

MOMENTUM

A Newsletter of the Clare Boothe Luce Program

April 15th, 2015: Volume 2, Issue 1





Jessica Elinburg and Elisabeth McClure, CBL Undergraduate Research Scholars at Emory, interest children in scientific research at the Atlanta Science Festival

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Courtesy of the Clare Boothe Luce Archives

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About the Clare Boothe Luce Program

Since its first grants in 1989 the Clare Boothe Luce Program (CBL) has become the single most significant source of private support for women in science, mathematics and engineering. Clare Boothe Luce, the widow of Henry R. Luce, was a playwright, journalist, U.S. Ambassador to Italy, and the first woman elected to Congress from Connecticut. In her bequest establishing this program, she sought "to encourage women to enter, study, graduate, and teach" in science, mathematics and engineering. Thus far, the program has supported more than 1900 women.

Clare Boothe Luce Program Director's Corner

April 2015 CBL *Momentum!* Newsletter

Welcome to the Spring 2015 edition of the Clare Boothe Luce Program newsletter *Momentum!* 2014 was a very exciting year for the CBL Program. Last year, we kicked off activities to celebrate 25 years of the Clare Boothe Luce Program with the release of new program brochures and the launch of *Momentum!* We are continuing the celebration in 2015 with a Clare Boothe Luce 25th Anniversary Professors Conference. This event is being organized and will be hosted by Clare Boothe Program "Designated Institution" Fordham University at their Lincoln Center (Manhattan) campus. Please see the piece included in this edition for more information about this exciting event!

We'd like to thank everyone who took time to submit articles and photos. Please note as you are reading the articles that CBL Program Guidelines for the "Designated Institutions" (those that were named in Mrs. Luce's bequest to receive funds in perpetuity), vary somewhat from those for "Invited Institutions" (those that participate in the open competition for Clare Boothe Luce grants). For example, Biology is an accepted field for Designated Institutions, as this enables the schools named in Mrs. Luce's bequest to fully capitalize on their particular institutional strengths in the STEM fields. Also, any international travel mentioned was funded by recipients' institutions, not the CBL program.

Congratulations to all of the Clare Boothe Luce Undergraduate Scholars, Graduate Fellows, and Professors featured this edition of *Momentum!* Please join us again in celebrating their outstanding activities and accomplishments! Enjoy and Happy Spring! Carlotta M. Arthur, Program Director

Meet the newsletter team!

Carlotta M. Arthur – Director, Clare Boothe Luce Program

Carlotta earned a B.S. in Metallurgical Engineering from Purdue University, and worked for ten years in the aerospace and automotive industries before completing an M.A. and Ph.D. in Clinical Psychology, with a specialty in Psychophysiology, at the State University of New York at Stony Brook. Carlotta was a member of the inaugural cohort of the W.K. Kellogg Scholars in Health Disparities postdoctoral fellowship program at the Harvard School of Public Health. Carlotta also taught at Meharry Medical College in Nashville and later at Smith College. Prior to joining the Foundation, she served on the staff of the Andrew W. Mellon Foundation. In her free time, Carlotta enjoys yoga, digital photography, jewelry making, and travel.



From left: Bridget, Carlotta, and Eleanor

Bridget Talone - Clare Boothe Luce Program Assistant

A graduate of Sarah Lawrence College, Bridget worked in arts administration and event planning for the Geraldine R. Dodge Poetry Festival and Program before pursuing her M.F.A. at the Iowa Writers Workshop. While at Iowa, Bridget was awarded an Iowa Arts Fellowship, The John Logan Poetry Prize and The Donald Justice Award for Poetic Excellence. After graduation, Bridget taught writing at Rosemont College and held an editorial position with the independent poetry press Saturnalia Books. She joined the Foundation in 2013. When she's not at work, Bridget is either immersed in New York's vibrant literary scene or looking for a quiet place to write.

Eleanor Burgess - Web Editor/Newsletter Designer

Eleanor earned a B.A. in History from Yale University, and has taught English, Global History, and Creative Writing at Brookline High School, Hopkins School, and the American School in London. Eleanor is a playwriting fellow at the Huntington Theatre in Boston, and her play *Mocha* debuted in Austin, TX in 2013. When she is not writing or editing, Eleanor is generally reading, especially history books.

LET'S GO HUNTING

The Trinity Washington University Genome Annotation Initiative

By Dr. Karobi Moitra



Have you ever wondered how some organisms can survive in the extreme environment of hot springs or in the icy wilderness of the Arctic? The secret lies encoded in their genomes within the myriad genes that make up their genetic material.

The Biology/Biochemistry students at Trinity Washington University under the mentorship of Clare Boothe Luce Assistant Professor of Molecular Biology, Dr. Karobi Moitra are delving into this mystery to understand how methanogens (methane producing organisms) like ancient archaea (bacteria-like organisms) can survive under extreme conditions of oxygen deprivation inside underground sewers. But what exactly is genome annotation? It is the process of linking 'biological information' to 'gene sequences' in the genome

of an organism. By annotating predicted genes students can connect these genes to proteins and predict their cellular functions. The larger scientific question that this research project is linked to is - What can the sequence of an organism's genome tell us about its overall biology?

Dr. Moitra recently travelled to the 64th Annual Meeting of the American Society of Human Genetics last year to present the work carried out by her students.

In order to answer this question we are using the Genomics Education National Initiative- Annotation Collaboration Toolkit (GENI-ACT) developed by the Joint Genome Institute's genomics and bioinformatics education program. Students in Introductory Genetics and Cell & Molecular Biology classes are annotating predicted genes of Methation Collaboration Toolkit (GENI-ACT) developed by the Joint Genome Institute's genomics and bioinformatics education program.

Students in Introductory Genetics and Cell & Molecular Biology classes are annotating predicted genes of *Methanothermobacter thermautotrophicus* and *Methanobacterium* sp. SWAN-1 both methanogenic archaea using a virtual learning environment—an electronic laboratory notebook connected to the annotation toolkit.

To date the students have annotated over 60 genes and have periodically presented their research work in the form of poster symposiums. Dr. Moitra has also been awarded a travel grant by the Microbial Genome Annotation Network (MGAN) with the aid of which she travelled to San Diego, CA to



One of Dr. Moitra's students, shown next to her poster on genome research

the 64th Annual Meeting of the American Society of Human Genetics last year to present the work carried out by her students.

The ge-

nome annotation laboratory module provides students with an inquiry-based project where students can learn about the scientific method and put it into practice by hypothesizing protein-coding genes for a segment of a prokaryotic genome.

Students collect evidence in support of or against their hypotheses using the toolkit provided in GENI-ACT. This project is a very engaging way to integrate original scientific research into the curriculum, and we at Trinity have succeeded in creating a vibrant research environment in which our students can grow and thrive.



Dr. Moitra

News from our Network

Three new CBL program grantees announce their plans to support scholars:

<http://www.olin.edu/news-events/2015/olin-college-announces-2015-clare-boothe-luce-research-scholars/>

<http://www.stevens.edu/sit/diversity-and-inclusion/clare-boothe-luce-scholarship>

<http://www.stmarys-ca.edu/saint-mary%E2%80%99s-receives-clare-boothe-luce-grant-to-establish-women-in-science-scholars-program>

From the Archives

University of Colorado's first ever Clare Boothe Luce Professor!

