

THE MARIAN E. KOSHLAND INTEGRATED NATURAL SCIENCES CENTER

# KINSC

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ANNUAL REPORT

2015

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HAVERFORD  
COLLEGE

## MAJOR PROGRAMS

Astronomy  
Astrophysics  
Biology  
Chemistry  
Chemistry - ACS Certified  
Computer Science  
Geology (at Bryn Mawr)  
Interdisciplinary Physics  
Mathematics  
Physics  
Psychology

## MINOR PROGRAMS

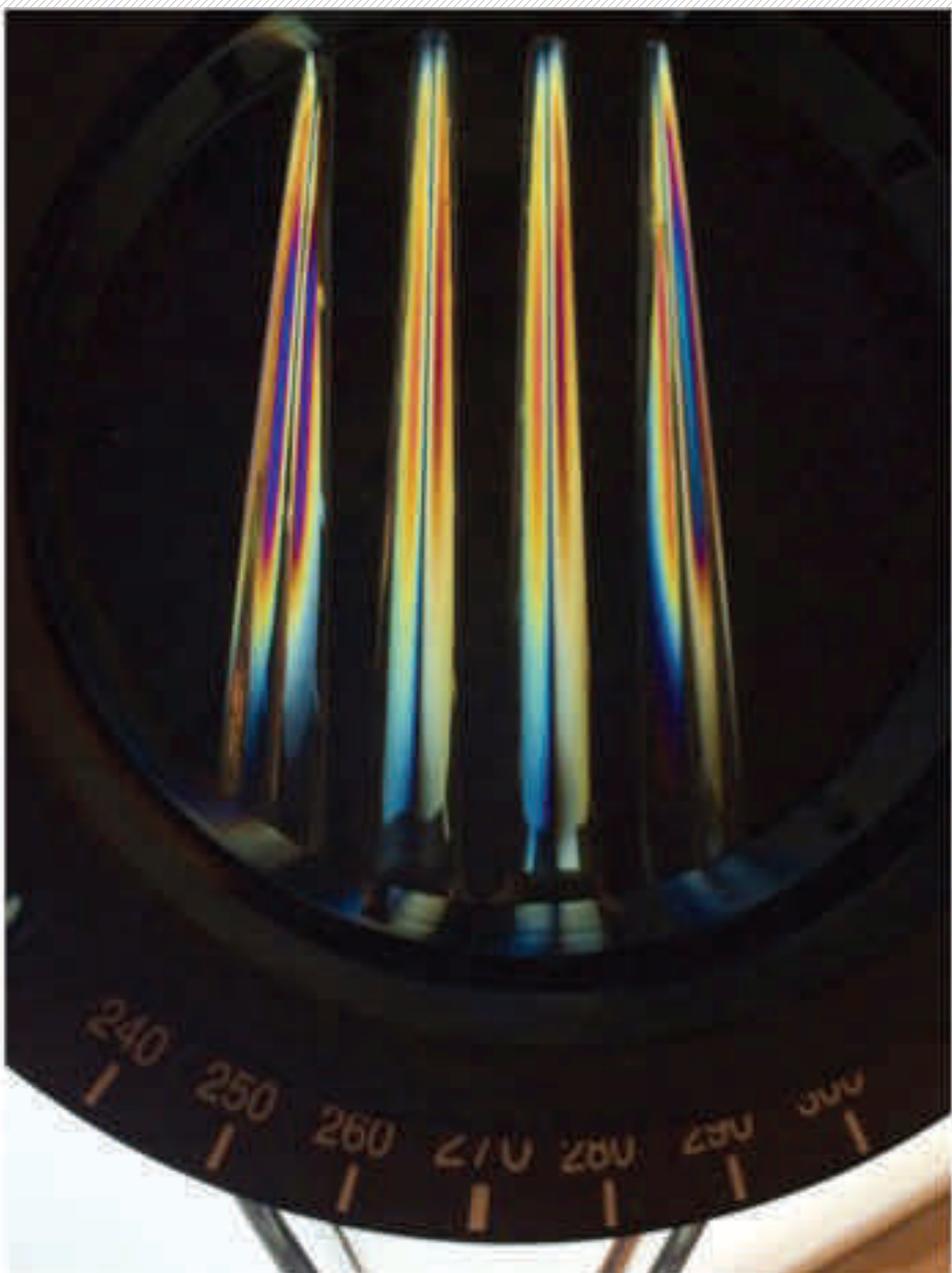
Astronomy  
Chemistry  
Chemistry - ACS Certified  
Computer Science  
Environmental Studies  
Health Studies  
Mathematics  
Neuroscience  
Physics  
Psychology  
Statistics

## CONCENTRATIONS

Biochemistry  
Biophysics  
Computer Science  
Geoarcheology (at Bryn Mawr)  
Geochemistry (at Bryn Mawr)  
Mathematical Economics  
Mathematics Education  
Scientific Computing

## DEGREE PARTNERSHIP PROGRAMS

4+1 Bioethics with UPenn  
4+1 Engineering with UPenn  
3+2 Engineering with CalTech



**ABOVE: 2015 KINSC Imaging Contest second-place winner: Rui Fang '17**

A plastic fork viewed through crossed polarizers shows beautiful multicolored patterns. This is due to birefringence of plastics. In birefringent materials, the index of refraction of a plane-polarized light can take on two values, resulting in a phase retardation which changes the polarization of transmitted light. Different colors of light have different indices. So, through another polarizer, a fringe pattern is revealed due to color interference. Because the pattern is indicative of the varying birefringence of the material, this method, called photoelasticity, is often used for analyzing stress distribution.

