Students at Wright State who attain high GPAs during a quarter are placed on the Dean's List. The following are lists of physics majors who made the College of Science and Mathematics Dean’s lists since Spring of 2011. Congratulations to all of these students on their hard work and dedication to excellence in education!

**Spring 2011**
- James Caplinger—High Honors
- Amanda Dahlman—High Honors
- Brendan Eck—High Honors
- Zachary Gault—Highest Honors
- Kathryn Reilly—High Honors
- Kent Weaver—Highest Honors

**Summer 2011**
- Brendan Eck—Highest Honors
- Gregory Karjala—Highest Honors
- Kent Weaver—High Honors

**Fall 2011**
- Daniella Branco—Honors
- Amanda Dahlman—Highest Honors

**Winter 2012**
- Daniella Branco—High Honors
- Amanda Dahlman—Highest Honors
- Brendan Eck—Highest Honors
- Gary Kash—High Honors
- Matthew Van Voorhis—Highest Honors

My first department newsletter was in 2008. This year, I have transferred responsibilities to Abbey Brown and she has done a great job producing a very informative newsletter. I hope you will enjoy reading about the achievements of our students, faculty and alumni in this issue.

2012 is also a pivotal year. After eight years as department chair, I am stepping down June 30 to take on the position of Dean of the School of Science and Mathematics and Traubert Chair at The Citadel in Charleston, SC. Thanks to the work of the faculty and to the support of the college and university, our department has experienced significant growth in faculty, in students, in externally-funded research and in overall visibility and respect.

Dr. Doug Petkie has been named interim department chair. I wish the department well under his leadership and as it looks for a permanent chair.
The Department hosted a Fall Social in September, in conjunction with the Society of Physics Students, to welcome students, old and new, to the department. Majors not only got to interact with one another, but also with the faculty. Pizza and snacks were enjoyed by all.

A Physics Career Night was held in October for all physics undergraduate and graduate students, as well as EP majors. Students came to learn about financial aid opportunities, current departmental job opportunities, research experience/internship opportunities, graduate school opportunities and careers for after graduation.

The Physics department hosted its annual end-of-the-year cookout/picnic on Friday, May 25 at the Village Community Picnic Shelter. In attendance were physics and engineering physics majors, faculty and staff. Everyone had a great time!

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They look for “the look.”
It’s the revealing expression on the face of a student that shows comprehension—understanding something that had once been a mystery.

Those doing the “looking” are teams of teachers who have redesigned their lessons and are giving them a test drive before classes of elementary and middle-school students.

It is all part of a professional-development model for teachers being used in Dayton-area schools under the leadership of Wright State University.

The “Lesson Study” model is one of four professional-development programs for STEM teachers supported by Wright State in 2011-12.

Originating in Japan, the Lesson Study model used in one program has been credited for a shift from “teaching as telling” to “teaching for understanding” in math and science classes.

Supporters say Lesson Study is flexible, inquiry driven, creates curiosity and keeps teachers in control while making students the focus. It is taking root across the United States, being used in classrooms from California to Chicago to Florida.

“To really improve education, we need a more systemic approach,” said Rutter. “Lesson Study often involves all the teachers of a particular subject matter within a school and has more potential to have schoolwide impact or even impact districtwide.”

Rutter said it’s all about the skill and methodology the teachers learn as they solve problems together.

“They, themselves, have the power to improve their schools and the outcomes for their students,” he said.

There are about 60 elementary and middle-school teachers in the Lesson Study program, most of them from Dayton Public Schools.

Wright State professor Ann Farrell and assistant professor Sachiko Tosa meet with small groups of the teachers at their schools in three-hour sessions. Between August and December 2011, the two spent 170 hours in the sessions.

Farrell said the teachers bring their problems to the table.

“We help them look at their textbook, at other resources, at their student work and try to find the answer,” she said. “They build off of each other’s expertise. We want them to be researchers in their own classrooms and do it collaboratively. That’s one of the lasting effects we think there will be.”

Lisa Minor, Dayton Public Schools’ executive director of school improvement for pre-K to 8, experienced the Lesson Study program for several years when she was principal at Kemp PreK-8 School.

“The redesigned lessons were more meaningful and relevant to the students,” said Minor. “And veteran teachers were revived and refreshed by the opportunities in the program.”

Lesson Study has also affected teaching styles. One teacher learned to not always give students the answers, but let them work through problems—even if they fail to solve them.