<http://artsandsciences.colorado.edu/magazine/2010/10/physicist-wins-cu%E2%80%99s-first-ever-clare-boothe-luce-professorship-award/>

Living Lab Takes Root at Olin College

As first year students, Clare Boothe Luce Undergraduate Research Scholars Carly Ingrao and Mariko Thorbecke were captivated by the idea of creating a living lab on the campus of Olin College of Engineering. The project had initially been conceived by their advisor, Associate Professor of Design and Mechanical Engineering Professor Ben Linder, as a way to incorporate environmental and sustainability practice into the classroom through the creation of a zero-energy building with wet lab and greenhouse spaces. Net zero is the idea that the total amount of energy used by the building on an annual basis is equivalent to the amount of renewable energy produced on the site – a true engineering challenge.

Although it was initially dreamed up by a faculty member, the Living Lab is a true student-driven project that will model, plan, and design all of the systems (including the solar electric, water catchment/treatment, and annualized solar gain heating/cooling systems) for the off-the-grid wet-lab project space. “It was our dream project,” says Carly Ingrao who, with Thorbecke, quickly set about

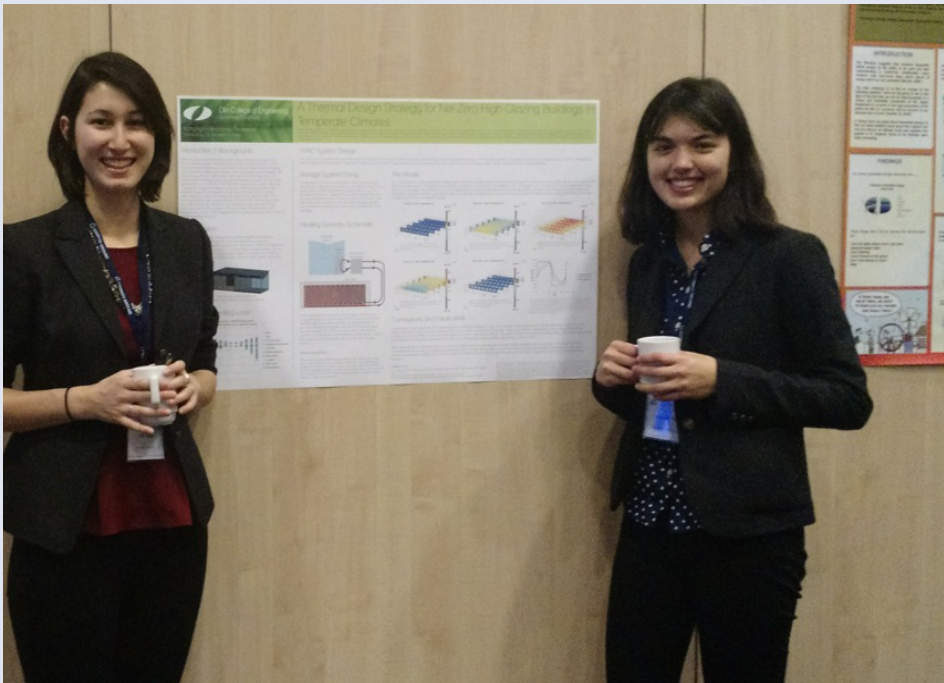
“This research has really allowed me to get my hands dirty in a field I can see myself getting into and loving.”

investigating the feasibility of building a living lab on Olin’s 14-year-old suburban campus. Early on, the two decided to focus on building systems rather than starting with the design esthetics. “We looked at the heating and cooling of the building. HVAC accounts for 50 percent of a building’s energy costs. We took it upon ourselves to do some thermal-modeling,” says Thorbecke.

As Ingrao and Thorbecke continued on with their studies they gained some useful engineering skills and applied them to their research. Specifically, Thorbecke took a class that explored in-depth heat transfer and fluid dynamics called Transport Phenomena. The students learned how to use a software tool which allowed them to modify the flow of heat in different materials thus directly applying classroom learning to the project. “We were able to use knowledge from class to create a computer model in simulation software,” Thorbecke. They ended up with a schematic drawing and a thermal design strategy for net-zero buildings in temperate climates.

Ingrao and Thorbecke created a 30-page program summary including goals, basic designs, overview of the project and a cost analysis. With the document in hand, Ingrao and Thorbecke presented their project to the Vice President of Operations and CIO Joanne Kossuth and the Director of Facilities at Olin College, and to student, faculty, and staff groups on campus and at an international conference in Copenhagen.

Ben Linder, the students’ advisor, says the research Ingrao and Thorbecke conducted could have an impact beyond Olin’s campus. “Carly and Mariko are doing the analysis that needs to be done to advance the Living Lab project as a truly self-sufficient



Ingrao, left, and Thorbecke pose with their research poster

building, and in the process contributing to basic research on green building design,” says Linder.

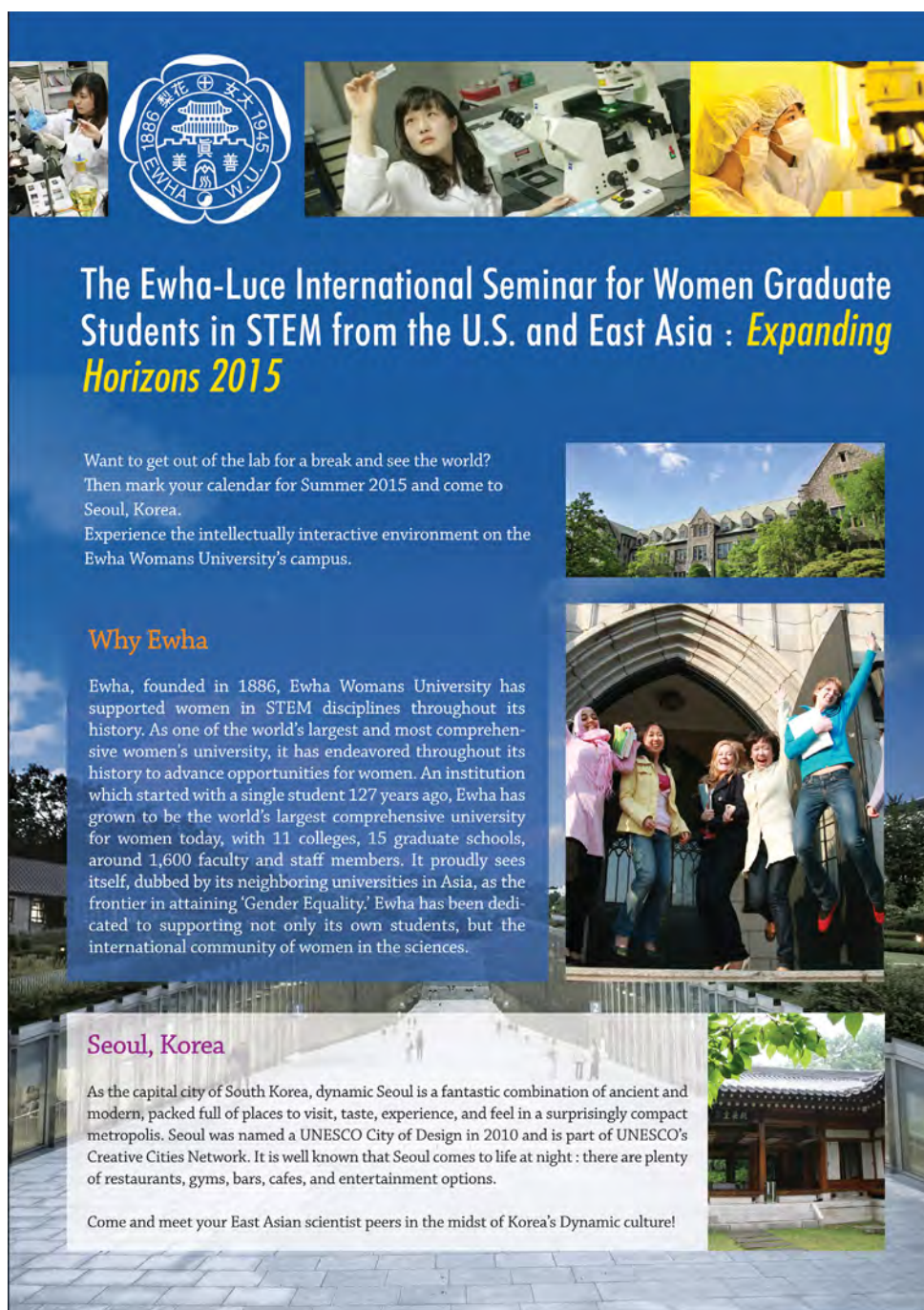
Recently, Thorbecke and Ingrao took a minute to reflect back on their experience. “I think the highlight for me was attending a sustainability conference in Copenhagen and presenting our work . . . I don’t quite know where I want to be in 10 or 20 years. But I do know I want to be working towards