**COVER: 2015 KINSC Imaging Contest first-place winner: Audra Devoto '17**

The effect of Interleukin 13 (IL13) on cultured small intestine epithelial cells from a normal patient. The cultured cells show several crypts and villi characteristic of the intestinal epithelium. Cell membranes are stained green, mucin is stained red, and cell nuclei are stained blue. IL13 is a cytokine involved in inflammatory and anti-inflammatory pathways in the airways and intestinal epithelium. Here, IL-13 treatment is shown to result in increased growth of mucin-secreting cells and increased mucin secretion.

# The Marian E. Koshland Integrated Natural Sciences Center (**KINSC**) catalyzes and facilitates programs that maintain Haverford's position at the leading edge of academic excellence in the sciences.

To achieve this end, the KINSC promotes scientific scholarship involving close collaboration between faculty and students and provides opportunities for these activities to expand beyond the borders of the Haverford campus.

The KINSC is unique among Haverford's three academic centers in that **it is both a building and a program**. The 185,000 square foot building is the epicenter of natural science research at Haverford. It was constructed to facilitate sharing of ideas, instruments, and expertise across disciplines and to contribute to a climate of cooperative problem solving and investigation.

The KINSC comprises the departments of Astronomy, Biology, Chemistry, Physics, Psychology, Mathematics and Statistics, and Computer Science. To supplement the efforts of the departments, the KINSC **supports interdisciplinary interactions**. In addition to directly funding students and faculty, the Center supports academic activities initiated with outside grants and individual faculty awards.

The KINSC funds individual research projects and sponsors symposia, seminars, curricular initiatives, courses, and scholarly projects that go **beyond the bounds of a single discipline** and involve students and faculty from multiple departments.





The range of programs supported by the KINSC is limited only by the imagination of the Haverford science community.

Currently, the KINSC supports the following activities:

- ▶ Summer research opportunities for students on-campus or at other institutions
- ▶ Fall research symposium, showcasing student work from Haverford, Bryn Mawr, Swarthmore, and other area colleges
- ▶ Travel for students to pursue academic year research with collaborators in labs either within the USA or abroad
- ▶ Travel for students to attend conferences, to present research or to gain experience applicable to future careers (in collaboration with the Green Fund)
- ▶ Student and faculty training in new science-related skills
- ▶ Science Faculty special projects
- ▶ Events, such as research talks, film screenings, panels, etc.
- ▶ Annual career panel focusing on careers for science majors, in collaboration with the Center for Career and Professional Advising
- ▶ Annual Student Scientific Imaging Contest
- ▶ Mentoring and Student Teaching Program (MAST)
- ▶ Multicultural Scholars Program

We are committed to supporting a wide variety of creative ideas in the sciences; students should not feel limited by the categories listed.

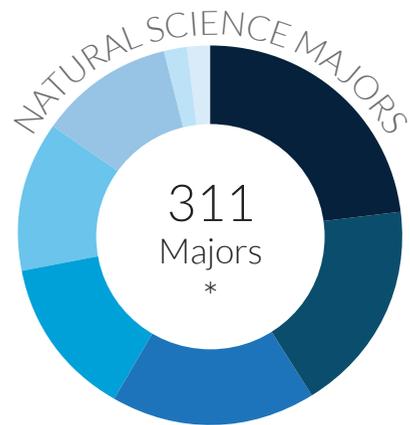
# KINSC BY THE NUMBERS:

2015



- 8 STUDENTS RECEIVED FUNDING FOR INTERNATIONAL RESEARCH TRAVEL
- 16 STUDENTS RECEIVED FUNDING AS KINSC SUMMER SCHOLARS
- 28 STUDENTS RECEIVED FUNDING TO ATTEND OFF-CAMPUS CONFERENCES
- 94 STUDENTS PERFORMED SUMMER RESEARCH WITH FACULTY IN THE KINSC
- 133 STUDENTS PERFORMED ACADEMIC YEAR RESEARCH WITH FACULTY IN THE KINSC

\*Student research opportunities are funded through the KINSC and through individual faculty grants from the NSF, NIH, and more.



- 6 ASTRONOMY MAJOR
- 6 ASTROPHYSICS MAJORS
- 35 PHYSICS MAJORS
- 40 COMPUTER SCIENCE MAJORS
- 42 MATHEMATICS MAJORS
- 54 CHEMISTRY MAJORS
- 56 PSYCHOLOGY MAJORS
- 72 BIOLOGY MAJORS

\*This figure captures Juniors and Seniors who have declared a major in science. Students do not declare majors until the end of the year.

