DEAN’S MESSAGE

Much of this issue of Outlook is devoted to collaborations and partnerships—among researchers, institutions, alumni and others—all working to advance the College of Science and Technology’s efforts in research and education.

Our cover story—“A Race Against Time”—details efforts by S. Blair Hedges, Laura H. Carnell Professor of Biodiversity, and an airline CEO to establish several national parks to preserve Haiti’s rapidly disappearing species. Their story, born from Hedges’ pioneering work to identify biodiversity “hot spots,” is a powerful reminder that CST’s research impact reaches far beyond the Temple University campus.

Another feature story chronicles CST faculty partnerships with colleagues from other universities, as well as Temple schools and colleges, to understand how: self-driving cars improve traffic and fuel efficiency; magnetics might be able to treat cardiovascular patients; and new materials can potentially decrease brain injuries in athletes and soldiers.

CST’s success in research and education is the result of many collaborative efforts. Our increasing research expenditures—up 85 percent in just five years—stem from CST scientists working across disciplines to look at scientific challenges from new angles. For example, CST earned a prestigious Keck Foundation grant for a new method to identify dark matter. Other CST researchers are making breakthroughs in detecting and destroying chemical weapons and investigating the anti-cancer properties of tomato extracts.

CST is also succeeding in educating the next generation of innovators. Our undergraduate enrollment is at 4,000 students, making us one of the largest colleges at Temple. The increase in graduate and post-baccalaureate enrollment is particularly dramatic, up 90 percent from a decade ago. Together, CST faculty, advisors and professional development staff craft exceptional educational experiences, such as the Undergraduate Research Program, professional science master’s degrees and a pre-health post-baccalaureate, that attract top students.

Some of our strongest partners are CST graduates and friends of the college. They volunteer for our Owl to Owl Mentor Program, serve on the Board of Visitors and invest in scholarships and faculty endowment. You can learn more about what inspires several supporters in this year’s Honor Roll section.

I am so grateful for the financial contributions and for the time and expertise our supporters share with CST. I look forward to working together as we grow the college, push the boundaries of discovery and prepare our students for what is next in science.

Sincerely,

Michael L. Klein, FRS
Dean and Laura H. Carnell Professor of Science
Nearly 500 graduates participated in CST’s spring 2017 graduation ceremony.

CST GRADUATION FEATURES GOLDEN OWL AND RESEARCH GIANT

On May 11, at Temple University’s McGonigle Hall, nearly 500 graduates were honored at the 2017 CST graduation ceremony. CST faculty presented bachelor’s, master’s, professional science master’s and doctoral degrees and, after years of hard work, graduates spent the day celebrating with friends, family and professors.

The ceremony began with remarks from Dean Michael L. Klein, FRS, who praised the graduates for their determination. Robert M. Fineman (BA ’66, Chem), a medical doctor and clinical professor of pediatrics in the Department of Pediatrics at the University of Washington, Seattle, then delivered the keynote address.

Fineman, a Golden Owl for having graduated from Temple more than 50 years ago, is proof that “the work done [at Temple] makes all of us better human beings.” He is a passionate public health advocate, serving as dean of the Health and Human Services Department at North Seattle College from 2007 to 2012. In 2006, the Temple University Alumni Association awarded Fineman a Certificate of Honor for his achievements and dedication to Temple.

The ceremony’s student speaker was Colton Howard, an information science and technology major, who served as president of the National Association for Computing Machinery’s Temple chapter. After graduation, Howard took a position as a technical solution specialist at IBM.

In a first for the college, Dean Klein and Temple University Board Member Solomon Luo presented an honorary doctor of sciences degree to Professor C.N.R. Rao, FRS, for his extraordinary accomplishments in chemistry. Rao is National Research Professor, Linus Pauling Research Professor and honorary president at the Jawaharlal Nehru Centre for Advanced Scientific Research in Bangalore, India. He has more than 1,600 publications and has been awarded more than 70 honorary degrees from universities around the world.

—Hannah Amadio
Graduate students Katrina Korman and Shannon Hibbard are studying asteroid strikes in South Africa with Associate Professor Alix Davatzes.