a more sustainable society,” says Thorbecke. Ingrao echoed those sentiments, “CBL provided me with the opportunity to not only network with industry professionals in the New England area, but to travel across the world to present among some of the brightest individuals in many fields of sustainability . . . This research experience has really allowed me to get my hands dirty in a field I can see myself getting into and loving.”

Ewha Womans University Launches *Expanding Horizons* program!

The *Expanding Horizons* Program, funded by a Luce Foundation 75th Anniversary Initiative grant award of \$1.5 million to Ewha Womans University, in Seoul, Korea, will launch summer 2015! The program will take place on the Ewha campus, and will be an 18-day experience, June 22 through July 9th.

The program will include ten days of seminar and lecture activity in STEM fields, tours of STEM research and industrial facilities, and visits to Korean historical sites and cultural attractions. It is particularly designed to allow ample time for peer interaction and for one-on-one meetings between students and faculty members. Nine to ten Clare Boothe Luce Graduate Fellows will be making the trip to Seoul and participating this summer! They will be joined by an equal number of participants from Asia. We will share stories and photos from the 2015 *Expanding Horizons* program in a later edition of *Momentum*!



The Ewha-Luce International Seminar for Women Graduate Students in STEM from the U.S. and East Asia : *Expanding Horizons 2015*

Want to get out of the lab for a break and see the world?
Then mark your calendar for Summer 2015 and come to Seoul, Korea.
Experience the intellectually interactive environment on the Ewha Womans University's campus.

Why Ewha

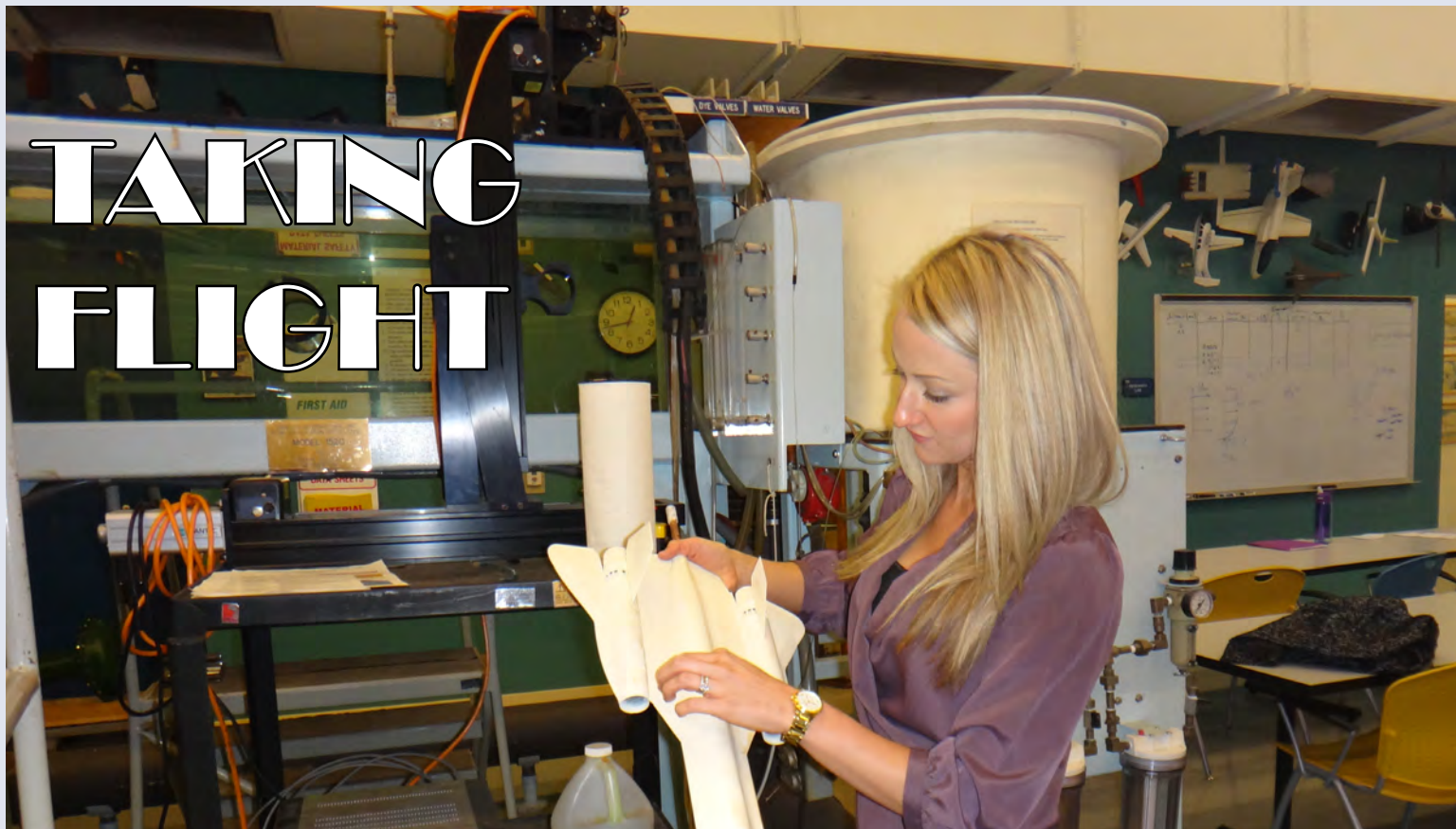
Ewha, founded in 1886, Ewha Womans University has supported women in STEM disciplines throughout its history. As one of the world's largest and most comprehensive women's university, it has endeavored throughout its history to advance opportunities for women. An institution which started with a single student 127 years ago, Ewha has grown to be the world's largest comprehensive university for women today, with 11 colleges, 15 graduate schools, around 1,600 faculty and staff members. It proudly sees itself, dubbed by its neighboring universities in Asia, as the frontier in attaining 'Gender Equality.' Ewha has been dedicated to supporting not only its own students, but the international community of women in the sciences.

Seoul, Korea

As the capital city of South Korea, dynamic Seoul is a fantastic combination of ancient and modern, packed full of places to visit, taste, experience, and feel in a surprisingly compact metropolis. Seoul was named a UNESCO City of Design in 2010 and is part of UNESCO's Creative Cities Network. It is well known that Seoul comes to life at night : there are plenty of restaurants, gyms, bars, cafes, and entertainment options.

Come and meet your East Asian scientist peers in the midst of Korea's Dynamic culture!

TAKING FLIGHT



Two CBL Graduate Fellows at St. Louis University are doing advanced academic work with serious implications for industry - and for other women.

Miranda Pizzella and Mary Jennerjohn are completing their second year as Clare Boothe Luce Graduate Fellows at Parks College of Engineering, Aviation and Technology at Saint Louis University. They are pursuing PhDs in Aerospace Engineering with a concentration in Thermal Fluid Science.