31

Number of on-campus faculty supervising student researchers

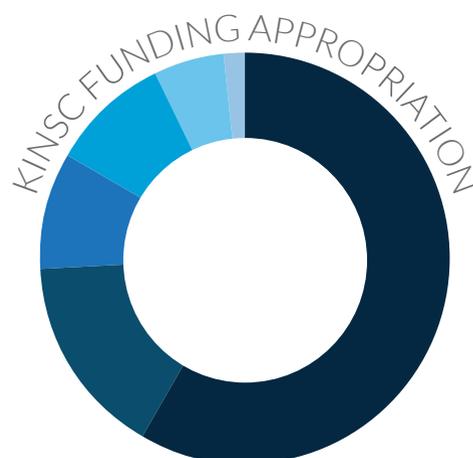
100%

Science majors who graduate with advanced research experience

\$4.75 M

External funding for research being done by our natural science faculty

# 2014-15 KINSC FUNDING INITIATIVES



- STUDENT SUMMER RESEARCH
- STUDENT TRAVEL GRANTS
- FACULTY SPECIAL PROJECTS
- MAST PROGRAM
- EVENTS AND SYMPOSIA
- FACULTY TRAVEL GRANTS

## STUDENT RESEARCH



### KINSC SUMMER SCHOLARS

In 2015, the KINSC supported students **for a 10 week summer research project**. Sixteen students received support for research internships at Haverford and at other colleges and universities across the country. Six of these students worked with faculty on campus, while ten worked in labs in England, Canada, New York, California, Oregon, and Michigan as well as in the Philadelphia area. Selected student profiles from the 2015 Summer Scholars are featured on pages 16 - 18.

## STUDENT RESEARCH FUND

The Student Research Fund provides **travel support for research conducted outside of the Philadelphia area**. The KINSC will fund domestic or international student research during breaks in the academic year. Preference is given to those applying for funds related to senior thesis research. Students traveling to present their research may also receive support from the Louis Green Fund, administered by the Provost's Office.

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## ACCESS AND ACHIEVEMENT ENDOWED FUND

The Access and Achievement Endowed Fund **supports diversity in the sciences** and provides an additional source of funding for science students from underrepresented groups to attend conferences, perform research, take courses, attend workshops, and participate in activities that will enhance their scientific experience as students at Haverford. The Multicultural Scholars Program, supported by this fund, offers workshops for science students from historically underrepresented groups and enables students to perform research during the summer months. Nine students received funding for research through the Access and Achievement Endowed Fund in 2015.

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## INTERNATIONAL TRAVEL STIPENDS

KINSC faculty maintain collaborations with scientists at other institutions throughout the world, creating **opportunities for our students to travel abroad in the course of their research**. International travel stipends are provided by the KINSC or through external funding for faculty projects.

In 2014-15, eight Haverford students traveled abroad to perform research.

- ▶ Ann-Victoria Isaacs '18, Neal Patel '16, and Marco Rivas '18 traveled to Sweden to perform x-ray crystallography of calmodulin-target complexes with Dr. Sara Linse at the Department of Biochemistry and Structural Biology at Lund University.
- ▶ Aurelio Mollo '17 visited Heidelberg, Germany for training on glycopeptide antibiotic research with Dr. Max Cryle at the Department of Biomolecular Mechanisms, Max Planck Institute for Medical Research.
- ▶ Chris Nagele '16 spent the summer at Exeter University in the United Kingdom working to calculate stellar open flux from magnetohydrodynamical simulations with Dr. Sean Matt.
- ▶ Tian Jin '17 attended the International Computer Science Conference in Amsterdam, Netherlands for the 5th Annual International Workshop on Polyhedral Compilation Techniques.
- ▶ Diana Perry '15 examined the effects of modified gold nanoparticles on *Daphnia* with Dr. Tommy Cedervall's research group at Lund University in Sweden.
- ▶ David Reilley '16 spent the summer at the University of Montreal in Canada working on experimental and computational studies of the mechanism of bicyclization of ring systems in peptide mimics with Dr. William Lubell.

## 2014-15 STUDENT CONFERENCE TRAVEL

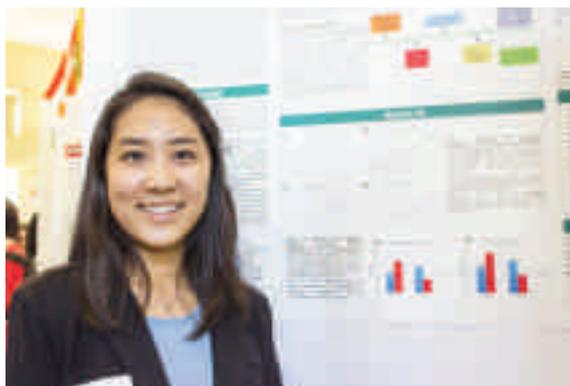
Conferences students attended with funding from the KINSC:

- ▶ American Psychology Association Convention, New York, NY
- ▶ Grace Hopper Celebration of Women in Computing Conference, Phoenix, AZ
- ▶ American Society of Agronomy, Crop Science Society of America Conference, Long Beach, CA
- ▶ Society of Women Engineers and Scientists Conference, Los Angeles, CA
- ▶ Annual Biomedical Research Conference for Minority Students, San Antonio, TX
- ▶ Society for Personality and Social Psychology Conference, Long Beach, CA
- ▶ The American Chemical Society National Meeting and Exposition, Denver, CO
- ▶ Biophysical Society Annual Meeting, Baltimore, MD
- ▶ American Meteorological Society 14th Student Conference /95th Annual Meeting, Phoenix, AZ
- ▶ Presence of Social Support in Relationships/Association for Psychological Science, New York, NY
- ▶ 5th International Workshop on Polyhedral Compilation Techniques, Amsterdam, Netherlands
- ▶ Gulf of Mexico Oil Spill & Ecosystem Science Conference, Mobile, AL
- ▶ 225th Meeting of the American Astronomical Society, Seattle, WA
- ▶ Society for Affective Science Conference, Oakland, CA
- ▶ Association for Women in Mathematics Research Symposium, Baltimore, MD
- ▶ Geological Society of America Northeastern Section Meeting, Bretton Woods, NH

