James Senft

Award: Aerospace Outreach K12 Program K12; $5000.00

Title: Director of Aviation, Astronautics Corporation of America

Project: Central High School STEM Aviation

Abstract: (Project Goal in Proposal) This program meets the Natural Science Foundation (NSF) and the NASA Directorate by expanding the number of student’s involved in STEM education. This program will help improve the STEM pipeline by including underserved and/or underrepresented students in the project. As part of the NSF goal, this program will provide training to young woman and man to pursue career in aviation field. Our program using a modified engineering design model process. This process is a STEM-driven hands-on curriculum. We use the building of the Van’s RV-12 aircraft as the activity to engage learners at every level and provide real-world learning opportunities that expose students to careers in science and technology. Our program also stresses critical 21st-century skills, such as communication and teamwork. Our curriculum involves both student-directed and teacher-led curricula to create a powerful and effective STEM experience.

Biography: Mr. James Senft and together with Mr. Kan Pai we run the Central High School STEM Aviation Program. I have degrees in Chemistry and Physics, Master’s degree in Curriculum and Instruction, and a Master’s degree in Aeronautical Science. I hold an FAA Private Pilot, FAA Advance Ground School Instructor, FAA Light Sport Repairman Inspector, and a commercial UAS pilot certificate. I taught AP physics for 10+ years at Grayslake High School and I am currently the Director Technology at College of Lake County in Grayslake Illinois. Mr. Kan Pai graduated from the University of Texas at Austin with a Bachelor's in Chemical Engineering. Upon graduation, he worked at the ExxonMobil Beaumont Olefins and Aromatics Plant as a Process Engineer. Eventually, Mr. Pai changed careers and embarked onto the wonderful world of education. Mr. Pai has since taught all levels of Chemistry and Principles of Engineering. We provide a unique venue for developing knowledge and skills in the areas of STEM, by the building of a Van’s RV-12 real flying aircraft. This grant has allowed us to accomplish something wonderful and also ensure that the excitement, challenge, and fun of personal aviation carries on to the next generation. This is a life-changing program.

Congressional District: 1

Congressional Representative: Paul Ryan

Andrea Henle

Award: Higher Education Initiatives; $9947.00

Title: Assistant Professor, Biology

Project: Development of an upper-level biology course on human health and disease in space

Abstract: (First Paragraph of Proposal) The goal of this project is to develop an advanced space biology course at Carthage College, a small liberal arts college in Kenosha, WI. Students will analyze scientific articles, meet NASA scientists, and use NASA’s GeneLab database to investigate space research. For the majority of biology majors enrolled in this course, this will be their first exposure to the interdisciplinary nature of space biology research. The course will serve as a capstone course in these students’ biology education, with a goal of allowing the students to make connections between research topics across a variety of biological disciplines. The objectives for the course can be contained within an important over-arching theme composed of two questions: what do scientists need to understand about biological adaptation to the space environment for long-term human missions in space and how do these studies help advance our understanding of human health and disease on Earth?

Biography: Andrea Henle is an immunologist and cancer cell biologist who studies the development of  
melanoma. At Carthage College she teaches cellular and molecular biology and an introductory  
biology course in which first year students conduct research to isolate bacteriophages from the  
environment. She previously received a WSGC research grant to isolate bacteriophages from the  
International Space Station with a Carthage undergraduate student. She will continue to promote  
space biology at Carthage by developing a course focused on understanding human health and  
disease through space research.

Congressional District: 1

Congressional Representative: Paul Ryan

Doug Arion

Award: Higher Education Initiatives; $4500.00

Title: Professor, Physics and Astronomy

Project: Characterization of Rapidly Rotating Asteroids through Filtered Photometry

Abstract: (First Paragraph of Proposal) There is considerable interest in the compositions of asteroids, particularly those that are small enough to potentially be ‘harvested’ for minerals. Smaller asteroids are generally conglomerates of smaller components, and are usually oddly shaped, as they have insufficient gravity to have been pulled into spheres during their formation. The odd shapes result in tumbling, and thus these objects exhibit rapid changes in brightness as they rotate. While many observers around the world have obtained asteroid light curves, and thus provide data that could be used to infer general shape and size information, those which rapidly rotate are difficult to categorize through light curves as (a) it is uneconomical to utilize large telescopes with spectrographs to characterize the large number of such asteroids that exist; (b) many are not bright enough to allow filtered photometric imaging with the smaller telescopes that are usually employed to obtain light curves; and (c) even with sufficient aperture, the rapid rotation makes it difficult to compare brightness measurements in different bands directly as the aspect of the object changes substantially between exposures. In addition, if an asteroid is a composite of different materials the light curve obtained in a single band may be over- or under-estimating the actual geometrical reflectance of the object as the color shifts with orientation.

Biography: Dr. Douglas Arion is Director of the Carthage Institute of Astronomy,  
Professor of Physics and Astronomy, and Donald D. Hedberg Distinguished Professor  
of Entrepreneurial Studies at Carthage College. He is an Appalachian Mountain Club  
Lifetime member and a member of the AMC’s Presidents Society, and was awarded  
the 2015 Volunteer Leadership Award. He is a Lifetime member of the International  
Dark Sky Association, and serves on both the American Astronomical Society and  
International Astronomical Union commissions on dark skies preservation. He  
manages a partnership between Carthage and the AMC to offer astronomy programs  
and observing opportunities at AMC facilities and New Hampshire state parks, and  
operates telescopes at AMC’s lodges and high mountain huts. In its first five years  
the program has reached over 35,000 people, while also providing training in  
science communication to undergraduate science students and AMC full-time and  
seasonal staff. Arion’s presentations address the multitude of ways that everything  
on Earth is connected to the entirety of the Universe, and how cosmology and the  
history of life on Earth are combined in one big, fascinating story that will change  
the way audiences interact with their environment.  
For the International Year of Astronomy-2009, he founded Galileoscope LLC to  
develop, manufacture, and distribute high quality low cost telescopes for worldwide  
promotion of science education and outreach. Over 250,000 telescope kits have been  
distributed to 110 countries, including 7000 donated to developing nations and 25,000 to  
US science teachers. The Telescopes4Teachers donation program recruits donations to  
place Galileoscopes in classrooms throughout the United States. Galileoscope LLC was  
also a worldwide cornerstone project of the 2015 International Year of Light, and  
continues to supply Galileoscope kits all over the world, along with free educational  
materials including lesson plans, observing guides, and instructions in many languages.  
Arion is actively involved in promoting technology entrepreneurship education.  
He founded the ScienceWorks entrepreneurship program at Carthage in 1994, and  
supported the creation of the Center for Advanced Technology and Innovation. He has  
co-chaired a conference to promote entrepreneurship education with the American  
Physical Society, serves on the organizing committee and teaches courses on technical  
entrepreneurship for the Industrial Physics Forums of the American Institute of  
Physics/International Center for Theoretical Physics, held in 2014 in Sao Paolo, BZ and  
recently in Johannesburg, South Africa, and lectures on entrepreneurship education  
across the US and Canada.  
Previously, at Science Applications International Corporation, he was Division  
Head and Assistant Vice President, and led the growth of the Applied Physics and  
Engineering Division by a factor of 10 in less than four years. He directed the design and  
construction of extensive experimental systems, including space-qualified optics and high  
precision structural measuring systems. He holds a patent on the Blast Induced Emission  
of Radiation Gage to measure time-resolved pressure in high explosive environments.

Congressional District: 1

Congressional Representative: Paul Ryan

Tristan Grams

Award: NASA Internship Program; $6000.00

Status: Junior, Biology

Advisor: Christine Bolz

Research Topic: NASA Jet Propulsion Laboratory Summer Intern

Abstract: The establishment of a permanent human presence on the International Space Station (ISS) raised new questions regarding the microbial burden inside this closed environment. High-efficiency particulate filters (HEPA) have been installed inside the ISS to reduce the level of harmful microbes that may affect an astronaut’s health. While multiple studies have investigated bacteria within the ISS, no research has been done to detect the viruses that attack bacteria, bacteriophages, which can be used for biocontrol of bacterial levels. Bacteriophages specifically infect bacteria, replicate, and lyse the bacterial host cell, releasing new progeny. The goal of this interdisciplinary project is to isolate and characterize bacteriophages obtained from ISS HEPA filter samples. In the process of isolating bacteriophages, two Bacillus species were recovered and identified from the HEPA filters. This research allows for the potential application of bacteriophages in therapeutics and in the control of microbial burden in space.

Biography: Tristan is a biologist who is currently studies Bacteriophages from the International Space  
Station at Carthage College. Tristan will be conducting research with Dr. Kasthuri  
Venkateswaran on assessing the ability of a microgravity environment to promote the transfer of antibiotic resistance and virulence genes between bacteria at Jet Propulsion Laboratory. In the future, he plans to attain a doctorate in immunology, virology, and microbiology to conduct research at a NASA facility.

Congressional District: 1

Congressional Representative: Paul Ryan

Jordan Rice

Award: NASA Internship Program; $6000.00

Status: Senior, Astrophysics

Advisor: Kevin Crosby

Research Topic: NASA Goddard Space Flight Center Summer Intern

Abstract: (First two Paragraphs in Interim Report) In my internship at NASA’s Goddard Space Flight Center, I have a variety of tasks that I  
work on for the Office of Communications (Code 130) as well as getting to explore the different  
aspects of the office, such as photography, social media, and video. I will be working to help  
move forward the efforts of the Communications Office by providing new story ideas, and  
completing stories on the work being completed here at Goddard. I will be adding content to the  
Goddard webpage and to all other aspects of Goddard communication.  
My main task that I work on is writing and organizing campaigns for big stories, like I  
just completed a story on the opening of the new Earth science exhibit at the Goddard Visitor  
Center. I am still working on the navigation team behind the OSIRIS-REx Earth Gravity Assist  
story. Writing a story involves completing research on the topic, interviewing people, and finally  
writing the story. The stories go through many rounds of edits here at Goddard, but also at  
NASA headquarters.

Biography: Jordan Rice is finishing her senior year at Carthage College where she is majoring in astrophysics and minoring in math. Her interest in astrophysics began in 3rd Grade when her teacher introduced the class to astronomy. She keeps very busy at Carthage where she is a teaching assistant and the President of SPS (Society of Physics Students). She was the SPS Vice-President for the 2015-16 school year and the Historian for the 2014-15 school year. Jordan was the team lead of the 2016 RockSat-X team and a member of the 2015 RockSat-C team. She has participated in three observational trips to Kitt Peak National Observatory in Tucson, Arizona; most recently photographing an asteroid with the WIYN 0.9 meter telescope. Jordan is a member of the 2016-2017 Lake Michigan Launchers Collegiate Rocket Team at Carthage College and recently competed in the WSGC sponsored Collegiate Rocket Launch Competition on April 22, 2017. Jordan spent last summer as the first Astronomy Magazine student science writer. This summer, she will be interning at NASA’s Goddard Space Flight Center in the Communications Department. In the fall, she will pursue her M.S. in Science Journalism at Boston University.

Congressional District: 1

Congressional Representative: Paul Ryan

Paul Martino, Ph.D.