**PROBING ASTEROID STRIKES BILLIONS OF YEARS OLD**

Between 3.5 billion and 2.4 billion years ago, more than 10 large asteroids pulverized the Earth's crust and mantle as deep as 16 kilometers. The impacts vaporized megatons of rock into the atmosphere, which then crystallized into rounded, hail-sized particles called spherules that coated the entire planet.

With a five-year, $445,000 NSF CAREER research grant, Associate Professor Alix Davatzes has been studying the environmental impacts of the asteroid strikes during the early evolution of life on Earth. She is doing so in the only known areas of the world where these deposits can be found—in near-desert environments in Western Australia and near the South Africa-Swaziland border east of Johannesburg which, at the time, were submerged under ocean waters.

“What we’re hoping to learn is how the impacts altered the atmospheric chemistry and surface conditions,” says Davatzes. “We’ve been able to make an argument that plate tectonics started possibly a quarter-billion years earlier than the previously agreed-upon evidence, as early as 3.25 billion years ago. Even though these impact sites don’t exist anymore—either because the sites have been covered by other layers of rock or recycled by plate tectonics—it’s really exciting that the remaining evidence of these impacts is giving us a glimpse of the Earth more than 3 billion years ago.”

—Bruce E. Beans

**NSF GRANT ENHANCES CAREER PREP FOR URBAN GEOSCIENCE STUDENTS**

The Department of Earth & Environmental Science (EES) has received a three-year, $359,000 grant from the National Science Foundation’s GEOPATH program to enhance recruiting of undergraduate geology and environmental science majors and to enhance their career development. The goal is to entice students within CST’s EES Department and from across Temple University to pursue urban geoscience.

Three EES faculty members, Professor Jonathan Nyquist, Associate Professor Alix Davatzes and Professor Laura Toran, teamed up with Carol Brandt, an associate professor in the College of Education, on the successful grant proposal. One of NSF’s priorities is increasing student interest in pursuing STEM careers, with the GEOPATH program focusing on enhancing student engagement in the geosciences.

“We want students to realize that geology isn’t just about mapping mountains out West,” says Toran. “There are local problems that impact where students live, such as protecting impaired streams, working on chemical hazards found in urban soils and understanding coastal hazards caused by storms.”

The grant also includes a one-on-one math mentoring program in which EES student volunteers help students through the required math sequence; an enhanced curriculum geared toward providing job skills; an internship program that recently linked up its first cohort of students with participating employers; and, pending the approval of the Temple University Board of Trustees, an environmental professional certificate.
MATERIALS SCIENCE BREAKTHROUGH

In a materials science breakthrough, an international team of researchers led by Xiaoxing Xi, Laura H. Carnell Professor of Physics, has developed a novel technique to create nanoscale-level oxide interfaces and heterostructures.

The research, according to Xi, has potential electronic, magnetic and superconducting applications—including possibly creating new computing, detector and energy-production devices. In their study, published in npj Quantum Materials, an open-access Nature research journal, Xi and 16 colleagues from Temple and other institutions describe how they successfully constructed oxides with well-controlled chemical compositions and atomic-layer precision.

The new method is called atomic layer-by-layer laser molecular beam epitaxy (ALL-Laser MBE). It is built upon, and improves on, the combined strengths of the two most successful methods utilizing oxide interfaces to synthesize new artificial structures.

“There is a significantly enhanced capability to grow these oxide materials one atomic layer at a time, not just to make existing materials better but to also create materials that don’t exist naturally,” says Xi, whose research was funded by a three-year, $367,000 U.S. Department of Energy grant. “The method pushes current boundaries for growing new functional materials that are theoretically predicted but cannot be made with existing techniques.”

Other Physics Department researchers involved in the study include Qingyu Lei, Maryam Golalikhani, Guozhen Liu, Ravini Chandrasena, Weibing Yang, Alexander Gray, Qiao Qiao and Bruce Davidson.