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## 2015 FALL RESEARCH SYMPOSIUM

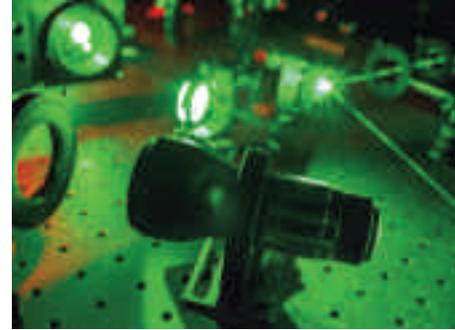
Every year, the KINSC hosts a fall research symposium showcasing the summer work of students from Haverford, Bryn Mawr, Swarthmore, and other area colleges.



# MENTORING AND STUDENT TEACHING (MAST)

The Mentoring And Student Teaching program (MAST) is a long-standing outreach program at Haverford College. The program provides laboratory experiences and writing tutorials for 40-50 Philadelphia area high school and middle school students who come from backgrounds traditionally underrepresented in the sciences. The young students come to the Haverford campus for ten Saturdays during the spring semester. They spend mornings in the lab pursuing scientific experiments and afternoons working on writing skills. Haverford and Bryn Mawr College students prepare the course curricula, devise and teach the science labs, and work with small groups of high school and middle school students as writing tutors.





## MULTIDISCIPLINARY PROGRAMS

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### HEALTH STUDIES MULTIDISCIPLINARY MINOR

This new minor program speaks to all issues of health care and its provision from the perspectives of the sciences, social sciences and the humanities. It directly addresses the intersection of public health and social justice. The Health Studies Minor is designed to provide context to the issues facing health professionals on local, national, and global scales. The structure of this program is intentionally multidisciplinary, bringing scientists together with social science and humanities professors to guide students through the political, cultural and ethical questions that relate to health issues worldwide. The minor is a perfect complement to a more traditional science major, especially for those students planning to go into medicine, nursing, physical therapy, psychotherapy and other clinical fields. It is also designed to give scientific context to students of the social sciences and humanities who are interested in policy, economics, health care management, health education, medical narratives and more. In this Bi-college minor, courses are taught by Haverford and Bryn Mawr faculty across many disciplines.

### ENVIRONMENTAL STUDIES INTERDISCIPLINARY MINOR

The Environmental Studies Interdisciplinary Minor cultivates students' capacity to identify and confront key environmental issues through a blend of multiple disciplines. Since 2011, Haverford, Bryn Mawr and Swarthmore colleges have cooperated to offer a Tri-College Environmental Studies Interdisciplinary Minor, involving departments and faculty in the natural sciences, the social sciences, the humanities and the arts, encompassing historical, cultural, economic, political, scientific and ethical modes of inquiry. Students and faculty together explore the interactions among terrestrial and marine systems, local and global environments, and human societies.

### SCIENTIFIC COMPUTING CONCENTRATION

Many disciplines in the natural and social sciences include components that are explicitly computational, particularly in astronomy, biology, chemistry, economics, and physics. The concentration in Scientific Computing provides students with the opportunity to develop facility with the tools and concepts necessary to apply computation to a scientific problem and explore the computational aspects of their own major disciplines. Students in the Scientific Computing Concentration are required to complete a project-based experience in which computation is applied to investigate a real-world phenomenon.

## APRIL FOOLS DAY IN THE KINSC

In keeping with Haverford College tradition, students celebrated April Fool's Day by decorating the KINSC in a variety of themes. This year, the building was transformed into scenes from *Harry Potter*, *Snow White and the Seven Dwarfs*, *The Matrix*, *Jungle Book* and *The Lego Movie*.



## MULTI-CENTER INITIATIVES

Haverford's inaugural Public Policy Forum, which took place on campus March 21, was a day-long event co-sponsored by the Center for Peace and Global Citizenship, the Koshland Integrated Natural Sciences Center, the Center for Career and Professional Advising, and involved the participation of faculty members and alumni from many different departments of the College. This event featured panels focused on topics such as law, health care, and international and domestic policy. Most of the panelists were Haverford alums working with organizations such as the United Nations, the National Security Council, and the Environmental Protection Agency.



Bruce Agins '75, Medical Director, New York State Department of Health AIDS Institute; Director, HEALTHQUAL International, speaks during the Health Policy Panel at the 2015 Public Policy Forum.

# SUPERLAB: A HAVERFORD TRADITION

Superlab brings together professors from different research areas, and sometimes different departments, to team teach a **stand-alone junior laboratory course dedicated to solving real world problems**. It is a testament to the collaborative spirit in which the KINSC was conceived



Professor Mel Santer was one of the first to teach Superlab in 1964.

Superlab was initiated by the Biology Department in 1964 with the support of an NIH grant, the first such grant to a liberal arts college. Though students report spending up to **20 hours a week in the laboratory** and rate it as one of their most challenging courses, many also rate it as the best class they've taken.