Award: Research Infrastructure Program; $9956.00

Title: Associate Professor, Biology

Project: The Effects of Zelevated CO2 and Anxiety Vulnerability on Stress and Performance: Potential Implication for Extended Space Travel

Abstract: (First Paragraph of Proposal)Carbon dioxide (CO2) is an important gas involved in the neural control of breathing. It is the primary driver of the normal resting breathing cycle (eupneic breathing). Humans have evolved with relatively constant and low atmospheric levels of CO2 in the range of 0.04% of total atmospheric gases. There is a direct relationship between arterial blood partial pressure of CO2 and the acidity of the blood. With increasing partial pressure of CO2 in the blood leading to increasing acidity and there decreased arterial pH (Dempsey, 1982, Martino, 2006 and 2007, and Forster 2008)2. Normal human arterial pH is in the range of 7.35 – 7.45. In 1965 Schwartz et al. (Schwartz, 1965) demonstrated that the pH is vigorously defended and at all inspired levels of CO2. Jennings and colleagues demonstrated in conscious dogs that after breathing a mixture of 5% CO2 for 2,4,7, and 14 days that there was a triphasic response when studied beginning a day after being removed from chronic 5% CO2. During acute hypercapnia (elevated CO2) there was an increased response compared to controls, and this was followed by a decrease in breathing below initial control levels, and finally elevated breathing levels for 4-14 days after being removed from chronic 5% CO2 (Jennings et al.). In their review of the rate of acclimatization to chronic hypercapnia, Clark et al. demonstrated using evidence from numerous studies that indeed the human body will acclimatize to chronically elevated levels of CO2. Acclimatization is the process by where an organism upregulates defense mechanisms to adapt to an environmental insult such as elevated CO2, and thus the organism is able to maintain homeostasis (an active regulation of a physiological variable such as CO2 so that the variable remains relatively constant). On average the acclimatization to chronically elevated CO2 for physiologic variables such as respiration, arterial pH, cerebral spinal fluid pH takes approximately 3-5 days with the majority of the acclimatization occurring within the first 24 hours (Clark, 1971). That being said, there are still many unknown changes in many other physiologic variables that might be a consequence of exposure to chronically elevated CO2, such as changes to all of the human hormones, and changes to the nervous system, both in the central (brain and spinal cord) and the peripheral (all other parts of the nervous system) portions.

Biography: Dr. Paul F. Martino earned a B.A. in Natural Sciences and Mathematics from Dowling  
 College in 1993, an M.S. in Exercise Physiology from Ball State University in 1996, a Ph.D. in Physiology from Medical College of Wisconsin in 2006, and completed an American Heart Post-Doctoral Fellowship at Wright State University in 2008, as well as an additional post-doctoral training in breathing research at Medical College of Wisconsin in 2009. He has collaborations on research projects both at his current institution, Carthage College in Kenosha, Wisconsin, and at Medical College of Wisconsin located in Milwaukee, Wisconsin. His research interests have spanned the breadth of physiology in awake and sleeping rats, goats, and humans. Of interest in this research have been the cellular and molecular mechanisms involved in the neural control of breathing responses to changes in pH, and CO2. He has also studied human physiologic responses to changes in pH, CO2, sleep, strength and endurance exercise, and vitamin E and C. His current research collaborations at Carthage College investigate the endocrine, respiratory, and cardiovascular responses to anxiety, behavioral inhibition, and chronic exposure to CO2 in college age adults.

Congressional District: 1

Congressional Representative: Paul Ryan

Daryl Sauer, Ph.D.

Award: Research Infrastructure Program; $10000.00

Title: Assistant Professor, Chemistry

Project: The Development of an Electrochemical Flow Reaction System for Extraterrestial Organic Synthesis

Abstract: (First Paragraph of Proposal)A key need for long term space exploration and long-term colonization will be synthetic organic chemistry capabilities to produce small amounts of needed materials, prepare biological reagents for experimentation and culturing, nutrients, fuel, and perhaps most importantly, for creating any needed medicines via a “drug-on-demand” approach. The ability to manufacture synthetic drugs to combat disease (both known and not yet identified), radiation damage and the effects of reduced gravity will be critical to the success of any long-term space mission. Such a system will be critical for astronaut’s health and welfare, as once embarked a crew will need to be self-sufficient and flexible enough to adapt to changing and unforeseen circumstances. Efforts to battle cancer tumors are particularly important in the light of the substantial space radiation that astronauts are exposed to on long-duration missions, coupled with their lack of access to traditional care because of travel distance and the unacceptably excessive weight of treatment equipment. To this end, the development of a “drug-on-demand” system is imperative (1) (2) (3), and notably has corresponding applications back on Earth in resource poor settings, for the military, etc. Space radiation also induces accelerated pharmaceutical drug expiration dates (4) (5), and thus a system that will allow astronauts to produce needed drugs in real time is another vital aspect of this medical need.

Biography: Dr. Sauer currently is an Assistant Professor of Chemistry at the University of Wisconsin-Parkside. His research focuses on natural product isolation, microwave accelerated organic synthesis, flow chemistry and electrochemistry. Prior to joining Parkside he worked at Abbott Laboratories/AbbVie for 25 years in roles in as a medicinal chemist in the Cancer Research area, leader of the Abbott High-Throughput Organic Synthesis group which developed tools, methods, and facilities for increasing the efficiency of the drug discovery process, and as a Senior Manager in the Scientific Assessment – Discovery Licensing and Acquisition organization responsible for identifying, evaluating and implementing technologies to enable the drug discovery process for Global Pharmaceutical Research & Development. Dr. Sauer received his B.S. in chemistry from the University of Wisconsin-Parkside and completed his doctoral at the University of South Florida. His thesis work focused on the utilization of the 1,3-dipolar cycloaddition reaction to synthesize novel  
 nucleoside analogs. Following completion of his graduate studies he joined The Ohio State  
 University as a National Science Foundation post-doctoral fellow where he worked on the total synthesis of biologically interesting natural products. He is an author on 30 peer-reviewed publications and named inventor on 30 U.S. and International Patents.

Congressional District: 1

Congressional Representative: Paul Ryan

Adam Biewer

Award: Undergraduate Student Research; $4000.00

Status: Freshman, Physics

Advisor: Brant Carlson

Research Topic: An observation of EM VLF waves emitted by lightning

Abstract: The objective of the RockSat-C experiment is to observe very low frequency (VLF) electromagnetic (EM) waves that come from natural lightning discharges as a function of altitude. The experiment will receive and store electric and magnetic field data from antennas as well as data from a magnetometer/compass. We expect to see 60Hz interference, mostly from power lines, as well as various structures corresponding to lightning discharges. This project focused on the digital electronics of this experiment

Biography: Adam Biewer is a full-time student attending Carthage College. He is a recipient of the Math and Science Scholarship as part of the class of 2020. He is also working towards a Physics Degree and is the team lead for the Carthage College RockSat-C Team, run through the Colorado Space Grant Consortium. He is currently preparing for the upcoming Wisconsin Space Grant Consortium Undergraduate Research Program that will be continuing his work with the RockSat-C program emphasizing the analysis and interpretation of the data that will be collected.

Congressional District: 1

Congressional Representative: Paul Ryan

Megan Janiak

Award: Undergraduate Student Research; $4000.00

Status: Sophomore, Physics

Advisor: Kevin Crosby

Research Topic: Development of Fuel Gauging Methods in Microgravity

Abstract: Since 2011, the Modal Propellant Gauging (MPG) team, consisting of multidisciplinary undergraduate researchers from Carthage College, has been developing and testing a fuel gauging system for use in microgravity environments. Using experimental modal analysis (EMA) techniques, the goal of the MPG project is to develop a flight ready technology that gauges fuel in microgravity environments by correlating the modal response of a 1-g equilibrium surface to the microgravity surface response at the same fluid fill level. The technology has been tested aboard parabolic flights via a manned parabolic flight payload. The payload consists of two propellant tanks and is designed to measure the modal response of each propellant tank to an injected white noise signal via piezoelectric sensors. Flight data shows that the MPG method can measure fuel with greater than or equal to 1% resolution at and below 50% fill levels. Under funding from the Wisconsin Space Grant Consortium during the summer of 2017, the MPG team made improvements to the parabolic flight payload in addition to designing a new payload for use aboard a Blue Origin New Shepard research flight scheduled for the first half of 2018.

Biography: Megan Janiak is a sophomore physics and chemistry major with a minor in mathematics at Carthage College. She is currently a member of the Microgravity Team, Lake Michigan Launchers, and Chemistry Club. She is a co-president of Carthage’s chapter of Society of Physics Students. Megan also enjoys playing the viola in the Carthage Philharmonic.

Congressional District: 1

Congressional Representative: Paul Ryan

Nathaniel Lee

Award: Undergraduate Student Research; $4000.00

Status: Junior, Physics

Advisor: Kevin Crosby

Research Topic: Development of Fuel Gauging Methods in Microgravity

Abstract: Since 2011, the Modal Propellant Gauging (MPG) team, consisting of multidisciplinary undergraduate researchers from Carthage College, has been developing and testing a fuel gauging system for use in microgravity environments. Using experimental modal analysis (EMA) techniques, the goal of the MPG project is to develop a flight ready technology that gauges fuel in microgravity environments by correlating the modal response of a 1-g equilibrium surface to the microgravity surface response at the same fluid fill level. The technology has been tested aboard parabolic flights via a manned parabolic flight payload. The payload consists of two propellant tanks and is designed to measure the modal response of each propellant tank to an injected white noise signal via piezoelectric sensors. Flight data shows that the MPG method can measure fuel with greater than or equal to 1% resolution at and below 50% fill levels. Under funding from the Wisconsin Space Grant Consortium during the summer of 2017, the MPG team made improvements to the parabolic flight payload in addition to designing a new payload for use aboard a Blue Origin New Shepard research flight scheduled for the first half of 2018.

Biography: Nathaniel (Nate) Lee is a junior at Carthage College. He is majoring in Physics, and  
 minoring in Computer Science and Mathematics. Post graduation, he would like to enter the field of Aerospace Engineering and contribute to the growing fields of deep space exploration or unmanned aerial systems. He is entering his second year as a member of Carthage’s rocket team, Lake Michigan Launchers, and has also participated in the RockSat-X and microgravity research programs at Carthage. Apart from his roles in science-related programs, he holds two part-time jobs, is a member of the varsity golf team, and is president of the Asian-Pacific American Coalition of Carthage. In his free time, he enjoys playing golf, learning about and working with \cars, and exploring new areas of science that aren’t introduced in the classroom.

Congressional District: 1

Congressional Representative: Paul Ryan

Jackson Wehr

Award: Undergraduate Student Research; $4000.00

Status: Junior, Physics

Advisor: Kevin Crosby

Research Topic: Development of Fuel Gauging Methods in Microgravity

Abstract: Since 2011, the Modal Propellant Gauging (MPG) team, consisting of multidisciplinary undergraduate researchers from Carthage College, has been developing and testing a fuel gauging system for use in microgravity environments. Using experimental modal analysis (EMA) techniques, the goal of the MPG project is to develop a flight ready technology that gauges fuel in microgravity environments by correlating the modal response of a 1-g equilibrium surface to the microgravity surface response at the same fluid fill level. The technology has been tested aboard parabolic flights via a manned parabolic flight payload. The payload consists of two propellant tanks and is designed to measure the modal response of each propellant tank to an injected white noise signal via piezoelectric sensors. Flight data shows that the MPG method can measure fuel with greater than or equal to 1% resolution at and below 50% fill levels. Under funding from the Wisconsin Space Grant Consortium during the summer of 2017, the MPG team made improvements to the parabolic flight payload in addition to designing a new payload for use aboard a Blue Origin New Shepard research flight scheduled for the first half of 2018.