—Bruce E. Beans
CST PRESENTS SCHOLARSHIPS AND AWARDS AT RECOGNITION LUNCHEON

On April 20, the College of Science and Technology presented more than 100 awards, scholarships and other recognitions to the college's graduate and undergraduate students at the annual Scholarships, Awards and Student Recognition Luncheon.

With nearly 200 attendees filling the Science Education and Research Center lobby, the luncheon celebrated the success of talented students from the college's departments of Biology; Chemistry; Computer & Information Sciences; Earth & Environmental Science; Mathematics; and Physics, as well as from TUTeach and the Undergraduate Research Program.

In attendance were many graduates and friends who established or contributed significantly to college scholarships and awards, including Sina Adibi (BA ’84, CIS; FOX ’86), CST Alumni Endowed Scholarship; Albert Brown (BA ’64, Chem) and Marie Koals (EDU ’63), Albert B. Brown Chemistry Scholarship; Arthur Dawson (BA ’67, PhD ’76, Chem), Hazel M. Tomlinson, Ph.D. Memorial Scholarship; Eva Havas, Peter Havas Humanitarian Scholarship for Outstanding Physics Graduate Students; Gerald Kean (BA ’65, Bio) and Marlene Chachkin, Chachkin-Kean Fund for Undergraduate Research; Guenadiy Lazarov (MA ’97, PhD ’00, Phys) and Physics Professor Emeritus Theodore Burkhardt, Stanislav Kotsev (CST ’99) Memorial Award; physics professor Mia Luehrmann, Natan Luehrmann-Cowen Memorial Award; Rosemary Poole, J.A. Poole Award for Exceptional Department Service by an Undergraduate; Seda Tarzian (BA ’48, Bio), Seda Tarzian Endowed Scholarship; Henry Harrison, James A. Harrison Memorial Award; and David Tepper (BA ’64, Math; CLA ’66, ’69), David Tepper and Elaine Kowalewski Scholarship in Mathematics.
CHELSEA WALTON NAMED A 2017 SLOAN RESEARCH FELLOW

The Alfred P. Sloan Foundation named Temple mathematician Chelsea Walton a 2017 Research Fellow, putting her in company with academicians from Stanford University, Massachusetts Institute of Technology and Princeton University. The highly competitive and prestigious honor identifies rising scientists who’ve made significant marks on their field and represent the next generation of leaders in the U.S. and Canada.

Walton’s work on such algebraic structures is part of her larger exploration of the field of noncommutative algebra. She explains that in noncommutative algebra, multiplication doesn’t behave as expected. “That is, a x b doesn’t have to be b x a. This occurs more often than one might think because functions are naturally noncommutative,” she says.

A 2011 recipient of a PhD in mathematics from the University of Michigan, Walton has presented her research widely, including at the Mathematical Sciences Research Institute in Berkeley, California. She comes to Temple from the Massachusetts Institute of Technology, where she was a National Science Foundation-funded postdoctoral fellow.

Walton joined Temple’s faculty in 2015 as a Selma Lee Bloch Brown Professor of Mathematics. She was drawn by the unusual number of experts in noncommutative algebra at Temple: five including herself and a postdoctoral fellow.

Walton is the fourth African American Sloan Fellow in mathematics since the award’s inception in 1955. She’s the first Sloan Fellow at Temple since 1989, when Lee-Yuan Liu-Chen was honored for neuroscience.

Walton plans to use the $60,000 grant from the fellowship to fund her travel for research as well as the research expenses of her postdoctoral fellow and her graduate and undergraduate students and mentees.

—Eryn Jelesiewicz

RESEARCHERS EXPLORE NEW WAYS TO DETECT AND DESTROY CHEMICAL WARFARE AGENTS

Department of Chemistry researchers have been awarded two different $1.5 million grants from a U.S. Department of Defense agency for the exploration of new technologies that could be used to detect and destroy chemical warfare agents, toxic industrial chemicals and nerve gas. Each three-year grant from the Defense Threat Reduction Agency’s (DTRA) Joint Science and Technology Office could also be extended another two years and increased by an additional $1 million.