“She said, ‘I never realized how important student struggles are and that it’s OK for students to have some struggles with material,’” Farrell said.

Tosa said there have been improvements in student test scores at Kemp PreK-8, where all of the teachers participate in the Lesson Study program.

“There is some good evidence of teacher growth and student growth,” Tosa said.

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PHYSICS MAJORS ON COSM DEAN’S CIRCLE

The CoSM Dean’s Circle student advisory board consists of 12 undergraduate students, who, together, represent the College’s six comprehensive departments. This year, the Dean’s Circle was made up of 5 physics majors: Alyxis Camden, Lisa Case, Amanda Dahlman, Brendan Eck and Kent Weaver.

In addition to their major, the members of the Dean’s Circle were selected based on their interest, academic achievement, and leadership skills. These students meet with the Dean once each quarter to discuss college-related issues that are high on the minds of CoSM students.

We are proud to have these students represent the department.

STUDENT NEWS

• Four physics students were inducted into ΣΠΣ in 2012: Gary Kash, Kent Weaver, Gregory Karjala (BS Physics majors) and Kathryn Reilly (BA Physics major). Congratulations to these well deserving students for this honor!

• As of the end of Winter quarter 2012, the following students have completed requirements and graduated during the 2011-2012 academic year: Arda Cakmakci, James Caplinger, Zachary Gault (BS Physics); Chang Choi (BA Physics); Steven Buller, Zafrulla Jagoo, Jay Patel (MS Physics); William Sanders (MS Medical Physics).

• Zafrulla Jagoo has received the 2012 Physics Graduate Student Excellence Awards. The program is an event to recognize the outstanding achievements of our graduate students. Students are nominated on the basis of superior academic achievement, noteworthy thesis or dissertation research, and a clearly demonstrated potential to make significant contributions to his or her chosen field.

WSU PHYSICS DEPARTMENT HOSTED 2012 ΣΠΣ INDUCTION BANQUET

On Monday, April 16, 2012, Wright State hosted the annual Sigma Pi Sigma Induction Ceremony Banquet in the Endeavor Room in the Student Union. The evening began with a buffet dinner followed the induction ceremony. Dr. Jason Deibel, who is the ΣΠΣ advisor, was the emcee for the evening. The evening’s inductees into the physics honor society included students from Wright State, The University of Dayton, Xavier University, Miami University and The University of Cincinnati. This year, WSU inducted four students into this prestegous honor society: Gregory Karjala, Gary Kash, Kathryn Reilly and Kent Weaver. Following the induction ceremony, Dr. Jure Zupan of the Department of Physics at the University of Cincinnati presented a talk on the “Exciting News from Large Hadron Collider” for all in attendance.

Below L to R: Inductees Gary Kash, and Kent Weaver with Sigma Pi Sigma Advisor Dr. Jason Deibel.
(Note not pictured are Inductees Kathryn Reilly and Gregory Karjala.)

Officer for 2011-2012
President: Amanda Dahlman
Vice President: Brendan Eck
Secretary: Kent Weaver
Treasurer: Lisa Case
Faculty Advisor: Jason Deibel
STUDENT RESEARCH AND SCHOLARSHIP NEWS

• Kathryn Reilly (BA Physics major) received a NASA Education Scholarship from the Ohio Space Grant Consortium. OSGC’s main goal is to teach future educators about the available materials NASA provides, especially for K-12 classrooms.

• In October of 2011, Lindsay Owens and Matthew Bischoff (MS Physics majors) presented research papers at the 2011 International Microwave, Millimeter Waves, and Terahertz Conference in Houston, TX. The work they presented is part of a 2 year long funded project by the Materials and Manufacturing Directorate at the Air Force Research Laboratory.

• In Fall 2011, student members of the Deibel research group presented their work at the poster session of the Dayton Engineering and Science Symposium. Hannah Jones (EP major) presented her work, part of a collaboration with AFIT, on the characterization of terahertz frequency metamaterials. Ryan Shaver (EP major) presented his work on the use of terahertz time-domain imaging to evaluate thin-film protective coatings on ceramic materials. This work was funded by MEMC Electronic Materials. Satya Ganti (PhD EGR major), presented her work on the terahertz frequency characterization of multi-walled carbon nanotube arrays.

• Amanda Dahlman (BS Physics major) received the 2011 Physics Scholarship.