Biography: Jackson Wehr is a Junior physics major with two minors in computer science and  
 mathematics at Carthage College. He is currently the team co-lead of the  
 Microgravity Team and a member of the Lake Michigan Launchers Collegiate Rocket  
 Launch Team. Jackson is interested in electrical engineering, computer programing,  
 and business. Originally from Minnesota, he enjoys spending time outdoors, hunting,  
 and fishing. Outside of academic interests, Jackson is a member of the Men’s Golf  
 Team, the Club Hockey Team, and serves on the Executive Board for Carthage’s  
 Delta Upsilon Chapter, a social fraternity.

Congressional District: 1

Congressional Representative: Paul Ryan

Nicholas Poole

Award: Undergraduate Student Research; $4000.00

Status: Freshman, Physics

Advisor: Brant Carlson

Research Topic: Data aqcuistion software development

Abstract: This project is the development of a data acquisition device, based on the XMOS startKIT microcontroller, capable of reading and saving analog values at a high rate. The project development consisted of two phases; for use by the Carthage College RockSat-C team in an experiment which is looking at the effect of electromagnetic radiation emitted from lightning on the atmosphere, and a means for large bodies of data created during a test to be observable during the test. The project is based on code developed by; M. Hernandez, T. Shannon as part of 2015 – 2016 Carthage College RockSat-X team.

Biography: Nicholas Poole is a fulltime undergraduate student attending Carthage College currently  
 completing his freshman year. He is double majoring in Physics and Mathematics and is  
 expected to graduate in the year 2020. He is currently a member of the RockSat-C club acting as the leader of the digital electronics team, responsible for writing the software necessary to run the clubs current experiment. Over the summer of 2017 he will be performing research for the RockSat-C team in the form of developing more software for use in future experiments.

Congressional District: 1

Congressional Representative: Paul Ryan

Barbara Bielec

Award: Aerospace Outreach Program K12; $3000.00

Title: Program Director, BioPharmaceutical Technology Center

Project: Biotechnology Teacher Academy Summer Courses --Biotechnology:   
The Basics & Biotechnology: Beyond the Basics

Abstract: (First Paragraph of Proposal) The Biotechnology Technology Center Institute plans to offer two week‐long intensive courses, Biotechnology: The Basics and Biotechnology: Beyond the Basics. Our basic goals are to assist teachers in their efforts to engage and educate future Science, Technology, Engineering and Math (STEM) professionals, improving the STEM pipeline, as well as to provide information essential to fostering a scientifically literate population. Both courses are designed to provide teachers with the background information, lab‐based training and curriculum materials required to successfully include hands‐on biotechnology content in their classes. Specific to space science, teachers will learn about NASA resources and projects that utilize biotechnology and how to share that information with their students. This addresses a specific goal of the 2017‐2018 Aerospace Outreach Program to: “raise the level of exposure and interest of K‐12 teachers, students and the general public in space, aerospace, and space‐related science, design, or technology and its potential benefits; and/or increase interest, recruitment, experience and training of pre‐college students in the pursuit of space‐ or aerospace‐ related science, design, or technology”. Every year, course content is reviewed and revised to include state‐of‐ the‐art information and corresponding techniques. The courses will be offered for graduate education credit through Viterbo University and Edgewood College. Funds are requested to provide stipends for participating teachers, prioritizing providing financial support to those who teach underserved and/or underrepresented students, and to assist with staff costs and purchase supplies.

Biography: Barbara Bielec received her B.S. in Genetics from UW-Madison and her M.S. in Genetics from Texas A&M University. She has secondary teaching certification in Biology, Chemistry, and Math; and has taught science to students of all ages, in many different settings for over twenty-five years. Currently she coordinates and teaches a variety of K-12 programs at the BTC Institute (www.btci.org ) including: the Youth Apprenticeship Program - Biotechnology, the Biotechnology Field Trip program, the African American Ethnic Academy (AAEA)/ BTC Institute science program "A Celebration of Life" and teacher courses and workshops through the Biotechnology Teacher Academy. This biotechnology outreach position includes grant writing and presenting at national and state conferences. Memberships include the National Association of Biology Teachers (NABT), the National Science Teachers Association (NSTA), and the Wisconsin Society of Science Teachers (WSST).

Congressional District: 2

Congressional Representative: Mark Pocan

Barbara Bielec

Award: Aerospace Outreach K12 Program K12; $5000.00

Title: Program Director, BioPharmaceutical Technology Center

Project: Biotechnology Teacher Academy Summer Course - Biotechnology: The Basics for Middle School Teachers

Abstract: (First Paragraph of Proposal) The BTC Institute piloted Biotechnology: The Basics for Middle School Teachers June 14‐16, 2017. Our basic goals are to assist teachers in their efforts to engage and educate future Science, Technology, Engineering and Math (STEM) professionals, improving the STEM pipeline, as well as to provide information essential to fostering a scientifically literate population. The BTC Institute will build on the success of our 2017 pilot, doubling class size to 16 to teachers in 2018. Curriculum will be designed and refined to provide middle school teachers with the background information, lab‐based training and materials required to successfully include hands‐on biotechnology content with their students. Specific to space science, teachers will learn about NASA resources and projects that utilize biotechnology and how to share that information with the diverse student populations that they teach. This addresses the 2017‐2018 specific goal of the Aerospace Outreach Program (AOP) to: “Improve the STEM pipeline by including underserved and/or underrepresented students in the project; or including the teachers who specifically teach those populations”. The course will be offered for graduate education credit through Edgewood College. Funds are requested from the Wisconsin Space Grant Consortium (WSGC) to assist in the provision of stipends for participating teachers and to help develop, staff, and purchase supplies for this course.

Biography: Barbara Bielec received her B.S. in Genetics from UW-Madison and her M.S. in Genetics from Texas A&M University. She has secondary teaching certification in Biology, Chemistry, and Math; and has taught science to students of all ages, in many different settings for over twenty-five years. Currently she coordinates and teaches a variety of K-12 programs at the BTC Institute (www.btci.org ) including: the Youth Apprenticeship Program - Biotechnology, the Biotechnology Field Trip program, the African American Ethnic Academy (AAEA)/ BTC Institute science program "A Celebration of Life" and teacher courses and workshops through the Biotechnology Teacher Academy. This biotechnology outreach position includes grant writing and presenting at national and state conferences. Memberships include the National Association of Biology Teachers (NABT), the National Science Teachers Association (NSTA), and the Wisconsin Society of Science Teachers (WSST).

Congressional District: 2

Congressional Representative: Mark Pocan

Erika Carlson

Award: WSGC Graduate and Professional Research Fellowship; $4799.00

Status: Ph.D., Astronomy

Advisor: Robert Mathieu

Research Topic: Determining the Fraction of Triple  
Star Systems in Open Clusters

Abstract: (First Paragraph in Proposal) Studying binary stars and other multiple star systems is essential for understanding stellar evolution and stellar dynamics within open clusters. Though stellar evolution processes for single stars like our Sun are thought to be well understood, stars in binary and multiple systems, which are known to comprise the majority of stars, can often follow evolutionary paths unavailable to single stars due to interactions both within and between systems in a star cluster. For instance, blue straggler stars, whose masses are too great given the age of their host clusters, cannot be readily explained as the evolution of single stars. In fact, in open clusters, blue stragglers are likely formed only in binary or multiple systems, where mass can be transferred to the blue straggler from a companion star to give it excess mass. Recent work has suggested that triple stars may be crucial for forming blue stragglers, through phenomena such as the Kozai mechanism and tidal friction (Perets & Fabrycky, 2009; Geller & Mathieu, 2011).  
Thus, in order to better understand the formation of stars such as blue stragglers, it is necessary to understand the frequency of triple systems. Very little is known about the primordial formation of triples in star clusters, i.e. their initial frequency and distribution of separations. Furthermore, dynamical models have long predicted that triple systems with a wide tertiary companion will be less common in evolved clusters due to dynamical encounters with other single and binary stars in the cluster (Aarseth, 2004). However, this prediction is yet to be tested.

Biography: Erika began her graduate student career in the fall of 2016 in the Department of Astronomy at the University of Wisconsin—Madison, where she works with Professor Robert Mathieu and his research group on questions regarding stellar evolution and binary star systems in open clusters in the Milky Way. She is working specifically on a project to determine the prevalence of triple star systems in open clusters and better characterize how the prevalence of triple star systems can change with time. Before coming to UW-Madison, she earned a bachelor’s degree in Physics with a concentration in Astrophysics at Pomona College in 2015 and then spent a year at the Carnegie Observatories working as a research assistant and a member of the Carnegie-Chicago Hubble Program team to better determine the expansion rate of the Universe known as the Hubble constant.

Congressional District: 2

Congressional Representative: Mark Pocan

Julie Davis

Award: WSGC Graduate and Professional Research Fellowship; $5000.00

Status: Ph.D., Astronomy

Advisor: Eric Wilcots

Research Topic: Gas Cycling and the Circumgalactic Medium in CHILES Galaxies

Abstract: (First two Paragraphs of Proposal) Of all the baryonic matter in the universe today, only a small portion of it exists as familiar visible collapsed objects such as stars, galaxies, groups, and clusters. A much larger fraction of baryonic matter has been found to exist in multi-phase gaseous reservoirs surrounding galaxies and in intergalactic space. Thus, understanding how this gas moves from the diffuse intergalactic medium (IGM) into galaxies and back out again is a crucial component in understanding the overall formation and evolution of galaxies in the universe. Material in the virialized area around a galaxy--the circumgalactic medium (CGM)--represents a convergence region where both infalling and outflowing gases often have sufficient densities to be observationally probed simultaneously. This is the target region for galaxies in this project.  
Given that a large portion of the circumgalactic medium is very diffuse and thus difficult to measure in emission, many observational studies have focused primarily on viewing the CGM in absorption, using ultraviolet quasar absorption lines in neutral hydrogen (HI), Mg II, O VI, and a variety of other species to probe different gas regimes (e.g. Tumlinson et al. 2013, Nielson et al. 2013, Tripp et al. 2008, Davis et al. 2015 ). While we cannot directly detect in emission the lower (101 3 to 101 8 cm- 2 ) column densities reached by these absorption studies, radio observations with sufficiently long integration times offer the ability to probe emission from cold neutral hydrogen in the CGM to scientifically interesting mass limits, along with continuum emission from energetic galactic outflows. Combined with longslit Hα observations as a probe of warm ionized galactic gas, it is possible to produce a more complete kinematic picture of gas cycling through galaxies. As a member of the COSMOS HI Large Extragalactic Survey (CHILES), I have access to a uniquely long 1000 hour integration dataset. Therefore, I propose using the CHILES HI and continuum radio data along with longslit Hα spectroscopy of an ensemble of galaxies out to z ~ 0.1 to probe gas dynamics through the whole inflow/star-formation/outflow cycle for a variety of galaxy environments and morphologies.

Biography: Julie Davis is a second year graduate student in the astronomy PhD program at the University of Wisconsin-Madison. She graduated magna cum laude with a B.A. in physics and astronomy from the University of Colorado, Boulder. Julie now works with her graduate advisor Prof. Eric Wilcots on the distribution of extragalactic neutral hydrogen at intermediate redshifts as part of the CHILES survey on the Very Large Array (VLA) radio interferometer. Outside of her research interests in observational extragalactic astronomy, Julie enjoys participating in science outreach activities, science policy, and social advocacy.