Professor Eric Borguet is collaborating with a team of University of Pittsburgh researchers to develop more economical methods to sense and eliminate weapons of mass destruction. The researchers are investigating the use of what are called multifunctional, metal-organic frameworks (MOFs) with plasmonic cores comprised of metal nanoparticles.

“If we are successful in identifying metallic materials that are cheaper and more abundant than gold and silver, which are most commonly studied for these purposes,” says Borguet, “it could impact not only chemical warfare agents but also other plasmonic applications.”

Meanwhile, a Temple-led team that includes two Department of Chemistry professors and researchers from UCLA and the Army Medical Research Institute of Chemical Defense (AMRICD) is exploring a new technology that has the potential to convert highly toxic organophosphate nerve agents into harmless phosphates.

Professor and principal investigator Christian Schafmeister’s team plans to synthesize complex, shape-programmable macromolecules called “spiroligomers” or “molecule Lego.” Much more robust and stable than currently used enzymes, Schafmeister says that these metal-containing macromolecules would be able to bind organophosphorus nerve agents and greatly speed up their breakdown into harmless compounds—and not generate immune responses in humans.

—Bruce E. Beans

Spiriligomers or “molecular Lego” will accelerate the breakdown of nerve agents into harmless compounds.
C.N.R. RAO DELIVERS INAUGURAL SHEIKH SAUD LECTURE

The College of Science and Technology and Temple Materials Institute (TMI) hosted the inaugural Sheikh Saud Lecture on Advanced Materials in May featuring Professor C.N.R. Rao, FRS, National Research Professor, Linus Pauling Research Professor and honorary president at Jawaharlal Nehru Centre (JNC) for Advanced Scientific Research, India, and director of JNC’s International Centre for Materials Science.

As one of the world’s preeminent chemists, Rao is the author of more than 1,600 research papers and recipient of some of the top honors in his field. During the Sheikh Saud Lecture, he discussed his work with inorganic graphene analogues. Graphene is one of the most sensational discoveries of recent years, with applications for superconductivity, transistors and electrocatalysts.

TMI is the focal point for materials research at Temple University, enabling collaborative interdisciplinary research on advanced materials ranging from complex functional solids and fluids to novel thin-film superconductors and materials for strategic applications.

The Sheikh Saud Lecture on Advanced Materials is named for H.H. Sheikh Saud bin Saqr Al Qasimi, United Arab Emirates (UAE) Supreme Council Member and Ruler of Ras Al Khaimah, a northern UAE emirate. The Sheikh Saud bin Saqr Al Qasimi Foundation for Policy Research was established in 2009 and aims to establish relationships with talented scholars and world-class universities, innovative public-policy research centers, established government institutions, and strategic partners in the private and nongovernmental sectors.

CHEMISTRY LEGEND FRANKLIN DAVIS RETIRES

Professor Franklin A. Davis, winner of the Cope Scholar Award and the John Scott Medal and Fellow of the American Chemical Society and the Royal Society of Chemistry, retired in 2017. He joined the Department of Chemistry in 1995, coming from Drexel University. At that time he was considering several offers, and while Temple had real advantages, there were also shortcomings.

“While the department had a high-field NMR (nuclear magnetic resonance spectrometer), it lacked X-ray and mass spectrometry facilities and operational support for instrumentation,” says Davis. “The laboratories were old and the heating and air conditioning were erratic. Chemistry is now considered one of the top departments in the university.”

The chemistry that Davis developed is regularly used by academic and industrial laboratories worldwide. His sulfur-nitrogen compounds (i.e., “Davis reagents”) include N-sulfonyl oxaziridines for oxidations and asymmetric hydroxylations and N-sulfinyl imines (sulfinimines) for asymmetric synthesis of chiral amine derivatives.

“Beyond Frank’s commitment to research, he always found time to be a tremendous mentor and supporter of students and colleagues,” said Professor Daniel Strongin, Chemistry Department chair. “The lively lunchtime conversations with Frank over the years will be missed.”

Davis says that he will not miss writing another proposal or even another paper. “What I will miss,” he says, “are my colleagues and the many students I have had the honor and pleasure to teach and mentor over many years.”