• Alyssa Fosnight (EP major) received the 2011 Dr. Merrill Andrews Memorial Scholarship.

LIGHTNING-FAST COMPUTERS POSSIBLE OUTCOME OF PIONEERING WRIGHT STATE RESEARCH

When it comes to the speed of processors that power our computers, the needle is stuck. A speed limit of sorts has been reached in processing data and turning it into text, images and video streaming.

Lok Lew Yan Voon, Ph.D., chair of the physics department at Wright State’s College of Science and Mathematics, says there was a time when the computer speed was going "up and up and up and up.

“But in current computer electronics—CPUs—the speed has been basically stuck at 3.2 gigahertz for the last decade or so,” he said. “They might discover some other processes to make it faster. But it seems like it’s plateaued.” A faster computer would be invaluable in such areas as weather forecasting, where massive amounts of data must be analyzed quickly.

To develop a faster transistor, a new material other than silicon is probably needed. In 2004, researchers discovered graphene, a single sheet of atoms that held out the promise of making transistors as much as 1,000 times faster.

However, because the current transistor industry is silicon-based, it could take up to 20 years to change existing manufacturing processes and commercialize graphene. In addition, graphene may lack the property to turn an electric current on and off, an essential quality for a transistor.

In 2007, Lew Yan Voon and student researcher Gian Guzmán-Verri wrote a paper identifying the possibility of creating a new substance. They called it “silicene.”

“The primary thing we did was demonstrate that if such a material could exist, it would have certain special properties,” said Lew Yan Voon.

The idea was to replace the carbon atoms in graphene with silicon atoms. Instead of a single sheet of atoms, silicene would have an up-and-down atomic configuration and would be able to turn an electric current on and off.

“We proved that it could have those same properties as graphene, even when the atoms go up and down,” Lew Yan Voon said. “We are now working on calculations to try to prove that we can turn it on and off.”

Lew Yan Voon grew up on Mauritius, a small tropical island in the Indian Ocean southeast of Africa. He obtained his bachelor’s degree at Cambridge University, his master’s at the University of British Columbia, and his doctorate at Worcester Polytechnic Institute in Massachusetts.

Lew Yan Voon did post-doctoral work in semiconductors at the Max Planck Institute in Germany. He came to Wright State, in part because of faculty members who were well recognized for their expertise in semiconductors.

Several groups of researchers have recently claimed to have successfully created silicene. As a result of these reports and his expertise, Lew Yan Voon has been interviewed by national news organizations.

“The bottom line is there are more and more groups coming out and saying they’ve made it,” he said. “The study of silicene is looking mWhen it comes to the speed of processors that power our computers, the needle is stuck. A speed limit of sorts has been reached in processing data and turning it into text, images and video streaming.

Taken from the Wright State University NewsRoom, by Jim Hannah
There is hardly a greater discovery during the past century than DNA—deoxyribonucleic acid—the biomolecular material in every cell of the human body. DNA contains the genetic information necessary for cell replication, protein synthesis and reproduction.

Naturally, DNA sensing and identification has become a very important technology in such areas as biology, medicine and law enforcement. But positive identification without ambiguity is difficult because DNA is so sparse in the human organism and because it shares many of the same chemical bonds as other more common biomolecules—proteins and polysaccharides.

So traditional spectroscopic methods, such as infrared transmission, cannot distinguish DNA from these other molecules. More elaborate techniques are necessary, such as polymerase chain reaction (PCR) followed by gel electrophoresis, which are expensive and time-consuming.

Fortunately, the large size of DNA molecules makes them amenable to other spectroscopic methods in the THz region of the electromagnetic spectrum—a region well below the infrared in frequency but well above common radio and radar frequencies.

Wright State University researchers led by physics professor Elliott Brown have been investigating these unique THz DNA signatures through a Multidisciplinary University Research Initiative (MURI) funded by the U.S. Army Research Office. Their multi-year $600,000 grant has recently identified several unique and surprisingly strong signatures from DNA molecules between 0.7 and 1.0 THz.

“The surprise is that we have recently measured these DNA signatures under physiological conditions in which the DNA was suspended in an aqueous buffer solution very similar to that in living cells,” Brown said. “Previously, the strong THz absorption by liquid water was thought to be too strong to observe signatures from any suspended molecular species.”

So far, Brown said, the signatures appear unique to the DNA molecule at hand, be it single-stranded or double-stranded DNA.