Teaching the lab in a stand-alone format and not requiring that each lab be keyed to a particular set of lectures allows students to explore several experimental problems per year under the guidance of a pair of experienced faculty members teaching in their areas of expertise. Students learn to be independent thinkers and researchers. Outside the formal laboratory periods, students have **24-hour access to the laboratories** so they can continue to work on their experiments and analyses.

**Close faculty-student relationships** are developed over the long hours spent in lab together. The availability of excellent equipment, along with carefully designed experiments, allows each student to work with state-of-the-art technology to answer the experimental question posed at the beginning of the lab. Superlab prepares students to take on the high-level research required of all senior science majors.

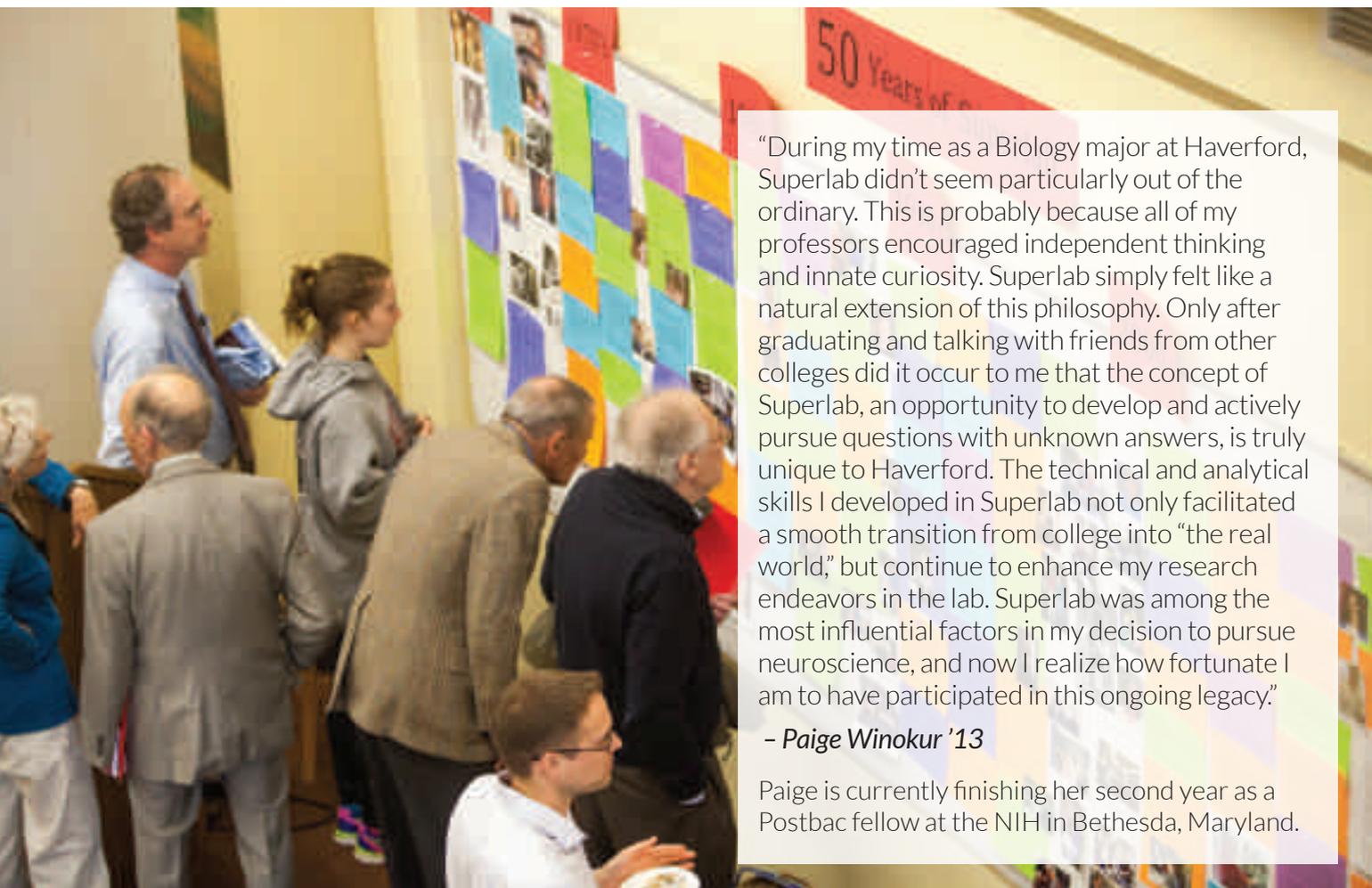
In addition to designing and conducting their own experiments, students develop excellent record-keeping skills and learn how to present their findings clearly in both written and oral form. Students present their results as a poster, talk or paper at the end of each seven-week section. **Students who have completed Superlab are in demand** around the region as summer research interns, and as research assistants after graduation.





## CELEBRATING 50 YEARS OF SUPER LAB

On April 30, 2015, students, faculty, and alumni gathered to mark the 50th anniversary of Superlab. The event featured a Poster Session highlighting student work in the three Superlab classes from the Spring 2015 semester. Alumni contributed photos and memories of their experiences in Superlab, which were on display, and emeritus faculty members spoke about the development of this innovative classroom-based approach to scientific research.