Other recent retirements at CST include Professor David Dalton of the Department of Chemistry and Professor Theodore Burkhardt and Professor Dieter Forster of the Department of Physics.

—Bruce E. Beans
NEW PSM DEGREES IN SCIENTIFIC WRITING AND CYBER DEFENSE

CST has introduced two new Professional Science Master’s (PSMs), scientific writing and cyber defense and information assurance. PSMs offer students the professional skills highly valued by top employers as well as advanced technical training. The new programs join CST’s existing PSMs in bioinformatics, bioinnovation, biotechnology and forensic chemistry.

The new program in scientific writing was developed in response to the growing need of companies, nonprofit organizations and news outlets to communicate science clearly and succinctly. Students with diverse STEM backgrounds will be able to develop the expertise to pursue scientific writing careers. It also gives professionals currently employed in science and technology fields an opportunity to broaden their skills for their career advancement.

With the rise of cybercrime and terrorism and their impact on privacy, finance and national security, the new PSM in cyber defense and information assurance provides professionals with the skills necessary to protect organizations from these increasing cyberthreats. The curriculum is technology-intensive, yet also bridges the increasing gap between cybersecurity technology and the overarching cybersecurity standards and policies. Information on CST’s PSM program is available at cst.temple.edu/psm.

DANIEL SZYLD’S WORK Earns AMS AND SIAM RECOGNITION

Daniel Szyld, professor in the Department of Mathematics, has been elected to the 2017 Class of Fellows of the American Mathematical Society (AMS) and to the 2017 Class of Fellows of the Society for Industrial and Applied Mathematics (SIAM). The honors recognize his contributions to numerical and applied linear algebra and his exemplary research and service to the community.

Szyld’s research, which has been funded by the National Science Foundation and the Department of Energy, utilizes computational linear algebra and applied linear algebra to explore a variety of complex systems arising in biology, physics or engineering.

Szyld’s work with his colleague, Professor Isaac Klapper, has examined the metabolism of bacteria in microbial communities, for example, on ponds in Yellowstone National Park. Another of his research projects is computing the gravitational potential of the Yucatan’s Chicxulub crater area, thought to have been formed by the impact of the meteorite responsible for the demise of the dinosaurs. With a grant from Temple’s Office of Vice Provost for Research, Szyld is working with Tonia Hsieh, associate professor in the Department of Biology, to study lizard locomotion across complex, natural surfaces.

Szyld is Temple University’s first SIAM Fellow. Along with Professors Shiferaw Berhanu, Irina Mitrea and Igor Rivin, Szyld is the fourth Temple mathematics professor to become an AMS fellow in the past three years.

—Greg Fornia, KLN ’92
Jocelyn Behm
ASSISTANT PROFESSOR, DEPARTMENT OF BIOLOGY

Jocelyn Behm earned her MS and PhD in ecology and biodiversity conservation from the University of Wisconsin-Madison after graduating summa cum laude from Drexel University with a BS in environmental science. She was an adjunct professor at Ursinus College in 2015 and brings more than 10 years of teaching experience to her new position at CST. She has received more than $750,000 in grants for her research in ecology, especially in regard to lizards, frogs, molecular ecology and species extinction. Behm has dedicated her time to mentoring undergraduate and master’s students in various aspects of her research. She has been awarded both the NWO Dutch Aspasia Women in Science Fellowship and the Fulbright Institute of International Education Fellowship. Her natural history notes have been published in the Herpetological Review, and she has published a field guide to the frogs of southwest China. At Temple, she will be studying patterns of biodiversity and invasive species in both the Caribbean and southeastern Pennsylvania.