Pizzella uses computational fluid dynamics (CFD) to predict normal shock wave boundary layer interactions. Her research impacts supersonic aircraft inlets, the portion before the engine that makes it go from supersonic to subsonic.

Jennerjohn's research impacts efficiency of gas turbine engines. She is involved in designing the Parks College Polysonic Wind Tunnel, which will be capable of subsonic, transonic, and supersonic test conditions and will be used for experimental research.

As CBL Graduate Fellows, Pizzella and Jennerjohn

have been taking classes, training on software, doing literature reviews, teaching labs, researching, and mentoring undergraduate students, especially women. Both have authored or co-authored a paper which was presented.

Pizzella and Jennerjohn have enjoyed being Teaching Assistants (T.A.) in Fluid Dynamics labs. Both have also served as Lead T.A. for these labs, ensuring that labs run smoothly, equipment is operating and T.A.s are grading consistently and covering the correct material. Jennerjohn is excited about her work and loves to share that enthusiasm with the students in her labs. "I give a mini-lecture before each lab about how what the students are learning applies to the real world," she said. "I think it's important for students to understand that."

Mentoring younger women is something that Pizzella and Jennerjohn are passionate about. They often advise undergraduate women about how to prepare for graduate school. In addition, they have

prepare for graduate school. In addition, they have participated in Introduce a Girl to Engineering Day, an event for high school girls to learn more about engineering fields. It is part of the international Engineer's Week. Pizzella and Jennerjohn have had the opportunity to talk to girls about what it is like being women in a STEM field, how they found their paths, and what courses they should take to position themselves for success.

While Pizzella and Jennerjohn are mentoring, they are also being mentored. They are grateful for the support they receive from the Dean and faculty at Parks College.

"I give a mini-lecture before each lab about how what the students are learning applies to the real world," Jennerjohn said. "I think it's important for students to understand that."

"We have a great advisor, Dr. Mark McQuilling," remarked Jennerjohn. "He's willing to spend time to mentor and foster opportunities and see us grow and succeed as graduate students".

Pizzella agreed. Dr. McQuilling offered her the opportunity to teach two weeks of a Gas Dynamics class. She prepared and delivered 50 minute lectures three times each week, held office hours and gave quizzes. "I got to see what a career in academia might be like," she said.

Both women are proud and grateful to be CBL Graduate Fellows. "I would not have been able to attend graduate school without the CBL Graduate Fellowship. I'm grateful," said Jennerjohn.

"It means a lot to me that I am supported by the Luce Foundation," Pizzella added. "I'm proud to be a representative for women in STEM fields in the classroom and labs, to encourage other women to go into these fields."



Mary Jennerjohn at Parks College of Engineering, Aviation and Technology, Saint Louis University

What's next for Pizzella and Jennerjohn? Both were accepted into the *Expanding Horizons* program hosted by Ewha Women's University in Seoul, Korea this summer. Long-term, they are interested in possible careers in academia, but intend to pursue positions in industry first.

"I want to stay in St. Louis," remarked Pizzella. "I'll go into industry for a few years and then maybe into academia later. I like the idea of interacting with students."

Jennerjohn agreed. "I'm focused on a career in industry right now but I do want to continue mentoring other women. That's important."

"I refuse the compliment that I think like a man. Thought has no sex. One either thinks or one does not."

- Clare Boothe Luce

The Start of Something Great:

Checking in with a CBL Professor, Seven Years On

by Steffanee Wang

Associate Professor of Chemistry Emily A. Weiss was awarded the Clare Boothe Luce Professorship in 2008. Since then, she has gone on to receive a number of other important fellowships, including the Packard Fellowship for Science and Engineering (2010), the Camille Dreyfus Teacher-Scholar award (2014), and the Irving M. Klotz Research Professorship (2013).

At Northwestern, Weiss says, she has received a great deal of encouragement and support. She believes the Clare Boothe Luce Professorship was an important factor in pushing her career forward, and that it helped to create a momentum that is very valuable to young scientists.

Weiss has since been invited to speak and present her work at numerous conferences, including the 2014 American Chemical Society conference in Dallas, where she was named the Kavli Emerging Leader in Chemistry. About 1,500 people attended her lecture — “probably the largest audience I’ll have in my career,” Weiss said. Her talk was broadcast on YouTube, and she gained further exposure from a webinar and a press conference.

Weiss’ research group at Northwestern focuses on energy conversion. Working with a group of about 20 graduate and post-graduate students, she studies the movement of electrical currents between complex materials. Leading such a team, she says, is another enriching and rewarding part of her career.

“The first-year grads are book-smart, but they have yet to do serious research in the lab,” Weiss said. “During their first year or two, they learn more than they ever did before about chemistry.”

“The first-year grads are book-smart, but they have yet to do serious research in the lab. During their first year or two, they learn more than they ever did before.”

And if she’s done her job right, they can more than hold their own with her when she reviews their research. “It’s great to argue with them, work with them and to see their knowledge and experience grow,” Weiss said. “That’s the most rewarding part of being able to work with my research students.”

In fact, Weiss finds that her academic career isn’t only about science, but also about the opportunity to mentor and motivate others. “It’s a bit of psychology, learning what makes people tick,” she said. “I also like gathering data and attacking complex problems and the chance that you’ll come up with something that makes an impact. That’s really motivating.”



Emily A. Weiss, awarded a CBL Professorship in 2008



Clare Boothe Luce Program to Mark 25 Years With Conference for Professors

In November, the Clare Boothe Luce Program will mark its 25th anniversary with an event in New York City featuring some of today's most accomplished women in the sciences, including a onetime science advisor to President Bill Clinton and the first woman to become a full professor of chemistry at Harvard.

The event—titled Women in STEM Leadership: Clare Boothe Luce 25th Anniversary Professors Conference—will be held Nov. 8 and 9 at Fordham University, and it will celebrate all that the program has done to inspire women to pursue careers in science, technology, engineering and math (STEM) since its founding.

"Fordham is honored to partner with the Henry Luce Foundation in marking this important milestone for the Clare Boothe Luce Program," said Amy Tuininga, interim chief research officer and interim associate vice president for academic affairs at Fordham. "This will be an insightful and inspiring event that highlights just some of the exciting work being done by women in STEM today."

Two women will give keynote addresses: former CBL Selection Committee member Cynthia Friend, the T.W. Richards Professor of Chemistry at Harvard and director of the university's Rowland Institute, and Shirley Malcom, head of education and human resource programs at the American Association for the Advancement of Science and former member of President Clinton's Committee of Advisors on Science and Technology.

The conference will take place Nov. 8 and 9 at Fordham's Lincoln Center campus in the heart of Manhattan, and will be open to Clare Boothe Luce Professors from across the country. It will include poster presentations as well as breakout sessions on teaching female students to be leaders in science, mentoring non-science students, innovations in science and technology, and incorporating assessment into student learning, among other topics.



For Four Tribal College Scholarship Recipients, a degree from Navajo Technical University Provides a New Way to Help Navajo Nation

Adriane Tenequer and Laverne Moore

For most Native Americans living on Indian reservations, college is only a distant dream. Native Americans account for less than one percent of college students in America today, primarily due to dire financial need. Only 1 in 20 of Native scholarship recipients with the American Indian College Fund (the College Fund) can afford to attend college without financial assistance. On the Navajo Reservation, the nation's largest Indian reservation, only 7% of people have a college degree and 42% live in poverty. But thanks to a Clare Boothe Luce Women's STEM Tribal College Scholarship through the College Fund, four Navajo women will defeat those odds. Founded in 1989, the American Indian College Fund has been the nation's largest provider of support for Native higher education for 25 years.