“During my time as a Biology major at Haverford, Superlab didn’t seem particularly out of the ordinary. This is probably because all of my professors encouraged independent thinking and innate curiosity. Superlab simply felt like a natural extension of this philosophy. Only after graduating and talking with friends from other colleges did it occur to me that the concept of Superlab, an opportunity to develop and actively pursue questions with unknown answers, is truly unique to Haverford. The technical and analytical skills I developed in Superlab not only facilitated a smooth transition from college into “the real world,” but continue to enhance my research endeavors in the lab. Superlab was among the most influential factors in my decision to pursue neuroscience, and now I realize how fortunate I am to have participated in this ongoing legacy.”

– *Paige Winokur '13*

Paige is currently finishing her second year as a Postbac fellow at the NIH in Bethesda, Maryland.



# SUMMER RESEARCH SNAPSHOT

*By Jack Hasler '15*

Katie Tsai '16 and Emily Winesett '16 spent their summers in Assistant Professor of Chemistry Lou Charkoudian's lab researching how fungi and bacteria create natural antibiotics and how these processes can be replicated. Their results will be immediately helpful for fellow researchers, but, long-term, their work could have significant repercussions in the pharmaceutical and alternative-fuel industries.

Tsai's research focuses on creating new ways to understand the structure of proteins. "It entails using an infra-red-activated cyanide probe to understand the binding behaviors of acyl carrier proteins and their partner enzymes in polyketide synthase and fatty acid synthase systems," she explains. In other words, she uses vibrating probes to figure out the structure and functions of various types of proteins.

Tsai came to Haverford expecting to major in biology, but professors like Charkoudian (a 2003 graduate of Haverford) inspired a change of heart. "Organic chemistry was probably one of the most rewarding classes I've taken at Haverford," says Tsai, who, as a biochemistry concentrator, has found a way to incorporate both of her interests into one field of study. "And it's what inspired me to become a chemistry major."

Winesett's work focuses on a special type of molecular bond, called aryl-aryl bonds, which are incredibly difficult and expensive to produce synthetically because the process requires toxic chemicals. "Bacteria make these same bonds using enzymes," says Winesett. "If you can figure out what enzyme is performing this reaction and if it needs any cofactors, the hope is that you could then use this enzyme to make the bond rather than chemicals which would damage the environment--hence an environmentally friendly biocatalyst."

For Winesett, who is also a pitcher for the women's softball team, the Chemistry Department's Superlab course and its advanced, inquiry-based introductory class prepared her for this independent research in Charkoudian's lab.

Both Tsai and Winesett have expanded their current research into their senior theses for the 2015-16 academic year.

Three additional students, Josh Bulos '16, Aurelio Mollo '17, and Grace Thiele '17, worked alongside Tsai and Winesett this summer in Charkoudian's lab.

# SUPPORTING FACULTY RESEARCH

Faculty special grants have been used to provide seed money to generate preliminary data that can be used in writing new grant proposals, to support small, discrete projects that do not meet the size criteria for federal funding or occasionally to supplement work done on federal grants in order to bring projects to completion.



Jennifer Lilgendahl & Benjamin Le  
*Associate Professors of Psychology*

With support from the KINSC, and in collaboration with a colleague at Western Washington University (WWU) we launched the Identity Pathways Project (IPP) at Haverford College in 2013. The project aims to understand how students transition to college, develop their academic and career goals, navigate existing and new relationships, and change during this four-year phase of their lives. We are studying identity development through the lens of students' own voices, in the context of how they narrate and derive meaning from both academic and social experiences.

This is really important research for Haverford because it investigates how students come to develop their academic passions and career identities, as well as cultivate interpersonal relationships. There is much past research demonstrating that these are two very important goals for college students, and we hope that our work will highlight how the College is facilitating students' growth, and where we can improve the ways we are supporting them. Of particular interest in this regard is our focus on understanding the development of science and math-related career interests and how to improve persistence in these fields, particularly among women and underrepresented minority groups. This project is also groundbreaking because it is the first research that uses a narrative approach to investigate how young adults form and maintain their relationships.

We are excited to report that in the summer of 2015 we were awarded a five-year, collaborative NSF grant to fund our continuing research at Haverford and WWU. This grant has allowed us to substantially increase our sample size by adding current freshman from both campuses to the study. The grant will also allow us to expand our focus on a critical issue facing colleges today: how to facilitate student persistence in STEM (science, technology, engineering, and math) fields.

During the summer of 2015, Dela Scharff '16 and Elyse Adler '16 worked as research assistants on the project. With support from the KINSC and the Provost's Green Fund, they presented some of their findings at the 2016 meeting of the Society for Personality and Social Psychology in San Diego, CA in January.

Read more about this project at [identitypathwaysproject.org](http://identitypathwaysproject.org).