Congressional District: 2

Congressional Representative: Mark Pocan

Kendall Hall

Award: WSGC Graduate and Professional Research Fellowship; $4926.00

Status: Ph.D., Astronomy

Advisor: Snezana Stanimirovic

Research Topic: Molecular Gas Evolution and "CO-Dark" Gas in Perseus

Abstract: Understanding molecular cloud formation is important to understanding star formation, but the processes by which it happens are still not clear. In particular, the importance of interstellar turbulence for molecule formation is still not understood. I propose to measure abundances of ionized carbon (CII) and OH molecules across the Perseus molecular cloud and compare abundance trends with predictions from both stationary and turbulence driven models of molecular cloud evolution. This study will provide a unique observational test for the importance of interstellar turbulence for molecule formation in the interstellar medium.

Biography: Kendall is a first year graduate student pursuing her PhD in Astronomy at UW-Madison.  
She received her B.S. in physics with minors of astronomy and piano performance from  
California State University, Fresno. Her research interests include the structure of the interstellar medium and photo-dominated regions, where the interstellar medium interacts with the radiation of nearby stars. When she isn’t studying hydrogen, carbon, and oxygen in space, she likes to swing dance, play piano, and bake desserts.

Congressional District: 2

Congressional Representative: Mark Pocan

Dhaneshva Krishnarao

Award: WSGC Graduate and Professional Research Fellowship; $5000.00

Status: Ph.D., Astronomy

Advisor: L. Matthew Haffner

Research Topic: Extragalactic Study of Ionized Gas Extending from Milky Way Knowledge

Abstract: (First Paragraph of Proposal) Disk galaxies are made up of layers - from cold dense molecular gas and dust in the disk to diffuse neutral and ionized gas in the halo. However, these layers interact through a complex disk-halo interplay that determines the flow of matter and energy throughout a galaxy and influences its evolution. Star formation, supernovae, and other mechanisms in the disk drive gas into the halo. In return, the height of this halo gas determines the gravitational pressure experienced in the disk, directly affecting molecular clouds and star formation. Over this past year, I analyzed and submitted a first-author paper on the vertical structure of ionized halo gas in our Galaxy to disentangle a piece of this complex disk-halo puzzle (Krishnarao et al. 2017). But to build an in-depth understanding of the ionized gas in disk galaxies, I must expand our knowledge of the Milky Way to a large sample of galaxies. I can then run a statistical ensemble of tests to understand the physics driving the gas of galaxies, rather than relying on a single sample.

Biography: Dhanesh (DK) is a graduate student at UW-Madison interested in the properties and  
interactions between the disk and halo of galaxies – particularly the Milky Way. He  
uses a unique and powerful telescope called WHAM, the Wisconsin H-Alpha Mapper,  
to study diffuse ionized gas that is seen throughout disk galaxies and disentangle the  
structure of the interstellar medium (ISM). Before coming to Wisconsin, DK studied  
math and physics at American University in Washington, DC, where he investigated  
the properties of interstellar dust and its effects on the ISM. He also worked at NASA Goddard Space Flight Center as an official Space Weather Forecaster, providing real-  
time alerts and analysis of space weather events to NASA mission operators, the Air Force, and other private sector satellite operators.

Congressional District: 2

Congressional Representative: Mark Pocan

Charee Peters

Award: WSGC Graduate and Professional Research Fellowship; $5000.00

Status: Ph.D., Astronomy

Advisor: Eric Wilcots

Research Topic: Variability of Radio Active Galactic Nuclei in the CHILES Field

Abstract: It is clear from previous and ongoing surveys that there are many sources that change in brightness over time. There is a wide range of extragalactic phenomena that create events with time-varying brightness. Variable sources have regular changes in brightness, such as the steady accretion of matter onto a super massive black hole at the center of a galaxy, known as active galactic nuclei (AGN). Despite strongly emitting in radio wavelengths, the radio sky is nearly completely unexplored in terms of these variable events. Most radio surveys on AGN variability have not been deep enough, include a small sample, and only have a few observations to understand how AGN are changing on timescales between weeks and months. Improving our understanding of the fundamental nature these sources requires a deep radio continuum survey with extension data to observe changes happening on timescales longer than days and less than years. The combination of the COSMOS HI Large Extragalactic Survey (CHILES) and 14 hours of extension observations, I will begin to answer: what is the variability of radio AGN and can it be used to predict and classify future events?

Biography: Charee Peters is currently completing her PhD in Astronomy at the University of Wisconsin-Madison. She received her MA in Astronomy and Physics from the Fisk-Vanderbilt Masters-to-PhD Bridge Program in 2013, and her BS in Physics from the University of Denver in 2011. Her PhD thesis consists mainly of using the new COSMOS HI Large Extragalactic Survey (CHILES). CHILES is a neutral hydrogen 21-cm radio survey conducted at the Very Large Array, a radio astronomy observatory in New Mexico. From this survey, Charee is trying to understand how the radio emission varies over time for different phenomena, including supernovae, active galactic nuclei, and tidal disruption events. In 2011, Charee became the first person in her tribe, Yankton Sioux, to obtain a degree in Physics. Since then, she joined the American Astronomical Society’s Committee on the Status of Minorities in Astronomy as a Committee Member. In her free time, Charee plays roller derby with the Mad Rollin’ Dolls under the alias SiouxperNova #185 and coaches for the Wisconsin Men’s Roller Derby.

Congressional District: 2

Congressional Representative: Mark Pocan

Andrea Vang

Award: WSGC Graduate and Professional Research Fellowship; $5000.00

Status: Ph.D., Astronomy

Advisor: Marsha J. Wolf

Research Topic: A 3D View into the Co-Evolutionary History of Galaxies and AGN

Abstract: (First Paragraph of Proposal) Our research project aims to study whether there is a connection between radio active galactic nuclei (AGN) and star formation (SF) activity by analyzing observational signatures of AGN feedback and its viability as the mechanism for truncating SF in galaxies. Feedback, a process by which gas is expelled or heated too much for new star formation to occur, is required in galaxy formation simulations to truncate SF and form galaxies with properties that we observe today (Springel+ 2005, Dekel & Birnboim 2006, Hopkins+ 2006). Winds from AGN or supernovae after a burst of new SF can blow out circumnuclear gas, suppressing SF. New spatially resolved galaxy surveys utilizing integral field spectra are finding galaxy outflows to be much more common than previously believed (Diamond-Stanic+ 2016, McElroy+ 2016), supporting the idea that feedback is an important ingredient in galaxy evolution. AGN are a potential source of this feedback, which would mean they are affecting the evolution of galaxies. Yet, the timing of star forming and AGN phases are not well known and as of today we do not have a complete understanding of the connection between AGN and SF. The goals of our project focus on the relationship between the supermassive black holes and their host galaxies through their active phases to understand the role of the AGN in the host galaxy's evolution, from the triggering of the AGN to its dormant quiescence phase. This research project will span three years and the results of this project would serve as the foundation for my dissertation at the University of Wisconsin-Madison under the guidance of my advisor, Dr. Marsha Wolf.

Biography: Andrea Vang is an Astronomy graduate student studying galaxy evolution at the  
University of Wisconsin-Madison. Specifically, her research focuses on studying the relationship between active galactic nuclei (AGN), the active supermassive blackhole at the center of a galaxy, and star formation. She studies the radio spectrum of a galaxy, which gives clues to the AGN history, and compares it to the star formation history obtained from the optical spectrum. This would allow a better understanding on how the AGN affects galaxy evolution, specifically its star formation.

Congressional District: 2

Congressional Representative: Mark Pocan

James Cho

Award: Industry Internship Program; $5000.00

Status: Senior, Aerospace Engineering

Advisor: Donna Kraenzle

Research Topic: International Space Station Payload Development

Abstract: Abstract not found in Preceedings Checklist

Biography: NONE

Congressional District: 2

Congressional Representative: Mark Pocan

Alexis Oxborough

Award: Industry Internship Program; $5000.00

Status: Senior, Mechanical Engineering

Advisor: Donna Kraenzle

Research Topic: International Space Station Payload Development

Abstract: Abstract not found in Preceedings Checklist

Biography: NONE

Congressional District: 2

Congressional Representative: Mark Pocan

Barbara Bielec

Award: Special Initiatives Program -- K12; $5000.00

Title: Program Director, BioPharmaceutical Technology Center

Project: A Celebration of Life XXII: Life in Space! - Middle School Session

Abstract: (Project Description in Proposal) A Celebration of Life XXII: Life in Space! ‐ Elementary Session is a two‐week summer program for students entering grades 3‐5, to be held weekday mornings from 8:30am‐12:00pm, June 13‐24, 2017. Hands‐on activities, in outdoor, classroom and laboratory settings, are designed to engage students’ interest in science and STEM careers. In 2017 this will include a series of activities related to (1) maintaining human health in space travel; (2) experiments with plants and invertebrates that take place on the space station and in other no/low gravity environments; and (3) how we might look for signs of life on other planets. Many of the educational activities to be used are from the NASA Education Program (http://www.nasa.gov/offices/education/about/index.html). The program will conclude with a celebration with students’ family members and friends. For this event, students select and prepare activities to share, guests and sponsors are thanked for their support of the program, each student receives a certificate and lunch is  
provided.

Biography: Barbara Bielec received her B.S. in Genetics from UW-Madison and her M.S. in Genetics from Texas A&M University. She has secondary teaching certification in Biology, Chemistry, and Math; and has taught science to students of all ages, in many different settings for over twenty-five years. Currently she coordinates and teaches a variety of K-12 programs at the BTC Institute (www.btci.org ) including: the Youth Apprenticeship Program - Biotechnology, the Biotechnology Field Trip program, the African American Ethnic Academy (AAEA)/ BTC Institute science program "A Celebration of Life" and teacher courses and workshops through the Biotechnology Teacher Academy. This biotechnology outreach position includes grant writing and presenting at national and state conferences. Memberships include the National Association of Biology Teachers (NABT), the National Science Teachers Association (NSTA), and the Wisconsin Society of Science Teachers (WSST).

Congressional District: 2

Congressional Representative: Mark Pocan

Barbara Bielec

Award: Special Initiatives Program -- K12; $4000.00

Title: Program Director, BioPharmaceutical Technology Center

Project: A Celebration of Life XXII: Life in Space! - Elementary Session

Abstract: (Project Description in Proposal) A Celebration of Life XXII: Life in Space! – Middle School Session is a two‐week summer program for students entering grades 6‐8, to be held weekday mornings from 8:30am‐12:00pm, June 26‐July 7, 2017. Hands‐on activities, in outdoor, classroom and laboratory settings, are designed to engage students’ interest in science and STEM careers. In 2017 this will include a series of activities related to (1) maintaining human health in space travel; (2) experiments with plants and invertebrates that take place on the space station and in other no/low gravity environments; and (3) how we might look for signs of life on other planets. Many of the educational activities to be used are from the NASA Education Program  
(http://www.nasa.gov/offices/education/about/index.html). The program will conclude with a celebration with students’ family members and friends. For this event, students select and prepare activities to share, guests and sponsors are thanked for their support of the program, each student receives a certificate and lunch is provided.

Biography: Barbara Bielec received her B.S. in Genetics from UW-Madison and her M.S. in Genetics from Texas A&M University. She has secondary teaching certification in Biology, Chemistry, and Math; and has taught science to students of all ages, in many different settings for over twenty-five years. Currently she coordinates and teaches a variety of K-12 programs at the BTC Institute (www.btci.org ) including: the Youth Apprenticeship Program - Biotechnology, the Biotechnology Field Trip program, the African American Ethnic Academy (AAEA)/ BTC Institute science program "A Celebration of Life" and teacher courses and workshops through the Biotechnology Teacher Academy. This biotechnology outreach position includes grant writing and presenting at national and state conferences. Memberships include the National Association of Biology Teachers (NABT), the National Science Teachers Association (NSTA), and the Wisconsin Society of Science Teachers (WSST).