Adriane Tenequer, Kierra Nalwood, Laverne Moore, and Ophelia Descheny-Burnside received

the Clare Boothe Luce Women's STEM Tribal College Scholarship in 2014. All four women are students at Navajo Technical University in Crown Point, New Mexico.

Adriane Tenequer is a third-year Industrial Engineering major and a single mother of two young boys. She says juggling home life, raising children, and going to school at the same time is hard, but her scholarship helps her to achieve her dreams. Adriane adds that working hard allows her to be a good role model for her children while emphasizing the importance of education. "I'm breaking the cycle of poverty; I'm setting and accomplishing goals; and gaining experience in my everyday life. I'm not settling for what I have around me, but instead I'm climbing the ladder to show that we can accomplish anything we set our minds to."

Kierra Nalwood is in her first year of industrial engineering studies. She always thought her future would include dropping out of high school like her two older brothers had. Yet one of those brothers encouraged her to enroll at the university to become an engineer. Her first year at school has taught Kierra that “my faith and education are all that I have; I do not want to lose them.” Kierra plans to work for Indian Health Services as a field engineer after graduation.

“I’m not settling for what I have around me, but instead I’m climbing the ladder to show that we can accomplish anything we set our minds to”

Ophelia Descheny-Burnside is the sole support of her family due to her husband’s health problems. After earning an associate’s degree at Diné College, also located on her reservation, she transferred to the University of Arizona. However, Ophelia missed the scholastic support and guidance she received at a smaller school. She decided to enroll

at Navajo Technical University on her reservation.

“The classrooms were not as full; I got a lot of attention and tutoring while attending a smaller college on the Navajo Nation. The teacher that I was working



Kierra Nalwood



Ophelia Descheny Burnside

with at the school where I was employed was very understanding. I was able to take some time off for college assignments that I needed to complete, using the classroom computer to type my assignments,” Ophelia says. Unfortunately, she found herself wondering how she would complete her education until she was awarded a scholarship. She says, “This means a lot to us students who are experiencing financial difficulties while obtaining our degrees. Without your support, we are unable to accomplish our goals. Many students drop out due to no funding and cannot get anywhere with limited finances.”

Laverne Moore, a second-year computer science major, was in an accident that left her briefly unable to walk last year; however, this summer she will be able to stay in school and complete her math requirements and focus solely on her core classes while applying for internships.

All four of the women state that thanks to the financial support of the Clare Boothe Luce Women’s STEM Tribal College Scholarship and the knowledge that someone believes in them, they can focus on their studies, assured that achieving their dreams of giving back to their community after graduation are that much closer to becoming a reality.

MODELING THE “MASTER CLOCK”



Above, from left: Shelly Tang, Professor Tanya Leise, and Melody Owen
(Copyright Transit Authority Figures)

Undergraduates at Amherst College learn about research as they investigate Circadian Rhythms

Before last summer, Amherst College students Melody Owen '17 and Shelly Tang '17 had heard the term “circadian clock,” but like most people, lacked an understanding of how this internal mechanism for regulating daily rhythms of activity, metabolism, and sleep actually works.

That changed soon after they were both invited to become Clare Boothe Luce Undergraduate Research Scholars and undertake a research project under the guidance of Associate Professor of Mathematics Tanya Leise. Leise’s research focuses on using mathematical modeling combined with time-frequency analysis to improve our understanding of how our circadian clock works and what can go wrong.

Professor Leise encouraged Shelly and Melody to lead the way in developing an independent project. To prepare for their research, the students dug into scientific papers to learn about the suprachiasmatic nucleus (SCN), a cluster of neurons in the hypo-

thalamus that forms the main circadian clock in our body. The SCN tracks time of day, can be reset by light, and aligns the clocks in tissues throughout our bodies to function in an optimally coordinated manner.

Professor Leise guided them in writing scripts in MATLAB, a powerful software tool, to simulate a mathematical model of the neuronal network in the SCN in order to study how the individual neurons coordinate to sustain a robust internal clock. As rising sophomores, both students were very new to both programming and mathematical modeling. Shelly explains, “At the beginning I knew nothing about MATLAB. Through Professor Leise’s instruction as well as studying sample code, I learned to write simple scripts, and could also understand slightly more complicated ones.”

The team modeled a network of oscillators, adjusting the strength of coupling in the network to observe the resulting change in the degree of syn-

-chronization. The aim of the modeling was to examine ways to strengthen the SCN network, through exposure to bright light during the day and regular exercise for instance, to mitigate the effect of aging on the clock.

Once they'd compiled their research results, Melody and Shelly developed a poster, "The circadian clock: a simple model with complex applications," which they presented at a day-long conference on undergraduate research held at Yale University in July, and later in the fall at a campus-wide event for summer science research presentations.

During the summer, Melody and Shelly connected with other CBL Undergraduate Research Scholars through luncheons, outings, and a confidence-building improvisation workshop that Shelly said "encouraged me to do things I had never thought of trying before." The CBL Undergraduate Research Scholars and other women students considering science and math careers later met with three dynamic alumnae who graduated with physics and math majors and went on to forge successful STEM careers. The alumnae had each tried

several different paths before finding the right one, and they encouraged the students to feel empowered to pursue new directions and not be afraid to jump off the beaten track.

"I was surprised to find out how much I enjoyed applied mathematics, and also how creativity is a great tool to have when doing research."

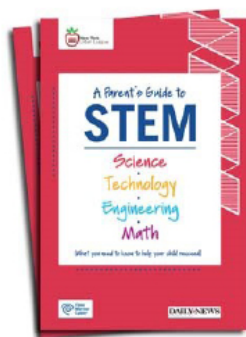
By the end of the project, Shelly had decided to enroll in computer science courses to learn advanced programming skills. The experience also helped the students develop critical thinking and problem-solving skills. Melody reports that she "learned how to stay focused on one long-term project, to think critically and to be creative. Much of my success

was due to trying new things and thinking about one problem in multiple ways."

Both Melody and Shelly have decided to continue their applied math work and major in mathematics. Melody explains, "I was surprised to find out how much I enjoyed applied mathematics, and also how creativity is a great tool to have when doing research. My summer experience has helped me realize my desire to go to graduate school for mathematics, and exposed me to the community of mathematical research. I would love to continue working on this project – this will help me greatly for future opportunities in applied mathematics."

New York Urban League Grant

Last fall, the Luce Foundation made a Special Grant to the New York Urban League to support the development and dissemination of a Parent's Guide to STEM, and to support the facilitation of STEM engagement workshops with parents and caregivers from underserved communities in New York.



A Parent's Guide To
STEM
Science Technology Engineering Math
(What you need to know to help your child succeed)

The Guide can be downloaded from this link:

<http://www.nyul.org/what-we-do/nyul-education-programs/713-2/a-parents-guide-to-stem/>

For more information about the New York Urban League, visit their website at www.nyul.org

Mentorship in Action

Ph.D. Students at Georgia Tech benefit from the support of the women who came before them

As Clare Boothe Luce Graduate Fellows Sarah Cannon and Alexandra Long, profiled in the inaugural edition of *Momentum*, approach the end of the second year of their Ph.D. programs at the Georgia Institute of Technology, they have settled into their programs and are focusing more on their research. With her qualifying exams successfully behind her, Cannon is concentrating on completing her Ph.D. in computer science through an interdisciplinary program – Algorithms, Combinatorics, and Optimization – that combines computer science, mathematics, and industrial and systems engineering. Long, a graduate student in the Daniel Guggenheim School of Aerospace Engineering, is working in the Space Systems Design Laboratory and is preparing for her qualifying exams next fall.