# STUDENTS IN THEIR OWN VOICES

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*“Thanks to the scientific inquiry skills I had developed in my courses at Haverford, I was trusted with the responsibility of not only assisting a post-doctoral fellow with her research but also running my own experiments.”*

*– Sarah Waldis '16*

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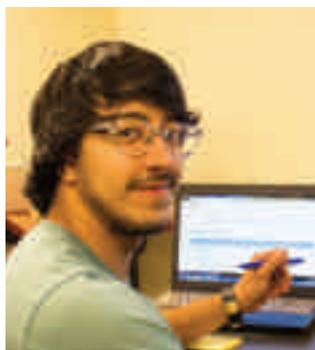
## **Sarah Waldis '16**

*Research Internship at the Children's Hospital of Philadelphia*

One of the aspects that drew me to the sciences at Haverford College was the wealth of opportunities available for undergraduate students to gain hands-on experience with real-world research, both inside and outside the classroom. This past summer, thanks to funding from the KINSC

Summer Scholars program, I was given the opportunity to work as a student research assistant in Dr. Stella Chou's pediatric hematology-oncology lab at the Children's Hospital of Philadelphia. In the Chou lab, the projects I assisted with specifically focused on understanding the role of the mutated gene GATA-1 in promoting anemia (deficiency of red blood cells) and leukemia (cancer of the blood-forming tissues). Thanks to the scientific inquiry skills I had developed in my courses at Haverford, I was trusted with the responsibility of not only assisting a post-doctoral fellow with her research but also running my own experiments. My time in Dr. Chou's lab has been invaluable in shaping

my experience as a student, preparing me to undertake my own senior thesis this year, as well as in shaping my future career plans, inspiring me to pursue a career in medicine that balances clinical practice with bench top research.



## **Luis Loza '17**

*Astrophysics Research Internship at Haverford College*

My summer research consisted of analyzing gas motions and interactions in a simulated interstellar medium (IMS) in Professor Desika Narayanan's lab. Working on this research over the summer has been quite fruitful. Coming in, I was expecting to learn some computer coding in Python, which I did. In addition to this, I learned how to work with a computer visualization and analysis toolkit, yt, to analyze the simulation data. These are a few technical things I had expected to learn when doing my research; however, I also learned more physics than I thought I would. I worked with computer simulation data, but through this, I applied more theory and knowledge of physics than I thought I

would. Specifically, I learned a lot more about shock wave physics which I had no previous knowledge of before my research. Working on this research also impacted my thoughts about my academic and career plans. Before the start of the summer, I was still unsure about which career path would interest me. Reflecting back on my experiences in lab during this summer, however, I have definitely gained insight and clarity on what career path I want to take. I had no research experience before, and this summer gave me insight in how research works and progresses in astronomy. I have a better sense of direction thanks to my research experience and am now more aware of the different fields in astrophysics I could pursue in graduate school.



### David Cookmeyer '16

#### *Cancer Research Internship at the University of Pennsylvania*

One great thing about the sciences at Haverford is that the KINSC provides significant support to students interested in conducting research, even in labs at other institutions. For the past year and a half I have been able to work in Dr. James Riley's lab at the University of Pennsylvania. With support from Haverford's chemistry department I was able to continue work there during my junior year for academic credit. I was then funded by the KINSC this past summer to work full time in Dr. Riley's lab, and am now completing my senior thesis research there, with support from my thesis advisor, Dr. Lou Charkoudian, at Haverford. My research in the Riley lab is focused on understanding the biochemical mechanisms underlying the development of anaplastic large cell lymphoma (ALCL), a highly aggressive non-Hodgkin's lymphoma that largely affects pediatric patients. My time in Dr. Riley's lab has allowed me to see the basic research underpinning today's novel cancer treatments, and recently I've even been able to observe clinical trials in human patients that apply the very same treatments that some researchers in our lab study. These experiences have put me on a path towards oncology and cancer research as a career, and needless to say they would not have been possible had I not been supported by the KINSC and Haverford's Chemistry Department. In fact, I've recently been offered a job working in Dr. Riley's lab during my gap year before medical school, and so quite literally the support I've received from Haverford has been instrumental in informing my future career in cancer research.



### Amanda Fleming '16

#### *Research Internship at the University of Pennsylvania*

This past summer, I was awarded a KINSC Summer Scholars stipend to work in a neurobiology laboratory in the Department of Neurosurgery at the University of Pennsylvania. My research focused on characterizing the role of a transcription factor in the development of the mouse cerebellum. Deciphering the role of this transcription factor in development may enhance our understanding of developmental diseases in humans, such as microcephaly. During my time in the lab, I gained experience with laboratory techniques such as RNA in situ hybridization, Nissl staining, and cryosectioning. However, the scope of my learning extended far beyond laboratory techniques. Working with Dr. Dahmane taught me how to "think" like a scientist. With her guidance, I learned how to ask the right questions and contemplate methods for answering such queries. This experience has proven pivotal in my academic and career planning. For the majority of my undergraduate career, I planned on applying to medical school. However, my experience this summer helped me to recognize that I love the critical thinking, problem solving and creativity required for research. I find it incredibly exciting to ask questions for which the answers remain unknown and push the boundaries for what we think we understand in neurobiology. Presently, I am considering applying to M.D.-Ph.D. or Ph.D. programs and will continue work in Dr. Dahmane's lab after graduation, studying the development of brain asymmetry between cerebral hemispheres in mice.