Congressional District: 2

Congressional Representative: Mark Pocan

Diedre Green

Award: Special Initiatives Program -- K12; $5000.00

Title: Program Director, Simpson Stree Free Press

Project: On Wisconsin! A Wisconin Idea in Action

Abstract: The SSFP 2017-18 “On Wisconsin!” project provides professional development for informal and formal education providers. In fact, the project uses an already successful back-and-forth pipeline model—a Wisconsin Idea model. SSFP continues to funnel college-ready students from underrepresented groups to UW System and other Wisconsin colleges. This innovative pipeline approach goes the other way too. We employ SSFP grads (now in college) as teachers and editors, helping students from modest-income backgrounds afford higher education. We inspire and engage young people, then educate and employ them. SSFP continues to build its partnership with professionals in the STEM fields during 2017. This project and this formula hit all the key benchmarks of the NASA Education Overview. These projects build on established assets and erect new, lasting strategic assets.

Biography: From humble roots in 1992 as a literacy program based in a challenged neighborhood, SSFP has carefully honed its craft. We deliver a menu of award-winning out-of-school time academic programs. We operate at several sites including Capital Newspapers, local schools, and our traditional location at South Towne Mall. Our focus is writing for publication. We are neighborhood-based, streamlined, and efficient. Known for rigorous academics, SSFP is  
popular in schools and neighborhoods across Dane County and southern Wisconsin. Fundamentally, we believe that actively engaged local young people are valuable partners in any achievement gap fight. Simpson Street Free Press (SSFP) delivers high-quality after-school academic instruction. Our students produce five separate youth newspapers and publish content on various media  
platforms. One of our major focus areas and most popular newspaper sections is our coverage of space science news. We staff our newsrooms using an innovative youth leadership pipeline. This model delivers impressive cost efficiency. SSFP grows its own after-school instructors. Our college-age newspaper editors know SSFP curriculum because they grew up doing it. Thus, SSFP is a pipeline for young people of color. Fourteen current editors are SSFP graduates. We see young leaders as assets. We place them in leadership roles.

Congressional District: 2

Congressional Representative: Mark Pocan

Benjamin Hoscheit

Award: Undergraduate Student Research; $4000.00

Status: Junior, Astrophysics

Advisor: Peter Timbie

Research Topic: Exploring the Effects of Foreground Removal Techniques and Instrumental Systematics on Observations of the 21 cm Neutral Hydrogen Signal

Abstract: There is a substantial and growing interest in cosmology to study the 21 cm signal emitted or absorbed by large abundances of neutral hydrogen (HI) in the vast cosmic web of the universe. Such study has the potential to allow scientists to map the matter distribution of the universe over nearly its entire history. However, in order to unlock this rich potential, one must first develop the ability to distinguish and remove large contaminating signals from ionized gas in the foregrounds of the 21 cm signal. Furthermore, one must also have a dominant handle over the instrumental systematics associated with the particular experiment. As such, in this proposed research project, we first aim to understand and construct the associated ability to remove four common astrophysical foregrounds to 21 cm experiments utilizing the Singular Value Decomposition (SVD) Principal Component Analysis (PCA) technique. We then aim to assess the degree to which three common instrumental systematics introduce systematic un-smoothing effects into the analysis of these astrophysical foregrounds. This study will take place within a direct application to simulated Green Bank Telescope radio beam data and will be conducted over the upcoming summer in the Department of Physics at the University of Wisconsin-Madison.

Biography: Ben Hoscheit is a third year undergraduate student enrolled at the University of  
 Wisconsin-Madison (UW) majoring in Astronomy-Physics and Mathematics. His  
 research specializes in both theoretical and observational cosmology. He has been  
 involved in a theoretical research project advised by Professor Amy Barger in the UW  
 Department of Astronomy to further explore the potential cosmological implications of  
 observational data that suggest we may live near the center of a large void of size ~300  
 Megaparsecs. Furthermore, Ben has also been involved in an observational research  
 project advised by Professor Peter Timbie in the UW Department of Physics to study the  
 effects of foreground removal techniques and instrumental systematics on observations  
 of the 21-cm neutral hydrogen signal. His future goal is to pursue a doctorate degree  
 (PhD) in observational cosmology as a next step on the career path of science research  
 and education at the university level.

Congressional District: 2

Congressional Representative: Mark Pocan

Ryan LeFebre

Award: Undergraduate Student Research; $3900.00

Status: Senior, Physics

Advisor: Peter Timbie

Research Topic: Kinetic Inductance Detectors for Future Space Missions to Observe the Cosmic Microwave Background

Abstract: (First Paragraph of Proposal)The cosmic microwave background (CMB) has been fundamental to observational cosmology ever since Arno Penzias and Robert Wilson accidentally discovered it in 1964. The CMB offers important information about the early universe and provides evidence for the big bang theory. In recent years, the polarization anisotropy of the CMB has been of much interest. This polarization is thought to have arisen from gravitational waves caused from Inflation. The theory of Inflation is important because it offers solutions to otherwise unsolved problems in cosmology. A precise measurement of the CMB polarization could provide indirect detection of these primordial gravitational waves and subsequently help prove the theory of Inflation (Krauss).

Biography: Ryan LeFebre is currently an undergraduate student at the University of Wisconsin at Madison. In May of 2018 he plans to graduate with a Bachelor of Science degree with majors in astronomy-physics, physics, and applied mathematics. Ryan’s interests include cosmology, astrophysics, and instrumentation. After his undergraduate education he would like to continue his studies at the graduate level. In his free time he enjoys exercising and following Wisconsin sports.

Congressional District: 2

Congressional Representative: Mark Pocan

Alecio Madrid

Award: Undergraduate Student Research; $4000.00

Status: Senior, Astrophysics

Advisor: Dr. Audra K. Hernandez

Research Topic: Using Velocity Anisotropy to Analyze Magnetohydrodynamic Turbulence in Giant Molecular Clouds

Abstract: Theoretical studies have shown structure function (SF) analysis to be a strong tool for gaging interstellar magnetohydrodynamic (MHD) turbulence. MHD turbulence plays a critical role in the structure and evolution of giant molecular clouds (GMCs) as well as in the formation of sub-structures known to spawn stellar progenitors. This study takes an in-depth approach to studying the limitations of SF analysis for gauging MHD turbulence in GMCs. Limitations of radio observation has led to large variations in the methods used to extract GMCs from survey data. Thus, a strong indicator of the robustness of SF analysis is whether it remains accurate even when implementing different methods of extraction. Even though a plethora of studies have indicated the strong potential of SF for analyzing MHD turbulence, this study finds significant cause for concern regarding the feasibility of SF analysis as a robust tool in GMC spectroscopy.

Biography: Alecio Madrid is currently a junior at the University of Wisconsin-Madison  
 studying Applied Mathematics, Astronomy, Chemistry, Computer Science, and  
 Physics. He is originally from Denver, Colorado, but his parents currently living in  
 Reading, United Kingdom. He is currently researching magnetic fields within star  
 forming molecular gas in the milky way galaxy, and is looking forward to  
 continuing his research over the next year. His hobbies include traveling, reading,  
 and coding, and he has a passion for space and science. He is grateful for this  
 opportunity, and looking forward to the upcoming months.

Congressional District: 2

Congressional Representative: Mark Pocan

Matthew Monfeli

Award: Undergraduate Student Research; $3900.00

Status: Junior, Mechanical Engineering

Advisor: Richard Barker

Research Topic: Hydrogen Peroxide Flow System

Abstract: Plants grown on orbit seem to be experiencing oxidative stress. The gene expression response of the plants to this oxidative stress bears striking resemblance to their response towards dilute hydrogen peroxide (H2O2). Thus, one route towards developing plants better suited to the stresses of spaceflight begins with developing a way to reliably and consistently treat plants with hydrogen peroxide in a laboratory setting. The ROSwell Device embraces this challenge, using 3D-printed components, Arduino and Raspberry Pi microcontroller units, and a solenoid valve mounted on a frame of 80/20 aluminum. The final goal for this device is to construct a reliable method for testing and development of plants designed to grow in space, before sending them into orbit.

Biography: Hello there! My name is Matt Monfeli, and I am an undergraduate student studying  
 Biological Systems Engineering at UW-Madison. Space exploration has intrigued me for most of my life, and it is something that I hope to advance with my professional career. That intrigue led me to the Gilroy Lab here in Madison, where I do extracurricular research under Dr. Richard Barker. With the help of the Wisconsin Space Grant Consortium, I’ll be able to continue my research through the summer. Something that goes hand in hand with my love of science is my love of nature. In my spare time, I enjoy hiking, kayaking, rock climbing, and pretty much anything else that can be done outside. I am also an avid Crossfitter, and I love to cook. Being out in nature has really become a scientific experience for me, marveling at the complexity of a mountain range or even a simple rock. In general, I love exploring and understanding this amazing universe which we inhabit, and I hope to play an integral part in increasing our reach into the unknown throughout my life.

Congressional District: 2

Congressional Representative: Mark Pocan

Pioneer Rocketry

Award: Collegiate Rocket Launch; $2000.00

Advisor: Dr. Katherine Rabidoux

Project: Collegiate Rocket Launch

Christina De Vries

Status: Sophomore, Mechanical Engineering

Award: Collegiate Rocket Launch; $333.33

Morgan Fenger

Status: Junior, Biomedical Engineering

Award: Collegiate Rocket Launch; $333.33

Andrew Lee

Status: Junior, Engineering Physics

Award: Collegiate Rocket Launch; $333.33

Eliot Rand

Status: Junior, Mechanical Engineering

Award: Collegiate Rocket Launch; $333.33

Bryan Reyes

Status: Senior, Mechanical Engineering

Award: Collegiate Rocket Launch; $333.33

Tyler Sorensen

Status: Freshman, Criminal Justice

Award: Collegiate Rocket Launch; $333.33

Abstract: none

Congressional District: 3

Congressional Representative: Ron Kind

Stuart Oliphant

Award: Elijah Balloon Payload; $4000.00

Advisor: Dr. William Farrow

Research Topic: The Elijah Project -- 2017 High Altitude Balloon Project

Abstract: The 2017 WSGC Elijah High-Altitude Balloon Payload Fellowship focused on three different topics for high altitude research: Modular Payload Design, Balloon Dynamics, and Energy Harvesting. A modular payload system was created using advanced manufacturing methods, which improved assembly and field operation. Minor structural fracturing was observed upon recovery. All instrumentation recovered were functioning. Vertical flight dynamics of a high-altitude balloon were studied to create a model that was compared against experimental data. Predictions did not accurately replicate GPS altitude data, possibly due to incorrect internal-balloon pressure readings and underlying assumptions. Habitability of high-altitude environments were explored by monitoring insect analog in pressurized environment. A slow pressure leak induced insects into a comatose state. Radiation was detected visually with camera.Investigated energy generation from balloon kinematics. Flight data not obtained but flight simulation data produced average voltage = 0.0039 V and total energy = 245.13 J.