Cannon and Long are perpetuating a tradition at the Institute, joining four Georgia Tech alumnae who were Clare Boothe Luce Graduate Fellows in

the late 1990s, as well as Dr. Tequila Harris, a tenured professor in the School of Mechanical Engineering. A former Clare Boothe Luce Graduate Fellow from 2002-03 at Rensselaer Polytechnic Institute, Harris joined the Georgia Tech faculty in 2006. Among her many distinctions, Harris earned the National Science Foundation Faculty Early Career Award from 2010-15.

Over the past few semesters, Harris and Dr. Rosario Gerhardt, Executive Director in Georgia Tech's Office of Institute Diversity and a materials science and engineering professor, have met with Long and Cannon to offer advice and guidance as the two Fellows navigate their academic paths.

At a recent lunch, Harris and Gerhardt talked with Cannon and Long about their current activities including research, qualifying exams, publishing in journals, and community outreach through pro-

grams like the Society of Women Engineers, among other topics. Discussing her own career path and the possibilities within academia, Harris talked about the merits of applying for a post-doctoral fellowship. She urged Cannon and Long to publish their research and to attend conferences where they can begin building a strong network in each of their fields.

As Cannon and Long complete the second and final year of their Clare Boothe Luce Graduate Fellowships, they are benefiting from the advice and counsel of those who have come before them, a service they are sure to provide for others in the future as they prepare for and embark on successful careers in their respective fields.



Clockwise from top left: Dr. Tequila Harris, Sarah Cannon, Dr. Rosario Gerhardt, and Alexandra Long

Christina Schweikert, Ph.D. St. John's University Clare Boothe Luce Professor

When Professor Christina Schweikert, Ph.D. was a new faculty member at St. John's University, she felt honored and fortunate to receive the Clare Boothe Luce Professorship. Dr. Schweikert completed her doctorate in Computer Science from the City University of New York, Graduate Center; she has previously held visiting professor positions at Fordham University and the State University of New York. She has said that it is a great privilege to continue in the path begun by previous Clare Boothe Luce professors at St. John's University and to be the first CBL Professor in the Computer Science discipline at St. John's. As a Computer Science faculty member, Dr. Schweikert teaches a variety of courses including computer programming, programming languages, operating systems, among others. This year, she is also teaching a graduate level course in data mining, which she designed. The data mining course is part of the University's newly created M.S. degree in Data Mining and Predictive Analytics. In this era of "big data", data mining and analytics is prevalent in many fields - from retailers trying to predict our next purchase, to medical researchers identifying risk factors for diseases. Dr. Schweikert's research interests involve programming languages, data mining, knowledge representation, and applying computational techniques in areas such as biomedical and health informatics.

At St. John's University, Dr. Schweikert is working with Dr. Bonnie MacKellar on the design of a system that would enable patient-oriented searches of clinical trials. One of the goals of the system is to provide patients information on the side effects of drugs that are involved with particular clinical trials. They developed a knowledge representation that integrates data from a clinical trial database and a side effect resource. This would enable patients to make an informative, integrative search and the results will connect to relevant linked open data. Preliminary work has been published and presented at the 12th IEEE International Conference on Cognitive Informatics & Cognitive Computing.

Another aspect of Dr. Schweikert's research is in the area of information fusion, which deals with methods to combine the results of various scoring systems with the goal of improving performance. The combination of multiple scoring systems can be utilized in various application areas, including: portfolio management, sales forecasting, bioinformatics, among others.



Professor Schweikert

In the area of bioinformatics, Christina worked on a project in ChIP-seq (a method used to analyze protein interactions with DNA) analytics. Christina analyzed the performance of systems that identify potential DNA binding sites using ChIP-seq data, and designed a method to combine multiple systems to improve the performance. In 2013, she was invited by the Cambridge Healthtech Institute to give a talk on this project at their NGX Applying Next-Generation Sequencing conference. Currently, Dr. Schweikert is working on a project that involves analyzing microarray expression data to compare the gene profiles of drug-treated samples.

Christina has ongoing collaborations with researchers from Fordham University and Caltech in the area of cognitive informatics. She is currently analyzing a gaze tracking dataset to gain insights into subjects' viewing behavior when comparing two images on a screen, searching for meaningful patterns that will enable us to predict a subject's choice based on the sequence of gaze points on the images.

The CBL Professorship has provided Dr. Schweikert the opportunity to participate in several conferences, which are excellent opportunities to network and advance in research. This semester, Dr. Schweikert plans to obtain and setup a server which will be dedicated to hosting databases and software for research, and will be a valuable platform for several projects involving colleagues and students. In addition to teaching and research activities, Dr. Schweikert appreciates the support of the Clare Boothe Luce Program and St. John's University Women in Science Program.

Alumna Spotlight: “Redefining Failure”

An interview with Julia Ferraioli

Failure is not something we strive for, but it is a necessity for success. Especially as a student, failure is a part of growth and evolution. Julia Ferraioli, Senior Developer Advocate for the Google Cloud Platform, and a 2005 Computing Research Association (CRA) Distributed Research Experience for Undergraduates (DREU) Alumna strives for more than just success, she strives for failure as well.

Julia Ferraioli’s story begins in 2004, when she heard an inspiring speech by Dr. Marie desJardins. The following summer, she received financial support from the Clare Boothe Luce Program to participate in the 2005 Summer DREU program. One of several programs organized by the CRA’s Committee on the Status of Women in Computing Research (CRA-W) and the Coalition to Diversify Computing (CDC), the DREU program offers women, underrepresented minorities, and people with disabilities research experiences to

“If you aren’t failing on a weekly basis, whether you’re doing research or software engineering, you probably aren’t going far enough.”

develop valuable skills in computing research.

“I chose to participate in the CRA-W/CDC Distributed Research Experience for Undergraduates Program because in 2004 at Bryn Mawr College, I had

the honor of listening to Dr. Marie desJardins give a talk on her research at the Multi-Agent Planning & Learning Lab (MAPLE). Throughout the entire talk, I was fascinated and completely engaged in her research and her passion for artificial intelligence.”

Ms. Ferraioli conducted her research experience under Dr. Marie desJardins at the Multi-Agent Planning and Learning Lab at the University of Maryland, Baltimore County. Her focus while working under Dr. Marie desJardins was on “Interactive visual clustering.” Specifically, they worked on tackling the problem of how to iteratively gather information from a person,

and use that as a priori knowledge (constraints) in a semi-supervised clustering algorithm. The goal was to construct an interface that presented multi-dimensional data in two-dimensional space and allowed the user to correct the organization of the data.

“If we could apply correction, then the algorithm would continually get better, and it would be able to rearrange the on-screen presentation, with minimal work by the user.”

“Working with Dr. desJardin taught me about tackling unsolved problems -- how to approach them, how to research prior work, and how to carefully craft your own solution. Due to my newfound interest in research, I expanded this research topic for my senior thesis. The most memorable moment of my CBL-supported DREU experience was when Dr. desJardins tasked me with figuring out how to handle a case where the dimensions on different elements of data didn’t match. I researched the problem, brainstormed my own algorithms, dreamt about it, and filled up pages and pages of a notebook with scratched out diagrams and false starts. I confessed my defeat during our weekly meeting. Smiling, she said that the problem I described was as yet unsolved, but we did discuss my attempts.”



Julia Ferraioli

This was an integral moment in Ms. Ferraioli's life; it was the moment she realized that failure was an inevitable part of learning. Even if there is no existing solution, it does not mean you give up; that is where you start.