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*"... I love the critical thinking, problem solving and creativity required for research. I find it incredibly exciting to ask questions for which the answers remain unknown and push the boundaries for what we think we understand in neurobiology."*

*- Amanda Fleming '16*

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## Levi Bowers '17

### *Microbiology Research Internship at Haverford College*

The research I completed in Professor Iruka Okeke's lab this summer investigated the surface protein interactions that help mediate autoaggregation, an important process. This summer doing microbiology research was one of the most influential summers I have had in terms of how it will shape the rest of my academic and professional life. I came into this summer hoping to gain experience that medical schools want to see, but I came out with something much more than a resume booster. During the course of the summer, I realized that research in a microbiology lab (and probably any lab) is something that I not only can do for an extended period of time, but also is something that I want to do for a long time. The idea of knowing something and finding something before the rest of the world really makes me excited, and doing that in a way that could change medicine to the benefit of people around the world could not make me happier.

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*The idea of knowing something and finding something before the rest of the world really makes me excited, and doing that in a way that could change medicine to the benefit of people around the world could not make me happier. -Levi Bowers '17*

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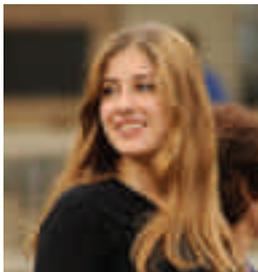
## ATTENDING CONFERENCES

### Elizabeth Fishman '16

#### *The Mid-Atlantic Regional Zebrafish (MARZ) Conference*

Thanks to funding from the KINSC and Louis Green Fund, I was able to attend my first professional conference, The Mid-Atlantic Regional Zebrafish (MARZ) conference. I attended talks and poster sessions that introduced me to current research and techniques utilizing zebrafish as a model organism. This prepared me for my thesis research on the neurobiology of decision making in zebrafish. The most rewarding aspect of attending the conference was listening to people present their research. I observed both strong and poor techniques for presenting at the conference, which was an especially helpful experience as I prepare to present my own research at the end of the academic year. I am very fortunate to have been given the opportunity and funding to travel off-campus and expand my scientific knowledge and network. The experiences I have had during my undergraduate education at Haverford will hopefully make me a more competitive applicant as I further pursue biology research after I graduate in the spring.





### Cecily van Buren-Freedman '16

*Association for Psychological Sciences Conference*

This summer, I received funding from the KINSC and Louis Green Fund to attend and present my independent psychology research at the Association for Psychological Sciences conference in

New York City. My study was on emotional support in heterosexual spousal relationships, and was the culmination of two years of research for Prof. Shu-wen Wang. Presenting at a conference was an unbelievable experience as it showed me the validity of my work outside of the college sphere, and also just how unique my Haverford research education has been. Although I didn't think at all about research opportunities when I was deciding which college to attend, I realize now how large a factor this was in determining the quality of my college experience. Going to a school without a graduate program enabled me to have graduate level research experiences as an undergrad. Instead of being one of 50 research assistants, I was one of two students working on my project, and we were in charge of the entire study from conception to presentation. Having this kind of comprehensive research experience has been incredibly beneficial, and I know that the work I have produced, as well as my relationship with my professor mentor, will serve me well long after I've graduated.

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*“Presenting at a conference was an unbelievable experience as it showed me the validity of my work outside of the college sphere, and also just how unique my Haverford research education has been.”*

**- Cecily van Buren-Freedman '16**

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### Cory Saunders '17

*Association for Women in Mathematics Research Symposium*

With the generous financial support of the KINSC, I attended the two-day Association for Women in Mathematics Research Symposium with my math professor Elizabeth Milicevic. Although I knew from the beginning of freshman year that I wanted to be a math major, I had yet to experience the professional world of mathematicians sharing their research with each other. At the conference, I listened to dozens of talks from empowering women mathematicians from fields of mathematics I didn't even know existed. I

especially enjoyed a series of accessible talks on math education, which helped push me to declare a Concentration in Math Education. By attending this first conference, I was much more confident and prepared when I presented a poster during my Math REU the following summer. The conference was an environment in which being a woman mathematician was celebrated. This was a powerful and relevant experience for me because I was taking a seminar co-taught by professors Beth Willman and Jeff Tecosky-Feldman on the “Persistent Lack of Diversity in the Sciences.” My math professor not only informed me about this conference, but also offered to drive me both ways as she was presenting her own research as well. During the long car ride, she offered advice on graduate school, being a professor, balancing teaching and research, and landing a job in academia. I am grateful that Haverford is a community of professors who gladly take their time to talk with students one-on-one and share their experiences outside of the classroom.

## KINSC Steering Committee

**Judy Owen**

Director, Koshland Integrated Natural Sciences Center, Elizabeth Ufford Green Professor in the Natural Sciences and Professor of Biology

**Marielle Eaton**

Program Coordinator

**Kate Heston**

Instructor of Biology

**John Mosteller**

Assistant Vice President for Academic Resources

**Desika Narayanan**

Assistant Professor of Astronomy

**Jeffrey Tecosky-Feldman**

Senior Lecturer in Mathematics,  
Director of Multicultural Scholars Program

## Student Advisory Committee

This committee is appointed each year and meets regularly with the Program Coordinator and annually with the Steering Committee as a whole.

**Sarah Betti '17**

**Xiwen Jia '19**

**Helen Jung '18**

**Geoffrey Martin-Noble '16**

**Isfar Munir '18**

**Alana Thurston '16**

For more information about studying in the natural sciences at Haverford College, please visit:

[haverford.edu/KINSC](http://haverford.edu/KINSC)



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