Biography: Stuart was born in Madison into a family of five kids. The family continued to grow to include  
ten kids in total. While Stuart’s family never moved during his childhood he did participate in  
ample amount of service helping others in his church community move. Stuart was constrained  
by a difficulty in reading until his older sister introduced him to the Harry Potter series in the  
third grade such that by fifth grade independent reading was one of his favorite moments of the  
school day. Through his dad’s hobby of bee keeping Stuart has been stung on countless  
occasions in his life, but also knows the method to extract honey, and thus knows its fresh  
sweetness. A few hobbies that Stuart has learned are chainmail armor and jewelry, net making,  
and whittling. One of Stuart’s chainmail necklaces entered at Dane County Fair was awarded the  
honor of being entered in the Wisconsin State Fair. By the end of high school Stuart had also  
earned the awards of Eagle scout through B.S.A., silver medal at state forensic competitions, also  
lettering in forensics, cross country, band, and academics. Stuart is now in college majoring in  
mechanical engineering, continues to play sousaphone in the university’s marching band and has  
so far added swing dancing and unicycling to his talents and hobbies. Stuart has always been  
interested in how things work, and understanding things at a deeper level. He plans to graduate  
with a bachelor of science degree from UW-Platteville in December of 2018.

Congressional District: 3

Congressional Representative: Ron Kind

Katherine Rabidoux, Ph.D.

Award: Research Infrastructure Program; $9972.00

Title: Assistant Professor, Engineering Physics

Project: Modeling the star formation histories of local luminous compact blue galaxies

Abstract: (Second Paragraph of Proposal)This project will be the first step in developing a new astronomy research program at the University of Wisconsin-Platteville that will involve students in exploring the evolution of galaxies. I will develop this research program in collaboration with researchers at the West Virginia University Center for Astrophysics. In addition, this research will make use of national facilities such as the National Radio Astronomy Observatory and the Green Bank Observatory. The proposed project falls under the Astrophysics Division of the NASA’s Science Mission Directorate. This division searches for answers to the questions “how does the universe work?”, “how did we get here?”, and “are we alone?”. The first two questions explore the universe’s history and evolution, including the evolution of galaxies and the star formation within them. As this project will use the star formation properties of local galaxies to infer the evolutionary paths of galaxies today as well as how past galaxies underwent changes to appear the way they do now, this project aligns well with the Division’s aim to better understand how the universe has evolved.

Biography: Katie Rabidoux graduated from Michigan State University with a bachelor’s degree in Astrophysics. She received her M.S. and Ph.D. in Physics from West Virginia University. She studies the evolution of star- forming galaxies. Her Ph.D. thesis work investigated the gas kinematics and global star formation properties of local luminous compact blue galaxies (LCBGs), which are a type of galaxy that was common when the universe was half of its current age but are rare at the present time. She joined the faculty of the Department of Engineering Physics at the University of Wisconsin-Platteville in the fall of 2015.

Congressional District: 3

Congressional Representative: Ron Kind

Xavier James

Award: STEM Bridge Scholarship; $1000.00

Status: Sophomore, Aeropace Engineering and Physics

Biography: Raised at Florence, South Carolina, Xavier James currently attends University of Wisconsin La Crosse pursuing a degree in physics and mathematics. After graduating, he plans to continue his education and obtain his Ph.D. in nuclear physics. Once complete, Xavier will then pursue a career in the research field of nuclear science.

Congressional District: 3

Congressional Representative: Ron Kind

Logan Hess

Award: Undergraduate Student Research; $3272.00

Status: Junior, Physics

Advisor: Adriana Durbala

Research Topic: A Fourier Photometric Analysis of the Spiral Arms of Late-Type Spiral Galaxies

Abstract: (First Paragraph of Proposal)Colossal in size and complexity, spiral galaxies host a variety of features including bulges, disks, bars, and spiral arms. The shape and properties of these features are the result of secular evolution (“nature”) and influenced by environmental interactions with other nearby galaxies (“nurture”). It has been proposed that specific properties of these features are related to environmental density. For this project, we explore the properties of the spiral arms as a function of environmental density. Two samples of spiral galaxies of morphological classification Sb/Sbc/Sbc will be considered. These galaxies are drawn from two different environments; isolated (n = 34 galaxies) versus loose groups of 4-10 galaxies (n= 80 galaxies). Overall, these samples allow for a good comparison of galaxies in isolated versus dense environments. We will analyze the spiral arms properties using Fourier decomposition/analysis to measure and model the arms, paying specific attention to the shape and number/ multiplicity of the arms. Ultimately, we would like to quantify the effect environmental density has on the formation and evolution of early-type spiral galaxies. The proposed study will complement my current WSGC research project, which uses the same methods to compare the spiral arm properties of early-type S0a/Sa/Sab spiral galaxies located in isolated vs grouped environments. By continuing this research to encompass later-type spiral galaxies, we will have a greater variety of galaxies to gather information from, and can draw further conclusions based on the results of our current research.

Biography: Logan is currently a junior physics major attending the University of Wisconsin-Stevens point, and has plans to attend graduate school for astrophysics in the future. He is currently conducting research related to the effect of environmental density on the arms of spiral galaxies. Logan has experience with both optical and radio telescopes, including professional telescopes such as the Greenbank and Arecibo radio telescopes, and the WIYN .9m at Kitt Peak.

Congressional District: 3

Congressional Representative: Ron Kind

Karsten Hintz

Award: Undergraduate Student Research; $3188.00

Status: Senior, Physics

Advisor: Sebastian Zamfir

Research Topic: Evaluating Information Content in SDSS Quasar Spectra as a Function of Signal-to-Noise

Abstract: (First Paragraph of Proposal)In the last 20 years, a new type of framework has evolved in observational astronomy; large amounts of data are being gathered by survey-type projects such as the Sloan Digital Sky Survey (SDSS). Data collection for this program began in 2000 and by 2010 SDSS has obtained over 100,000 spectra of quasars at low and high redshift. This data is typically made available in public archives, which essentially become “goldmines” for a wide range of projects suitable for students, researchers, amateur astronomers and even citizen science projects. However, it is known that of this tremendous number of spectra, only about 10-20% have a suitable signal-to- noise ratio (S/N) for measurements such as width and internal shifts of broad emission lines. The goal of my proposed project is to test the hypothesis that these measurements are sensitive to changes in S/N. I will start by measuring the width and shifts of lines in very high quality quasar spectra. I would subsequently (artificially) degrade the S/N of the original spectra, using themknoisetask in IRAF, in several distinct steps and re-measure the same parameters. The goal of this process is to look for systematic trends induced by the S/N degradation. I will evaluate its consequences in obtaining parameters of high interest in cosmology, e.g., the mass of the black hole (BH), which is very sensitive to the width of the broad emission lines.

Biography: Karsten Hintz is a senior at the University of Wisconsin Stevens Point and is double majoring in physics and math, and has a minor in anthropology. He works as a trigonometry, calculus and chemistry tutor in the Tutor-Learning Center at UW-Stevens Point. Karsten also spends his time lecturing to kids and adults as a planetarium lecturer at the Allen F. Blocher Planetarium, and as an observatory operator at the Arthur J. Pejsa Observatory. Karsten recalls being interested in science as a child and developed a  
 particular curiosity in the science of physics and astronomy after he was gifted a telescope at a young age. He plans to continue nurturing his interest in physics and astronomy at the undergraduate level and eventually going on to pursue a doctorate in physics or math. After completing his doctorate Karsten hopes to pursue a career in academic research.

Congressional District: 3

Congressional Representative: Ron Kind

Sarah Parker

Award: Undergraduate Student Research; $2888.00

Status: Junior, Physics

Advisor: Adriana Durbala

Research Topic: Lenticular Galaxies in Different Environments – Isolated versus Group Environment

Abstract: (First Paragraph of Proposal)Isolated lenticular (S0) galaxies are a hot topic of research nowadays. I aim to learn more about these lenticular galaxies through exploring various photometric parameters to identify differences between galaxies in isolated and crowded (groups with 4-10 galaxy members) environments. Using a Fortran code (BUDDA – Bulge Disk Decomposition Analysis; http://www.sc.eso.org/~dgadotti/budda.html ), I will model and derive the parameters that describe the bulge, bar, and the disk of each lenticular galaxy (e.g., shape, light profile, etc.). Then, I will compare the given parameters along with colors and size to see if they are statistically different for the two samples. In doing this, I might be able to get some more insights into the formation and evolution of lenticular galaxies.

Biography: Sarah Parker is a physics major, math minor at the University of Wisconsin-Stevens Point. She is the treasurer of her school’s chapter of the Society of Physics Students, as well as an Astronomy Tutor, Planetarium Lecturer at the Allen F. Blocher Planetarium, and Telescope Operator at the Arthur J. Pejsa Observatory. She is doing research with Dr. Adriana Durbala on Elliptical Galaxies in Different Environments-Isolated versus Group Environments. She plans on continuing her studies by attaining a doctorate in astrophysics and hopefully doing research at either NASA or SpaceX.

Congressional District: 3

Congressional Representative: Ron Kind

Jacob Pfund

Award: Undergraduate Student Research; $3800.00

Status: Sophomore, Physics

Advisor: Seth King

Research Topic: Exploring Properties of Zinc Oxide/Graphene  
 Hybrid Structures

Abstract: Indium tin oxide (ITO) is a commonly used material in the production of transparent conducting films. However, indium is toxic, environmentally unfriendly, and expensive. To remedy this issue, a new material must be developed which can serve as a replacement for ITO. This project utilized commercially available zinc oxide powder and graphene nanoplatelets to manufacture nanocomposite materials through ultrasonic homogenization. To investigate their physical properties, these nanocomposites were then subjected to UV-Vis spectroscopy, particle size analysis, scanning electron microscopy, and X-ray diffractometry. Results indicate that ZnO/Graphene nanocomposites have promising potential as an inexpensive and environmentally friendly transparent conductor.

Biography: Jacob Pfund is a sophomore physics major at UW-La Crosse. He is currently performing summer research on Zinc Oxide/Graphene hybrid structures at Dr. Seth King’s Lab at UWL. Jake also has participated in several other summer research internships at both UWL and UW-Madison. These include spending the summer at the Wisconsin Geological and Natural History Survey in 2013, working at the Weibel biochemistry lab at UW-Madison in 2014, and performing research at Dr. King’s lab in 2016.

Congressional District: 3

Congressional Representative: Ron Kind

Whoosh Generator

Award: Collegiate Rocket Launch; $1000.00

Advisor: Dr. Anand Vyas

Project: Collegiate Rocket Launch

Tyler Braun

Status: Sophomore, Mechanical Engineering

Award: Collegiate Rocket Launch; $166.67

Nicole Jackson

Status: Freshman, Electrical Engineering

Award: Collegiate Rocket Launch; $166.67

Jordan Petrie

Status: Junior, Mechanical Engineering

Award: Collegiate Rocket Launch; $166.67

Zachary Runte

Status: Freshman, Mechanical Engineering

Award: Collegiate Rocket Launch; $166.67

Frederick Rosenberger

Status: Sophomore, Mechanical Engineering

Award: Collegiate Rocket Launch; $166.67

none

Status: none

Award: Collegiate Rocket Launch; $166.67

Abstract: none

Congressional District: 4

Congressional Representative: Gwen Moore

Nicholas Hennigan

Award: Elijah Balloon Payload; $4000.00

Advisor: Dr. William Farrow

Research Topic: The Elijah Project -- 2017 High Altitude Balloon Project

Abstract: The 2017 WSGC Elijah High-Altitude Balloon Payload Fellowship focused on three different topics for high altitude research: Modular Payload Design, Balloon Dynamics, and Energy Harvesting. A modular payload system was created using advanced manufacturing methods, which improved assembly and field operation. Minor structural fracturing was observed upon recovery. All instrumentation recovered were functioning. Vertical flight dynamics of a high-altitude balloon were studied to create a model that was compared against experimental data. Predictions did not accurately replicate GPS altitude data, possibly due to incorrect internal-balloon pressure readings and underlying assumptions. Habitability of high-altitude environments were explored by monitoring insect analog in pressurized environment. A slow pressure leak induced insects into a comatose state. Radiation was detected visually with camera.Investigated energy generation from balloon kinematics. Flight data not obtained but flight simulation data produced average voltage = 0.0039 V and total energy = 245.13 J.