“The caveat is that so far we have only observed relatively short DNA strands well under the length of the human genome,” he said. “But we are moving in that direction.”

The research project is headed by the University of California-Irvine, and along with Wright State University has collaborators at Marshall University, Yale University and the University of Chicago. The MURI Grant funds the research for up to five years.

Brown, Ph.D., Ohio Research Scholars Endowed Chair in Sensors Physics at Wright State, is an expert in terahertz radiation, which consists of invisible light waves in the electromagnetic spectrum higher in frequency than microwave and lower than infrared light. Terahertz waves can penetrate materials such as clothing, paper, cardboard, wood and plastic, but not metal or water.

For more information on the research being conducted by Dr. Elliott Brown and the THz Sensors Group, please visit their website at http://www.cecs.wright.edu/research/thz/ or just visit wright.edu keyword THz.
Dr. Randall Wagner is the recipient of the 2012 College of Science and Mathematics alumni award. Dr. Wagner graduated from WSU’s Department of Physics with an “Honors” degree in 1980. He received a scholarship from the department, was elected to the physics honor society and had published a research article with a faculty based on his undergraduate research work.

Dr. Wagner earned an MD at the Vanderbilt School of Medicine in 1984 and stayed at Vanderbilt an additional 3 years as a resident in Internal Medicine. His wife, Debra Benator, and he then took a “gap year” to volunteer in a “bush hospital” in Western Province of Kenya where they served as Medical Directors. Upon their return to the US, Dr. Wagner spent four years at Boston University as a Fellow in Pulmonary Diseases and Critical Care Medicine. These were very productive research years resulting in three book chapters and five of his nine peer review publications. He then became a research fellow in the Laboratory of Immunology at the National Institutes of Health. He joined the faculty at George Washington University School of Medicine in 1995. As an Assistant Professor, he was largely involved in patient care, teaching, and clinical research. He had a number of “Directorships” (Intermediate Care Unit, Department of Respiratory Care, and Co-Director of the Intensive Care Unit) and was Co-Investigator on 8 clinical trials. In 1999, Dr. Wagner left academics and joined a practice as an Intensivist at the Washington Adventist Hospital. In the past ten years, he has become involved in the medical leadership at the Washington Adventist Hospital where he has served on a number of committees. In 2007, he became the first Chairman of a newly formed Department of Critical Care Medicine, and he was given the Physician “RISES” award for 2008.

Dr. Lok C. Lew Yan Voon, welcomes how the CoSM Outstanding Alumni Award celebrates the success Dr. Wagner has seen in his career. When asked about the award Dr. Lew Yan Voon replied, "We genuinely appreciate Dr. Wagner’s on-going engagement with the department. His success is born from his professional talents so this recognition from the college is perfectly timed. Additionally he is a very likeable person and has always made a point to reflect on how the scholarship he received as a student changed his life.”

Taken, in part, from the Wright State University NewsRoom, by Cory MacPherson

Ed Patrick (‘85), who is a top researcher at the Southwest Research Institute in San Antonio, Texas, and his research team were featured on the San Antonio news recently. They are conducting research on a portable mass spectrometers that measures gases in the air in order to conduct atmospheric research in caves. The research is to eventually be used by NASA to find out whether there is, or was, life on Mars or the moon. “The presence of a cave means that there is a place where something could live, in theory, without being destroyed by the solar radiation. The Mars atmosphere is so thin that the UV light from the sun destroys any living material that is present on the surface of the planet” says Patrick. They are hoping that this research will help to analyze the caves on both Mars and the moon to better understand cave environments.

Have any news you’d like to share? Contact us and let us know! We’d love to hear from you! We can be reached by email at physics@wright.edu.
**FACULTY RESEARCH NEWS**

- Dr. Jane Fox is a science co-investigator on the next NASA mission to Mars: the Mars Atmosphere and Volatile Evolution Mission (MAVEN), which is scheduled to be launched in November 2013. She is involved in preparations for data analysis and interpretation of the data that is to be returned from the spacecraft, which has a nominal mission life of a year, but an extended mission is expected.

- Dr. Jason Deibel and his research group recently found out that their recent submission to Applied Optics, “A Technique to Measure Optical Properties of Brownout Clouds for Modeling Terahertz Propagation,” co-authored with collaborators from AFIT was accepted for publication.