Samuel J. Taylor
ASSISTANT PROFESSOR, DEPARTMENT OF MATHEMATICS

Samuel Taylor, a Philadelphia-area native, comes to Temple from the Yale University Department of Mathematics. At Yale, he held the title of Gibbs Assistant Professor and was awarded an NSF Postdoctoral Research Fellowship in 2014. Taylor earned BAs in mathematics and economics in 2009 from The College of New Jersey, and a PhD in mathematics from the University of Texas at Austin in 2014. He has also conducted research at the Mathematical Sciences Research Institute in Berkeley, California. Taylor’s research interests include geometric typology and geometric group theory with a focus on hyperbolic geometry and dynamics. In particular, he has studied the geometry of bundles as well as various statistical properties of geometrically significant groups. A passionate educator, Taylor has a deep interest in helping students succeed. He works to foster an interest in mathematics among younger students, and has participated in math groups open to the public during his time teaching at both Yale and UT-Austin.

Kai Zhang
ASSISTANT PROFESSOR, DEPARTMENT OF COMPUTER & INFORMATION SCIENCES

Kai Zhang, a former research staff member at NEC Labs America, scientist at Siemens Corporate Research and guest researcher with Lawrence Berkeley National Laboratories, has devoted his research to big-data mining, machine learning, bioinformatics and time series/complex network modeling. Zhang earned his PhD in computer science in 2008 from the Hong Kong University of Science and Technology and his master’s degree in pattern recognition from the Institute of Automation, Chinese Academy of Sciences. Zhang is a winner of the NEC Labs America 2016 Business Contribution award and 2016 Best Paper Runner-up awarded by the ACM Knowledge Discovery and Data Mining special-interest group. His research in brain functional networks was an editor’s choice cover story in Brain: A Journal of Neurology. Currently, Zhang is collaborating with the largest brain initiative in China to uncover the underlying mechanism of the human brain network in information processing and various mental disorders.

—Hannah Amadio
Evolutionary Bioinformatics of Tumor Profiles, NIH
Innovative Molecular Timing Applications to Obtain Accurate Histories of Early Life, NASA
Frank Nelson
Inference-Making and Reasoning, University of Illinois
Sergei Pond
Biological Properties of HIV-1 V3 Evolutionary Variants, NIH
MRI: Acquisition of a Flexible High-Performance Computing System for Data and Compute Driven Scientific Discovery, NSF
Tuning Big Data Analysis Infrastructure for HIV Research, NIH
Robert Sanders
Ecological Impact of Mixotrophic Algae in a Changing Arctic Marine Climate, NSF
Weidong Yang
Super-Resolution Microscopy Study of Molecular Transport Mechanisms, NIH
Rodrigo Andrade
Asymmetric Synthesis of Alkaloids Enabled by Novel Methodology, NSF
Eric Borquet
Emerging STEM Scholars, NSF
Graham Dobereiner
Ion-Paired Cooperative Catalysts for Carbon-Carbon Bond Formation, NSF
Michael Klein
Interaction of Inhalational Anesthetics, University of Pennsylvania
MRI: Acquisition of a Flexible High-Performance Computing System for Data and Compute Driven Scientific Discovery, NSF
Ronald Levy
HIV Interactions and Viral Evolution, The Scripps Research Institute
Yi Rao
Studies of Copper Nanostructures for High-Efficient Electrochemical Co2 Reduction, Honda Research Institute USA Inc.

Christian Schafmeister
Atomically Precise Membranes for the Separation of Hydrocarbons, Mainstream Engineering Corporation
Molecular Lego Based Organophosphatase Mimics, Defense Threat Reduction Agency
Synthesis of Selective Water Permeable Biomimetic Aquaporins, Department of the Army
Francis Spano
SusCheM: Collaborative Research, NSF
Yugang Sun
Self-Assembled Nanocellular Composites with Super Thermal Insulation and Soundproof for Single Pane Windows, University of Chicago
Vincent Voelz
Markov State Model Approaches for Folding, Binding and Design, NIH
Rongsheng Wang
Development of Chemical Probes to Study Post-Translational Modifications Key to Human Disease, Fox Chase Cancer Center
Sarah Wengrynuk
Cationic Nitrogen-Substituted lambda3-todanes for the Functionalization of Chemical Feedstocks, American Chemical Society, Petroleum Research Fund
Simplified Approaches to Medium-Sized Heterocycles for the Synthesis of Bioactive Small Molecules, NIH
Sara Zahim
Natural Product-Inspired Approaches Toward the Development of Antivirulence, Wallonie-Bruxelles International