"This moment completely redefined the concept of failure for me, and removed a lot of the fear surrounding 'approaching something new'." Even if you fail, you will have gained valuable knowledge of what doesn't work, for the next time you try.

For Ms. Ferraioli, her passion began in a room at Bryn Mawr College listening to Dr. Marie desJardins discuss her passion for artificial intelligence.

With guidance from participating in the DREU program and funding from the Clare Boothe Luce Program, Ms. Ferraioli was able to expand her horizons and knowledge of research, and gain invaluable insight into the computer science field. With all the success that Ms. Ferraioli has attained, she cites her success on the following advice:

"If you aren't failing on a weekly basis, whether you're doing research or software engineering, you probably aren't going far enough. There are so many stigmas surrounding the concept of failure, but if you can get past that, you'll find that there's actually a blissful feeling of accomplishment on the other side."

Right, and Below: Pi day, before and after

Pi Day

Xavier University of Louisiana Clare Boothe Luce Undergraduate Scholars in Mathematics, Carlyn Hunt, Jennifer Vicks, Courtney Jacks (pictured here), and the Math Club students hosted "Math Pi Week" this semester. The celebration took place the second week of March 2015, with a grand finale on Saturday, March 14th, National Pi Day (a.k.a. ULTIMATE PI DAY!!). We began advertising for the week's activities the weekend before, at the Dillard vs. Xavier Crosstown Classic basketball game. Math Pi week was full of fun activities and events leading up to ULTIMATE PI DAY!! On Monday, the scholars and the Math Club kicked off their week with a Hawaiian themed party. Tuesday, the students dressed up as future professionals to spread the awareness of job opportunities for math majors. On Wednesday, an origami workshop was conducted, hosted by one of our math faculty members, Dr. Klimas. A Math Club fundraiser was held on Thursday. The title of the fundraiser was "Pie a Math Major or Math Professor"; anyone could throw a pie for just a dollar. Three math faculty members Dr. Kostrov, Dr. Stutson and Dr. Unnithan were willing targets at this event. We took the day off Friday, to get ready for ULTIMATE PI DAY. The scholars, math majors, and some math faculty members participated in the local event, the STEM NOLA Pi Day. STEM NOLA (NOLA - New Orleans,

Louisiana) is an organization founded by a New Orleans native, Dr. Calvin Mackie and its purpose is to expose, inspire and engage members in the surrounding communities about the opportunities in Science, Technology, Engineering and Mathematics (STEM). Overall, Math Pi Week was successful for the Clare Boothe Luce Scholars and the Xavier University Math Department in raising awareness about Mathematics. The students and faculty thoroughly enjoyed all the activities and look forward to hosting and participating in similar events in the future.



LIVING THE DREAM



An Undergraduate Scholar at Stonehill College is Fulfilling her Childhood Dream to Work at NASA

Ashley Horan, a Clare Boothe Luce Undergraduate Scholar at Stonehill College (Easton, MA), is fulfilling her childhood dream to work at the National Aeronautics and Space Administration (NASA).

A physics major and mathematics minor from Brick Township, NJ, Horan has taken advantage of the many academic and research opportunities available to her at Stonehill, as well as sought out opportunities of her own – demonstrating an exemplary commitment to scholarship that is at the core of the Clare Boothe Luce Undergraduate Scholarship program.

At a young age, Horan developed a love for science and a desire to work for NASA. She arrived at Stonehill in the fall of 2011 and quickly set to work on a course of study that would allow her to achieve this goal. During her sophomore and junior years at Stonehill, Horan conducted independent theoretical research with Stonehill Associate Pro-

fessor of Physics Alessandro Massarotti to study liquid flow through the Earth's mantle. During the spring of 2014, Horan shifted her focus to experimental research efforts with Harvard University Lecturer and SAO Astrophysicist Dave Latham to search for a third companion in the Sirius binary system.

With her strong academic performance and robust resume of research experiences, Horan applied and was accepted to a summer internship at NASA. She spent the summer of 2014 at the NASA Goddard Space Flight Center in Greenbelt, MD, where she worked with Dr. Conor Nixon and Dr. Shawn Domagal-Goldman to model the atmospheres of planets orbiting other stars.

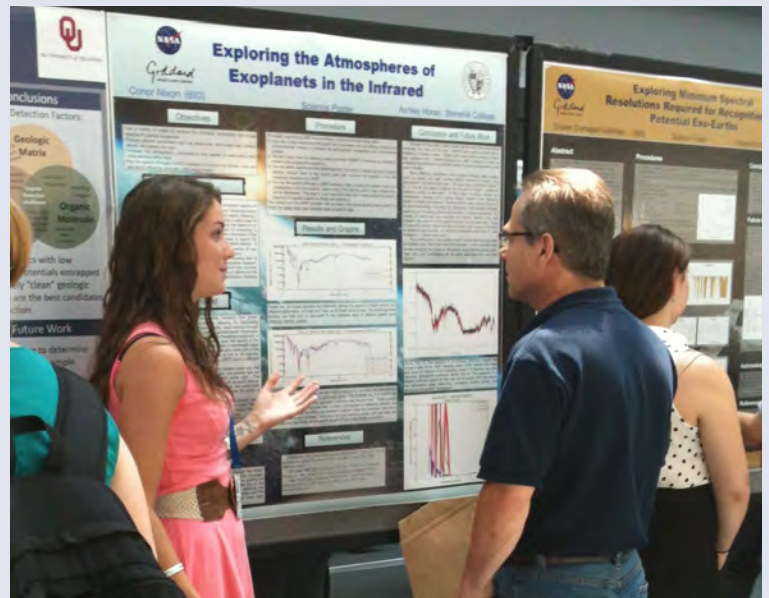
Horan developed and proposed model atmospheres for potential exoplanets and then tested those atmospheres – making minor modifications in the parameters to determine their level of impor-

tance. Horan's intellectual curiosity is evident as she speaks about her research at NASA:

"I definitely grappled with certain aspects of my research during my summer at NASA. I reached a point where I couldn't justify exploring the atmospheres of potential exoplanets when I wanted to know more about the atmospheres of early Earth and early Mars approximately 3.5 billion years ago. This parameter space exploration fascinates me and it is now the fact that early Earth had liquid water on its surface that has captured my attention," she said.

A senior at Stonehill, Horan continues her work with NASA as a Student Research Collaborator. Under the supervision of Dr. Domagal-Goldman, she works remotely – logging into a super computer at NASA from the comfort of her dorm room to produce potential atmospheres that could induce a greenhouse effect to keep a planet above 273 K (freezing temperature). To date, Horan has proposed many different ranges of atmospheric molecules that could lead to a planet warm enough to hold liquid water at the surface.

After graduating from Stonehill in May, Horan will enter a PhD program in Planetary Geosciences at Brown University under the guidance of academic advisor, Professor Jim Head. She will focus



Ashley Horan presents her research

on early Mars, in particular researching the claim that despite it being unknown whether early Mars was warm enough to hold liquid water, it would geologically make sense for there to have been at least periods of warmth leading to liquid water (i.e. a step towards the planet having the capability to hold life). Horan will search for atmospheres that makes this possible, as well as a geological explanation of how this makes sense. Proposed theories already exist, so Horan will be testing those theories. Horan's post-graduate career aspirations are to work as a faculty member in the physics department of a college or university while continue to conduct research at NASA as a full-time employee.

Dr. Amy Liu, Former Clare Boothe Luce Professor, Comes "Full Circle"



In January, the Clare Boothe Luce Program Selection Committee welcomed a new member, Dr. Amy Liu. Dr. Liu is Professor and Chair of Physics at Georgetown University, one of the CBL Program's "Designated Institutions." Dr. Liu was selected as a Clare Boothe Luce Professor during the early years of the program at Georgetown, and has remained at the institution, teaching and conducting research, ever since. We are very pleased to have such a distinguished former Clare Boothe Luce Professor come "full circle" and join the CBL Selection Committee!