- In June 2011, Kozlowski was the Session Chairman of a Session on Carbon and Oxide Nanostructures at the 7th International Conference on Diffusion in Solids and Liquids held in Algarve, Portugal. He also served as the Session Chairman at the 2nd International Conference on Fundamental and Applied Science in Kuala Lumpur for a session on Magnetic Nanoparticles. He will serve as a co-organizer again this year at the conference to be held in Istanbul, Turkey.

- Research first carried out by Dr. Lew Yan Voon and his MS student Gian Guzman-Verri in 2007 on a hypothetical new material they named “silicene” received renewed attention in 2011-12 as more conclusive proofs of the fabrication of silicene emerged, including a report in the prestigious Physical Review Letters in early 2012. They predicted that silicene would have similar properties to graphene, a two-dimensional material which has led to the 2010 Nobel Prize in Physics. Their 2007 paper has been cited close to 50 times already, and has led to various additional recognitions such as invited talks to the First International Workshop on Silicene in Safi, Morocco in 2010 and to the second one in Marrakesh, Morocco in 2011. Dr. Lew Yan Voon has also been invited to attend an NSF/AFOSR workshop on 2D materials in May 2012 and a similar OSU/ARO workshop in August 2012. Silicene has been recognized as one of the top 100 science news stories by Discovery magazine in January 2012 and Dr. Lew Yan Voon has been interviewed by various news organizations for his expertise in this area.

**DEPARTMENT NEWS / ANNUAL REPORT**

- Dr. Sarah Tebbens was selected by the pre-med hallway in the Honors Community residence hall as their 2011 faculty of the year. She was presented an award, a red metal water bottle signed by all of the students.

- Dr. Brent Foy was appointed to the editorial board for the International Scholarly Research Network Biomathematics.

- In 2011, departmental faculty had a total of 40 publications.

- 65 invited talks or presentations were given by departmental faculty in 2011.

- Dr. Steven Adams has been selected as a recipient of a 2012 CoSM Outstanding Teaching Award as an adjunct faculty member.

- Dr. Gregory Kozlowski has begun working to create Institutional Partnerships between Wright State University and Cambridge University (UK), Queens University Belfast (Northern Ireland, UK), Czestochowa Technical University (Poland), and Universiti Teknologi Petronas (Perak, Malaysia).

**SEMINARS**

Throughout the year, as part of course PHY 800, the department offers seminars presented by experts in the field. These seminars are open to the department as well as any other outside guests who wish to attend. Below is a listing of seminars that were hosted during the 2011-12 academic year.

- The re-emergence of electromagnetic spectrum dominance by Paul Wescott

- Can we understand transport at the molecular level? by Kamil Walczak (UES Inc.)

- Morphology control carbon nanotubes in directly spun CNT based fibres by Krzysztof Kozioł (University of Cambridge)

- Photoelectroactive Research at WPABF by Gary Cook (Azimuth Corp.)

- Geometry Effects in Waveguiding and Electronic Properties by Morten Willatzen (University of Southern Denmark)

- Conceptual Development, Spatial Visualization, and Representations in Learning about the Earth, Moon and Sun System by Beth Basista (Wright State University)

- Carbon Nanotubes and Nervous Tissue Repair by Sarah Pixley (University of Cincinnati)

- Spintronics Highlights by Marc Cahay (University of Cincinnati)

- Application of radiofrequency heating for process intensification in metal catalyzed hydrogenation by Thomas Houlding (Queens University)

- Wide Bandgap Semiconductors for Electrical Power Switching and Power Application by Krishna Shenai (University of Toledo)

- Rational Catalyst Design for Enhanced and Controlled Growth of Carbon Nanotube Carpets via Water-assisted Chemical Vapor Deposition by Placidus Amama (UDRI)

- After-Inflation Cosmology Based on Newtonian Gravity by Kamil Walczak (UES Inc.)

*Continued on next page...*
SEMINARS (CONT.)

- Possibility of the novel neutron detector using GaN based compound semiconductor by Toru Aoki (Research Institute of Electronics, Shizuoka University)
- Writing graphene on SiC using a laser beam under ambient conditions and graphene/Si heterostructures by Yong Zhang (ECE Dept., UNC - Charlotte)

If you’d like to be added to our seminar email list, please email us at physics@wright.edu

DEPARTMENTAL STAFF

Abbey Brown - Assist. to the Chair
Kelly Burcham - Admin. Assistant
Kelly Cooley - THz Admin. Coord.
William Wagner - Lab Manager
Riya Vira - Student Office Asst.
Allison Hinde - Student Office Asst.