Computer & Information Sciences
Xiaojiang Du
AF16-A10: Securing the Internet of Things in Tactical Environments, Air Force Research Lab
Light-Weight and Effective Security Schemes for Wireless Medical Devices, Qatar National Research Fund

TOMATO EXTRACT MAY PREVENT AND TREAT STOMACH CANCER

Researchers at CST’s Sbarro Institute for Cancer Research and Molecular Medicine have found that whole extracts from two varieties of tomatoes blocked the growth of stomach cancer cells and dampened their malignant characteristics. Their findings were published in the Journal of Cellular Physiology.

According to the American Cancer Society, there are more than 20,000 cases of stomach cancer, also known as gastric cancer, diagnosed in the U.S. each year. It is most common among older adults; around 60 percent of adults diagnosed are aged 65 or older. Previous studies have suggested that compounds found in tomatoes, such as lycopene, a carotenoid that gives tomatoes their red color, may help to fight cancer.

However, Antonio Giordano, professor and Sbarro Institute director, noted that few studies have investigated the anti-cancer effects of whole tomatoes, a research gap they set out to address with their new study.

To reach their findings, the researchers tested the effects of whole extracts from San Marzano and Corbarino tomatoes on stomach cancer cell lines. They found that each extract not only halted the growth of gastric cancer cells, but they also interfered with cell migration, whereby cancer cells begin to move away from the primary tumor to invade surrounding tissues, and led to cancer-cell death.
CHASING PROTEINS AND RNAs IN CANCER CELLS

Dysfunctional nuclear transport through the sub-micrometer nuclear pore complex (NPC) connecting the cytoplasm with the nucleoplasm in human cells, has been linked to various cancers, including leukemia.

By developing and employing high-speed super-resolution microscopy techniques, Associate Professor Weidong Yang and his research team have successfully tracked individual proteins or RNAs as they move through the NPCs—providing 3-D, super-resolution information for molecular transport kinetics and routes in leukemia and other cancer cells. Widely published in high-profile journals, Yang’s laboratory has received more than $2 million since 2010 from NIH and other funding agencies.

Yang’s related collaborations with researchers from the University of Michigan and the University of California, Berkeley have received another $2.2 million grant; and he recently received a five-year, $2 million National Institute of General Medicine grant.

Slobodan Vucetic
• Incorporating Residential Histories into Space-Time Models for Health Geographic Analysis, NSF
• SBIR Phase II: Using Data Mining to Optimally Customize Therapy for Individuals with Autism, Guiding Technologies Corporation
Anduo Wang
• CRII, NeTs: Towards a Database-defined Network, NSF
• Student Travel Support for the ACM SODS 2017 Conference, NSF
Jie Wu
• NeTs: Medium: Collaborative Research: Coexistence of Heterogeneous Wireless Access Technologies in the 5 GHz Bands, NSF

Dean’s Office
Susan A. Varnum
• Early Grades Instructional Leadership (EGIL) Project, PA Department of Education
• Mathematics and Science Partnership (MSP) Grant, Delaware County Intermediate Unit
• 2016-17 Navy After School Programming, Naval Surface Warfare Center
• 2017 ExxonMobil Bernard Harris Summer Science Camp at Temple University, Harris Foundation

Earth & Environmental Science
Alexandra Davatzes
• Understanding and Promoting Spatial Learning Processes in the Geosciences, NSF
Alexandra Davatzes, Jonathan Nyquist and Laura Toran
• GP-IMPACT: Career Paths for Urban Geoscientists: Recruitment, Retention and Apprenticeship, NSF
Sujith Ravi
• Meeting SunShot Cost and Deployment Targets Through Innovative Site Preparation and Impact Reductions on the Environment (InSPIRE), DOE/ National Renewable Energy Lab
Laura Toran
• Assessment of Storm Water Controls in the Upstream Suburban Philadelphia Cluster, William Penn Foundation
• Storm Water Control Management & Monitoring, PA Department of Transportation
• Upstream Suburban Philadelphia Cluster Phase 2, Pennsylvania Environmental Council Inc.