For more information about Dr. Amy Liu, please visit her webpage at: <https://physics.georgetown.edu/users/amy-liu>



INSPIRING THE COMMUNITY

Above: Elisabeth McClure demonstrates chromatography

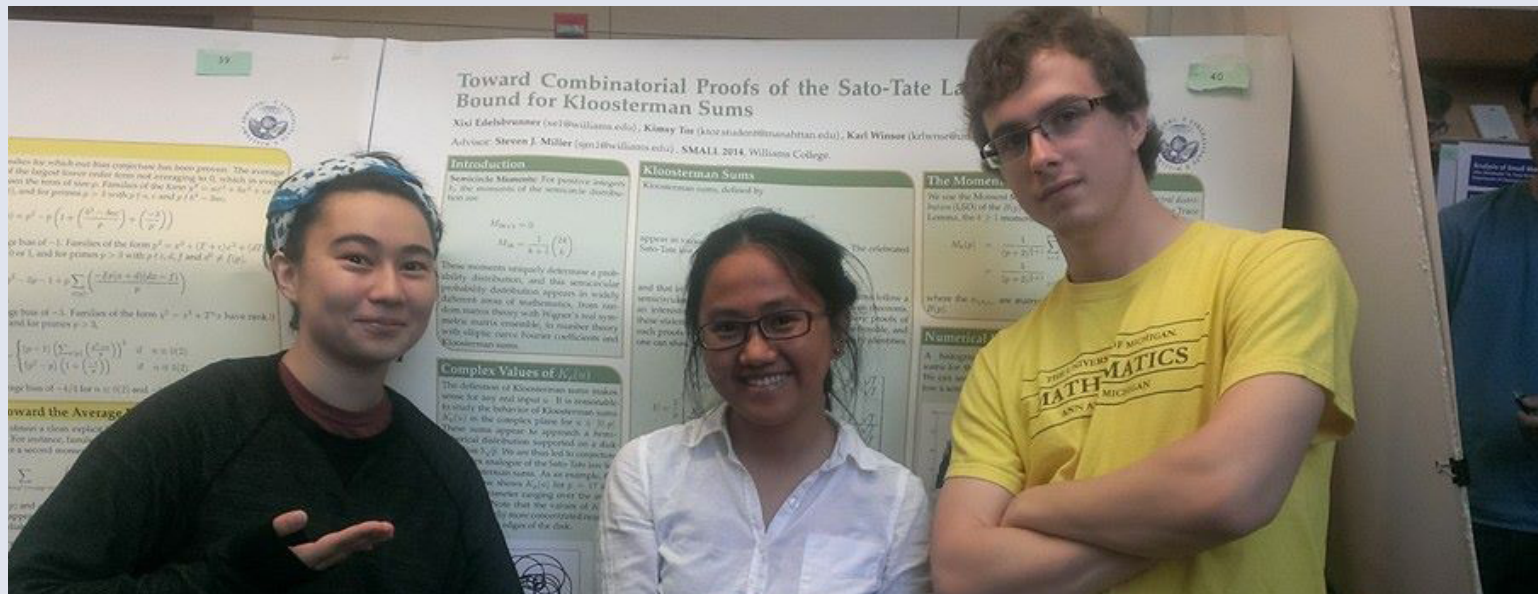
The Atlanta Science Festival is a weeklong celebration of local science and technology, held in March, with 2015 being the second year of the Festival. Curious people of all ages are able to explore the science and technology in the Atlanta area and see how science is connected to all parts of our lives in a variety of hands-on activities, facility tours, presentations, and performances throughout the metro Atlanta region. Events range from visits to the Emory Planetarium, Science of Sports and Arts presentations, along with mentoring workshops for individuals interested in educating the public about STEM fields.

The Festival culminates in the free, family-friendly Exploration Expo - an interactive day of demos, hands-on activities, and stage shows at Centennial Olympic Park. This is open to adults, families, and children all ages and interests, though the main draw was clearly for K-12 students in the greater Atlanta area that are bussed in for the event. It promotes science exploration, discovery and innovation with more than 100 interactive exhibits, hands-on experiments, mind-blowing demos and a full line-up of science-themed performances!

Representing Emory's Clare Boothe Luce Under-

graduate Research Scholars, Jessica Elinburg and Elisabeth McClure took the opportunity to participate in the Expo Day in 2014 and contributed to the efforts of the Emory Chemistry student club, ChEmory's, exhibition. During the Expo, they had the incredible opportunity to reach upwards of 16,000 future scientists with a demonstration booth highlighting their research through accessible and fun demonstrations aimed at the general public. Specifically, the booth demonstrated the applications of chromatography, a tool scientists often use to separate chemicals. Using wet-erase markers and filter paper, the scholars demonstrated how separation of compounds occurs in a chromatographic column. Finally, the scholars displayed a poster explaining how different methods of chromatography played into each of their specific research projects at Emory.

In addition to our interactive chromatography experiment, they used another exciting demonstration showing the basic principles of electrochemical plating. Using pennies soaked in vinegar (a weak acid), they showed how one can strip copper ions from the pennies. When the pennies were removed and steel washers were added to the solution, the washers became "plated" in copper.



Williams sophomore Xixi Edelbrunner (left) tries out life as a mathematician

Thanks to the support of the Clare Boothe Luce Undergraduate Research award, I was funded to research mathematics, particularly number theory and probability, at Williams College during the summer of 2014. I am a student at Williams during the year, but I have to say that Williams is more beautiful during the summer. Participating in the research program SMALL has been easily the most transformative experience I have had at Williams. It was the first time I have been completely sure I want to devote much of my life to mathematics research.

I worked closely with an adviser, Associate Professor of Mathematics Steven J. Miller, on several number theory projects. We chose problems that were interesting and approachable from my background, having just finished my sophomore year. One of these projects concerned Zeckendorf's Theorem, which says that every positive integer (i.e., 1, 2, 3, 4, ...) can be written uniquely as a sum of nonconsecutive Fibonacci numbers (the Fibonacci sequence is formed by adding the two previous numbers together to get the next: 1, 2, 3, 5, 8, 13, 21, ...). I worked in a group with five other undergraduates (Andrew Best, Patrick Dynes, Brian McDonald, Kimsy Tor, and Madeleine Weinstein), under the guidance of Professor Miller and a post-doctoral student, Caroline Turnage-Butterbaugh. We proved several results about these decompositions, which have gone into two papers for the Fibonacci Quar-

terly and two on more general cases, which have been completely and are in the review process. We also presented these results at several conferences, including the 16th International Conference on Fibonacci Numbers and Applications, where my group gave three different presentations on various results. This exposure to real mathematics research and the community was invaluable. Additionally we met some amazing people who worked on related problems.

Another advantage of undergraduate research was the opportunity to work with and get to know Professor Miller. The Zeckendorf project is one of three that I worked on this past summer. Of the other two, one resulted in a section in a book that he is writing, and I will continue to work on the other project with my peers as well as a professor from Pomona College. My relationship with Professor Miller has been one of the most valuable things about my experience at Williams, and of course came out of my research with him.

With the support of the Clare Boothe Luce Undergraduate Research award, I've been able to explore problems in three different areas of mathematics, travel to conferences and interact with experts in the field. The summer also gave me the opportunity to figure out what kind of work I enjoy and what I might want to pursue, as well as more concretely what I would be doing, going into mathematics.

25^{YEARS} 25th Anniversary