WRIGHT STATE
DEPARTMENT OF PHYSICS

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WRIGHT STATE UNIVERSITY
A World Of Opportunities

Find us on Facebook at
http://facebook.com/wrightstate.physics

EP MAJORS ON CECS DEAN’S LIST

Students at Wright State who attain high GPAs during a quarter are placed on the Dean’s List. The following are lists of engineering physics majors who made the College of Engineering and Computer Science’s Dean’s lists since Spring of 2011. Congratulations to all of these students on their hard work and dedication to excellence in education!

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- Jacob Banasek—Highest Honors
- Aaron Cherry—Honors
- Alyssa Fosnight—Highest Honors
- Haley Moeder—Highest Honors

**Summer 2011**
- Nicholas Hopkins—Highest Honors

**Fall 2011**
- Jacob Banasek—Highest Honors
- Christopher Dylan—Highest Honors
- Alyssa Fosnight—Highest Honors

**Winter 2012**
- Jacob Banasek—Highest Honors
- Dylan Christopher—Highest Honors
- Alyssa Fosnight—Highest Honors
- Ryan Hendrix—Highest Honors
- Nathan Wurst—Honors

NEW GRANTS

Dr. Beth Basista $200,000+ (OBR)
Dr. Sachiko Tosa $170,000+ (OBR)
Dr. Doug Petkie $10,000 (Traycer)
Dr. Ivan Medvedev $110,000+ (Missile Defense, RIF)
Dr. Elliott Brown $725,000+ (US Army, USAF, UCLA, ONR, MURI)
Dr. Jane Fox $400,000+ (NASA)
Dr. Naum Gershenzon $125,000+ (NSF)
Dr. Jason Deibel $55,000 (Princeton Nano, MEMC)
Dr. Allen Hunt $200,000 (PNNL)
Dr. Lok Lew Yan Voon $50,000+ (AFRL)

FACULTY

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<th>Basista, Beth PhD</th>
<th>Brown, Elliott PhD</th>
<th>Clark, Jerry PhD</th>
<th>Deibel, Jason PhD</th>
<th>Farlow, Gary PhD</th>
<th>Fox, Jane PhD (Research Faculty)</th>
<th>Foy, Brent PhD</th>
<th>Gershenzon, Naum PhD (Research Faculty)</th>
<th>Hunt, Allen PhD</th>
<th>Kozlowski, Gregory PhD</th>
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<td>Lew Yan Voon, Lok PhD</td>
<td>Look, David (Research Faculty)</td>
<td>Petrov, Dmitry PhD</td>
<td>Petrov, Victor PhD</td>
<td>Petrov, Yevgeny PhD</td>
<td>Petrov, Sergey PhD</td>
<td>Petrov, Vitaly PhD</td>
<td>Petrov, Vladimir PhD</td>
<td>Petrov, Yulii PhD</td>
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<td>Moscow State University, Solid state physics</td>
<td>Nizhny Novgorod State University, Solid state physics</td>
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- Dr. Ivan Medvedev $110,000+ (Missile Defense, RIF)
- Dr. Elliott Brown $725,000+ (US Army, USAF, UCLA, ONR, MURI)
- Dr. Jane Fox $400,000+ (NASA)
- Dr. Naum Gershenzon $125,000+ (NSF)
- Dr. Jason Deibel $55,000 (Princeton Nano, MEMC)
- Dr. Allen Hunt $200,000 (PNNL)
- Dr. Lok Lew Yan Voon $50,000+ (AFRL)

NEW GRANTS

- Dr. Beth Basista $200,000+ (OBR)
- Dr. Sachiko Tosa $170,000+ (OBR)
- Dr. Doug Petkie $10,000 (Traycer)
- Dr. Ivan Medvedev $110,000+ (Missile Defense, RIF)
- Dr. Elliott Brown $725,000+ (US Army, USAF, UCLA, ONR, MURI)
- Dr. Jane Fox $400,000+ (NASA)
- Dr. Naum Gershenzon $125,000+ (NSF)
- Dr. Jason Deibel $55,000 (Princeton Nano, MEMC)
- Dr. Allen Hunt $200,000 (PNNL)
- Dr. Lok Lew Yan Voon $50,000+ (AFRL)