Biography: Nicholas M. Hennigan is a Mechanical Engineering student at the Milwaukee School of Engineering. He will be starting his junior year this coming winter (2017/18). Mr. Hennigan is a recipient of the 2017 Wisconsin Space Grant Consortium Elijah Balloon Payload Team Fellowship Program. Mr. Hennigan is a member of the American Institute of Aeronautics and Astronautics (AIAA); Turners National Gymnastics Organization; and volunteer Technologies Project Director for Council of Scottish Clans and Associations. From a young age, Nicholas has been fascinated by how the universe works. Captivated by theoretical physics and black holes, Nicholas has a dual interest in space related research and mechanical engineering. Supported by a loving family, Nicholas also shares a love for competitive gymnastics and has placed 2nd overall at the Chicago Turnfest National Gymnastics competition. Other hobbies include Stage Acting, Musicianship (Trumpet, Classical Piano, Ukulele), cooking and hanging out with friends.

Congressional District: 4

Congressional Representative: Gwen Moore

Frederick Rosenberger

Award: Elijah Balloon Payload; $4000.00

Advisor: Dr. William Farrow

Research Topic: The Elijah Project -- 2017 High Altitude Balloon Project

Abstract: The 2017 WSGC Elijah High-Altitude Balloon Payload Fellowship focused on three different topics for high altitude research: Modular Payload Design, Balloon Dynamics, and Energy Harvesting. A modular payload system was created using advanced manufacturing methods, which improved assembly and field operation. Minor structural fracturing was observed upon recovery. All instrumentation recovered were functioning. Vertical flight dynamics of a high-altitude balloon were studied to create a model that was compared against experimental data. Predictions did not accurately replicate GPS altitude data, possibly due to incorrect internal-balloon pressure readings and underlying assumptions. Habitability of high-altitude environments were explored by monitoring insect analog in pressurized environment. A slow pressure leak induced insects into a comatose state. Radiation was detected visually with camera.Investigated energy generation from balloon kinematics. Flight data not obtained but flight simulation data produced average voltage = 0.0039 V and total energy = 245.13 J.

Biography: Frederick Rosenberger is an incoming sophomore to the Milwaukee School of Engineering. His  
prior experience to this project was working on an annual solar car through the Wisconsin Public Service solar Olympics competition and the Wisconsin Space Grant Consortium collegiate rocket competition for the Whoosh Generator team. He graduated from Marinette Senior High School in Marinette, WI and lives in Middle InLIT, Wisconsin. His future aspirations include receiving a masters in aerospace and working for NASA as an aerospace engineer.

Congressional District: 4

Congressional Representative: Gwen Moore

Blaine Vollmer

Award: Elijah Balloon Payload; $4000.00

Advisor: Dr. William Farrow

Research Topic: The Elijah Project -- 2017 High Altitude Balloon Project

Abstract: The 2017 WSGC Elijah High-Altitude Balloon Payload Fellowship focused on three different topics for high altitude research: Modular Payload Design, Balloon Dynamics, and Energy Harvesting. A modular payload system was created using advanced manufacturing methods, which improved assembly and field operation. Minor structural fracturing was observed upon recovery. All instrumentation recovered were functioning. Vertical flight dynamics of a high-altitude balloon were studied to create a model that was compared against experimental data. Predictions did not accurately replicate GPS altitude data, possibly due to incorrect internal-balloon pressure readings and underlying assumptions. Habitability of high-altitude environments were explored by monitoring insect analog in pressurized environment. A slow pressure leak induced insects into a comatose state. Radiation was detected visually with camera.Investigated energy generation from balloon kinematics. Flight data not obtained but flight simulation data produced average voltage = 0.0039 V and total energy = 245.13 J.

Biography: Blaine is a mechanical engineering student at the Milwaukee School of Engineering and has a strong  
interest in the aerospace field. He has been involved with several projects at MSOE including the design of a CNC machine, planning and design of a futsal field, development of an optimization program using a genetic algorithm, and the design and construction of a SuperMileage vehicle.

Congressional District: 4

Congressional Representative: Gwen Moore

Taylor Davitz

Award: Elijah Balloon Payload; $3000.00

Advisor: Dr. William Farrow

Research Topic: The Elijah Project -- 2017 High Altitude Balloon Project

Abstract: The 2017 Wisconsin Space Grant Consortium Elijah High-Altitude Balloon Launch Team was comprised of one student from Lawrence University, two students from the Milwaukee School of Engineering, and one student from the University of Wisconsin – Fox Valley. This year, three members of the team had experience with high altitude balloon launches due to previous participation on either the Elijah Payload or Launch Team, or both. A training session was hosted by Dr. Farrow to familiarize or refresh the team with the physical setup of a launch train as well as how to run track predictions and how to read the jet stream charts. Launches were planned and carried out for the Elijah High-Altitude Balloon Payload Team. This launch was successful, reaching a peak altitude of over 115,000 ft (35 km) above mean sea level.

Biography: Taylor Davitz is a mechanical engineering student at the Milwaukee School of Engineering, located in  
Milwaukee, Wisconsin. From an early age, he found his life passion on engineering and has been  
pursuing it ever since. During his first year at MSOE he got an internship working for WSGC on the Elijah Balloon Payload team. After his internship ended, he moved onto his second year of college and began working with the Project Lead the Way program on campus. During this year, he created and headed a student outreach network and program, that is continuing to this day. Which he had to give up for a year to attend a study abroad program in Germany. Currently he resides in Germany to continue studying engineering, but will return to MSOE in the summer season.

Congressional District: 4

Congressional Representative: Gwen Moore

Josh Furey

Award: Elijah Balloon Payload; $3000.00

Advisor: Dr. William Farrow

Research Topic: The Elijah Project -- 2017 High Altitude Balloon Project

Abstract: The 2017 Wisconsin Space Grant Consortium Elijah High-Altitude Balloon Launch Team was comprised of one student from Lawrence University, two students from the Milwaukee School of Engineering, and one student from the University of Wisconsin – Fox Valley. This year, three members of the team had experience with high altitude balloon launches due to previous participation on either the Elijah Payload or Launch Team, or both. A training session was hosted by Dr. Farrow to familiarize or refresh the team with the physical setup of a launch train as well as how to run track predictions and how to read the jet stream charts. Launches were planned and carried out for the Elijah High-Altitude Balloon Payload Team. This launch was successful, reaching a peak altitude of over 115,000 ft (35 km) above mean sea level.

Biography: Hi, my name is Josh Furey and I am a sophomore going to the Milwaukee School of Engineering for  
Mechanical Engineering. I am an Eagle Scout from Superior Wisconsin and live with a family of 7 with 2  
brothers and 2 sisters. I really enjoy math, science and programing as that is what interested me in  
mechanical engineering. This previous summer, I was a part of the Project Elijah Payload team which  
was a great experience. I love photography and take a wide variety of photos from graduation to nature and the night sky. Some of my other interests include hanging out with friends, making videos, and playing the saxophone.

Congressional District: 4

Congressional Representative: Gwen Moore

Casey McGrath

Award: WSGC Graduate and Professional Research Fellowship; $5000.00

Status: Ph.D., Physics

Advisor: Jolien Creighton

Research Topic: Measuring Gravitational Wave Source Distances and Redshift from Pulsar Timing Arrays

Abstract: With the existence of gravitational waves now confirmed, it is expected that collaborations like NANOGrav will detect gravitational waves coming from sources such as supermassive black hole binaries (SMBHBs) within the decade. A major question to ask is how far away are these SMBHBs in our universe? The aim of my Ph.D. work has been to develop a bayesian-based simulation that can estimate gravitational wave source parameters such as luminosity distance from data of timing residuals taken from radio observatories. My current goal is to improve the simulation to also estimate the source’s parallax distance. Knowing both the source’s luminosity and parallax distances would allow the direct estimate the source’s redshift. Therefore, this would provide a new way of obtaining the distance-redshift relationship, independent of the cosmic distance ladder which is currently required. This gravitational wave based method could be very useful in the future to astronomers, and would compliment the electromagnetic based methods for measuring these cosmic distances, as well as test the validity of the cosmic distance ladder on the largest of scales.

Biography: Casey McGrath received his B.S. in physics and mathematics at the University of Redlands in California, with minors in astronomy and Spanish. He is currently pursuing a Ph.D. in physics at the University of Wisconsin Milwaukee, focusing on gravitational wave physics. A member of both the NANOGrav and LIGO collaborations, he is focused on research related to pulsar timing experiments. Currently, Casey is working on determining how a curved gravitational wavefront would affect and change the timing of pulsars we see in our Galaxy. Additionally, he helps lead the CoffeeShop Astrophysics public outreach program in his department, which gives monthly astronomy-related talks in a local coffeeshop.

Congressional District: 4

Congressional Representative: Gwen Moore

Elizabeth Borucki

Award: Laurel Salton Clark Research Fellowship; $5000.00

Status: M.S., Geophysics

Advisor: Julie Bowles

Research Topic: Investigation of the Copper Harbor Conglomerate Paleo-Environment through Magnetic Minerals and their Magnetic Properties

Abstract: (First Paragraph of Proposal) Magnetic mineralogy may possess a key to unraveling mysteries about paleo-environmental variations. Environmental magnetism is increasingly being used as a tool to assess variability in climate or local environmental conditions by examining variations in the composition, abundance, and grain size of magnetic minerals in soils and sedimentary sequences (e.g., Liu et al., 2012). The purpose of my research is to utilize environmental magnetism to interpret the conditions under which early life on Earth was established that could eventually provide analog and test parameters for the genesis of life in other parts of the galaxy. The Copper Harbor Conglomerate formation is exposed along the shorelines of Lake Superior and provides an excellent opportunity to test this methodology on ~1.1 Ga Proterozoic sandstones. The sandstone units have been interpreted to contain features of early microbial type life forms, possibly related to the more prominent stromatolites near the base of the Copper Harbor Conglomerate (Noffke, 2009 and Wilmeth et al., 2014). By linking magnetic variations to depositional bed forms and microbial mat presence, we intend to investigate the environmental conditions under which such microbial lifeforms might develop and thrive. By understanding these conditions in early Earth history and how they are reflected in magnetic mineralogy, magnetic tests might be developed that can easily be applied in the search for habitable environments or paleo-environments beyond Earth.