Mathematics
Shiferaw Berhanu
• The Regularity of Cauchy-Riemann Mappings and Solutions of Systems of Nonlinear Differential Equations, NSF
Vasily Dolgushev and Chelsea Walton
• Algebra Extravaganza, NSF
David Futur and Matthew Stover
• Graduate Student Conference in Algebra, Geometry, and Topology, NSF
Cristian Gutiérrez
• OP: Monge-Ampère Type Equations and Geometric Optics, NSF
Axel Kohlmeyer
• Continuous Integration and GitHub Project Management for the LAMMPS Molecular Dynamics Software, Sandia National Laboratories
Brian Rider
• Operator Limits of Random Matrices, NSF
• Thematic Seminar on Probabilistic Methods in Geometry, Topology, and Mathematical Physics, NSF
Benjamin Seibold and Dong Zhou
• Collaborative Research: Overcoming Order Reduction and Stability Restrictions in High-order Time-stepping, NSF
Matthew Stover
• Discrete Groups and Character Varieties, Simons Foundation
Daniel Szyl
• Asynchronous Iterative Solvers for Extreme-Scale Computing, US Department of Energy
Samuel Taylor
• Negative Curvature in Fiber Bundles and Counting Problems, NSF
Chelsea Walton
• Quantum Symmetry, NSF

Physics
A. Marjatta Lyra
• Molecular Quantum Control by Coherence Effects, NSF
Andreas Metz
• Coordinated Theoretical Approach to Transverse Momentum Dependent Hadron Structure in QCD, US Department of Energy

James Napolitano
• Fundamental Physics Experiments with Reactor Neutrinos, US Department of Energy
John Perdew
• Density Functional Theory of Electronic Structure, NSF
Adrienn Ruzsinszky
• CAREER: Electron Correlation and Optical Spectra with a Nonlocal Energy-Optimized (NEO) Kernel, NSF
• Toward the Chemical Accuracy for the Description of the Catalytic Desulfurization Process, American Chemical Society Petroleum Research Fund
Nikolaos Sparveris
• Collaborative Research:

Equipment for PSI MUSE Experiment, NSF
• Studies of Hadronic Structure, US Department of Energy
Rongjia Tao
• Demonstration of Viscosity Reduction with Saudi Aramco Crude Oil Samples, QS Energy, Inc.
• Mass Spectroscopy Measurement for Ionized Air by Various Isotopes and Other Gas Ionizers, Naval Research Laboratory
• Reduction of Blood Viscosity and Turbulence by Magnetic Field Reduces Atherosclerosis, American Heart Association
Xiaoxing Xi
• Coating of Magnesium Diboride on 3 Ghz Cavities, Argonne National Laboratory

STUDY BY EES RESEARCHERS ADDS NEW INSIGHTS INTO FAIRY CIRCLES OF NAMIBIA

Numbering in the millions, the so-called fairy circles are in the eastern interior of the coastal Namib Desert, stretching from southern Angola to northern South Africa. Ranging in size from about 12 feet to more than 100 feet, they are bare patches of soil ringed by tall grasses. The origins of the circles have long been debated by researchers.

“This study provides some ‘fresh eyes’ for looking at the existing debate, using new field methodologies and data for a less studied location,” said Sujith Ravi, lead author of the study and assistant professor in the Department of Earth & Environmental Science (EES). “It’s a major contribution to resolving the fairy circles enigma.”

Ravi and another EES faculty member, Associate Professor Ilya Buynevich, worked with researchers from Indiana University-Purdue University and the National Museum of Namibia. Their work was published in the Journal of Geophysical Research: Biogeosciences, a peer-reviewed journal of the American Geophysical Union.

The team’s results provide support to the self-organization hypothesis of fairy-circle formation. Self-organization theory says that the circular vegetation pattern is created by plant competition for scarce water. It’s believed that the bare patches percolate more rainfall and act as water reservoirs, which the grass along the edges of the circle can access.

— Greg Forni, KLN’92