband SFG microscope that gives nanoscale spatial resolution.

"For starters, I will perform experiments focusing on polymer coatings, which will have a greater impact on corrosion inhibition and prevention of biofilm adhesion on surfaces. Hopefully, I will be able to apply it to energy applications for lithium batteries and solar cells," she said.

Cimatu received her Ph.D. in Chemistry from the University of Houston in 2008. She worked as a post-doctoral researcher for Texas A & M University and Oak Ridge National Laboratory, before joining OU's faculty for the fall 2013 semester. ✨

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comments.