Biography: Elizabeth Borucki was first introduced to the geophysical discipline of paleomagnetism in 2014 as an undergraduate researcher. She graduated with her Bachelor of Science in the spring of 2015 from the University of Wisconsin-Milwaukee, and has since returned for her Master of Science. In addition to an undergraduate focus on the reconstruction of plate tectonics, her current research has focused on studying environmental magnetism as an interpretive tool for climatic activity of ancient Earth. This field of paleomagnetism provides insight in relation to the magnetic qualities of a rock unit that were controlled by environmental factors, including transport and deposition of sediment. She hopes to demonstrate a link between magnetic variations that are typical paleo-climate indicators on Earth to establish a reference point for environmental reconstructions conducted on other planets. On her days off she enjoys Earth’s present climate in southeastern Wisconsin as much as possible by spending the warmer months camping and hiking, and occupies the cooler months with travel and the restoration of old furniture. She believes that resourcefulness is the ability to find purpose in what others cannot yet see, and uses that philosophy as a guide for every aspect of her life.

Congressional District: 4

Congressional Representative: Gwen Moore

Lauren Syverson

Award: Industry Internship Program; $5000.00

Status: Senior, Aerospace Engineering

Advisor: John Edquist

Research Topic: Test Automation for eConnects

Abstract: Manual testing of systems controlled by a single eConnectTM requires weeks to complete. With the use of test automation, the time required for testing will be reduced to requiring only a few hours. Test automation is done with the use of Bash scripts. The Bash scripts that were created for test automation include moving map, cabin lights, and a system configuration editor. Some minor edits were made to the previously created Bash scripts such as DVT-Menu. The new Bash scripts are explained in high level detail. The results files from the tests are used to verify that the eConnectTM meet customer requirements. The results files are also used for traceability.

Biography: Lauren Syverson is a Dual Degree student pursuing a Bachelor of Science degree in Applied Physics from University of Wisconsin – River Falls. She is also pursuing and a Bachelor of Science degree in Aerospace Engineering and Mechanics with a Minor in Astrophysics from University of Minnesota – Twin Cities. In the summer of 2017, Lauren worked as a Systems Engineer Intern at Rockwell Collins. While working, she was the recipient of the Industry Internship award as part of Wisconsin Space Grant Consortium. In the summer of 2016, Lauren worked as a Technical Writer at C2X Solutions. She was the recipient of the Dr. Henry Tranmal scholarship in April 2015. Currently Lauren lives near Beldenville, Wisconsin. In her spare time, Lauren enjoys reading, watching movies, and spending time with her family.

Congressional District: 4

Congressional Representative: Gwen Moore

Lindsay McHenry, Ph.D.

Award: Research Infrastructure Program; $9961.00

Title: Associate Professor, Geosciences

Project: Astrobiology at Lassen Volcanic National Park

Abstract: (Second Paragraph of Proposal)Silica, sulfates, and phyllosilicates, all mineral types also identified on Mars (e.g. Murchie et al., 2009), can be formed during hydrothermal alteration and precipitation, and the exact minerals that form is in part determined by these aqueous conditions. Hydrothermal environments were likely common on Mars (due to evidence of early aqueous activity and a long record of volcanic activity), and such environments could have remained habitable long after the surface cooled and desiccated (e.g. Schulze-Markuch et al., 2007). However, some hydrothermal environments are more habitable than others, and being able to distinguish between the deposits of hostile acid-sulfate fumarole and more gentle near-neutral hot spring environments can give clues to habitability. Lassen hydrothermal environments produce silica by both acid-sulfate leaching and by precipitation as sinters from neutral hydrothermal waters (Janik and McLaren, 2010), both of which have been suggested as potential origins for deposits in the Columbia Hills studied by the Mars Exploration Rover (MER) Spirit (Yen et al., 2008; Ruff et al., 2011).

Biography: Dr. Lindsay McHenry is an associate professor at UW-Milwaukee, where she has been  
 teaching and researching since 2005. Her research has included terrestrial analogs for the  
 mineralogy and geochemistry of Mars, with an emphasis on volcanic and hydrothermal  
 environments. This research has taken her (and her students) to Hawaii, California, Idaho,  
 Iceland, and Tanzania (East Africa) pursuing a variety of potentially Mars-like settings.  
 She has also developed and taught courses in Planetary Geology at the introductory level  
 (including a popular online course on the “Geology of the Planets”) and at the advanced  
 level, and has mentored both graduate and undergraduate students on field and lab  
 projects related to the geology of the Martian surface.

Congressional District: 4

Congressional Representative: Gwen Moore

High Altitude Balloon Launch Project

Award: Student Satellite Initiatives; $12000.00

Advisor: Dr. William Farrow

Research Topic: The Elijah Project -- 2017 High Altitude Balloon Project

Quinlan Bock

Status: Freshman, Computer Science

Award: Elijah Balloon Launch $3000.00

Taylor Davitz

Status: Senior, Mechanical Engineering

Award: Elijah Balloon Launch $3000.00

Josh Furey

Status: Junior, Mechanical Engineering

Award: Elijah Balloon Launch $3000.00

Tyler Rasmussen

Status: Sophomore, Mechanical Engineering

Award: Elijah Balloon Launch $3000.00

None

Status: None

Award: Elijah Balloon Launch $3000.00

Abstract: The 2017 Wisconsin Space Grant Consortium Elijah High-Altitude Balloon Launch Team was comprised of one student from Lawrence University, two students from the Milwaukee School of Engineering, and one student from the University of Wisconsin – Fox Valley. This year, three members of the team had experience with high altitude balloon launches due to previous participation on either the Elijah Payload or Launch Team, or both. A training session was hosted by Dr. Farrow to familiarize or refresh the team with the physical setup of a launch train as well as how to run track predictions and how to read the jet stream charts. Launches were planned and carried out for the Elijah High-Altitude Balloon Payload Team. This launch was successful, reaching a peak altitude of over 115,000 ft (35 km) above mean sea level.

Congressional District: 4

Congressional Representative: Gwen Moore

High Altitude Balloon Payload Project

Award: Student Satellite Initiatives; $20000.00

Advisor: Dr. William Farrow

Research Topic: The Elijah Project -- 2017 High Altitude Balloon Project

Nicholas Hennigan

Status: Freshman, Mechanical Engineering

Award: Elijah Balloon Payload; $4000.00

Stuart Oliphant

Status: Sophomore, Systems Engineering

Award: Elijah Balloon Payload; $4000.00

Tyler Rasmussen

Status: Freshman, Mechanical Engineering

Award: Elijah Balloon Payload; $4000.00

Frederick Rosenberger

Status: Senior, Mechanical Engineering

Award: Elijah Balloon Payload; $4000.00

Blaine Vollmer

Status: Junior, Mathematics

Award: Elijah Balloon Payload; $4000.00

Abstract: The 2017 WSGC Elijah High-Altitude Balloon Payload Fellowship focused on three different topics for high altitude research: Modular Payload Design, Balloon Dynamics, and Energy Harvesting. A modular payload system was created using advanced manufacturing methods, which improved assembly and field operation. Minor structural fracturing was observed upon recovery. All instrumentation recovered were functioning. Vertical flight dynamics of a high-altitude balloon were studied to create a model that was compared against experimental data. Predictions did not accurately replicate GPS altitude data, possibly due to incorrect internal-balloon pressure readings and underlying assumptions. Habitability of high-altitude environments were explored by monitoring insect analog in pressurized environment. A slow pressure leak induced insects into a comatose state. Radiation was detected visually with camera.Investigated energy generation from balloon kinematics. Flight data not obtained but flight simulation data produced average voltage = 0.0039 V and total energy = 245.13 J.

Congressional District: 4

Congressional Representative: Gwen Moore

Steven Girard, Ph.D.

Award: Research Infrastructure Program; $10000.00

Title: Assistant Professor, Chemistry

Project: Nanostructured Silicides for Next-Generation Radiosotop Thermoelectric Generators

Abstract: (First Paragraph of Proposal)Radioisotope thermoelectric generators (RTGs) have been used as a mainstay of most long-term and deep space NASA missions to power primary electronic and mechanical components on spacecraft, satellites, and rovers. However, the power-generating thermoelectric elements in RTGs are limited by low efficiencies and are typically made of expensive or toxic elements. Here, we propose a research effort in the laboratory of Dr. Steven Girard at UW–Whitewater to develop low-cost, non-toxic nanostructured silicide materials for high efficiency RTG applications. The grant will support research efforts over ten weeks during Summer 2017 and support the work of two undergraduates, Dr. Girard, and provide travel support for Dr. Girard to attend the 2017 International Conference on Thermoelectrics in Pasadena California, hosted by the Jet Propulsion Lab (JPL) and California Institute of Technology in Summer 2017.

Biography: Steven N. Girard earned a Bachelor of Arts Degree in Chemistry and Bachelor of Music Degree in   
 Cello Performance from Lawrence University in Appleton, Wisconsin, and a Ph.D. in Inorganic   
 Chemistry from Northwestern University in Evanston, Illinois. His research interests include   
 nanostructured thermoelectric materials, sustainable synthesis of inorganic and nanostructured   
 compounds, blowing things up, and flux chemistry. He was hired as Assistant Professor of  
 Chemistry at UW-Whitewater in 2014.

Congressional District: 5

Congressional Representative: James Sensenbrenner

Jerry Graf

Award: Aerospace Outreach Program Informal Education; $3000.00

Title: President, Aviators by Design

Project: Soar Like an Eagle Phase II

Abstract: (First Paragraph of Proposal) The Mission of Aviators By Design (ABD) is to reach and recruit our youth and non-pilot public with a “fired up” passionate introduction and entry into the world of aviation; as well as, promote and teach STEM education and safety in aviation. Our goal is to teach the physics of flight through the STEM tool Fly-To-Learn which utilizes X-Plane Flight Simulator for practical application of principles.

Biography: ABD (Aviators By Design) was created and founded in October 7, 2010 wanting to expose today's youth or what we like to call the “replacement generation” to the thrill of flight and the world of aviation. To get them excited and passionate about learning more about flight and aviation. Consequently, ABD began sponsoring Aviation Post 9868 and recruited students to start the program and begin building an airplane. This initial program is open to youth from the ages of 14-21, both girls and boys, and adult leaders. Aviators By Design (ABD) was formed to reach and recruit our youth with a “fired up” passionate introduction, interest and entry into the world of aviation. Our goal is to teach the physics of flight through STEM education, aviation safety and experience the building of airplanes.

Congressional District: 6

Congressional Representative: Glenn Grothman

Rocketeers

Award: Collegiate Rocket Launch; $3000.00

Advisor: Dr. Warren Vaz

Project: Collegiate Rocket Launch

Brian Eberwein

Status: Senior, Mechanical Engineering

Award: Collegiate Rocket Launch; $500.00

Drew Eisenberg

Status: Senior, Mechanical Engineering

Award: Collegiate Rocket Launch; $500.00

Jonathon Goss

Status: Freshman, Civil Engineering

Award: Collegiate Rocket Launch; $500.00

Kathryn Lenz

Status: Junior, Mechanical Engineering

Award: Collegiate Rocket Launch; $500.00

Shawn Schumacher

Status: Junior, Mechanical Engineering

Award: Collegiate Rocket Launch; $500.00

Cavan Maher

Status: Senior, Mechanical Engineering

Award: Collegiate Rocket Launch; $500.00

Abstract: During the 2016-2017 Collegiate Rocket Launch (CRL) competition, teams were required to  
 design and construct a high-power rocket that would complete a safe flight that would reach   
 as close as possible to a target apogee height of 3,000 feet, as well as generate an electric   
 current during the pre-apogee portion of the rocketÕs flight. The UW-Fox Valley team, the   
 Rocketeers, designed a three-inch diameter, thin-walled fiberglass airframe at a final length   
 of 188cm that was able to achieve safe flights. In order to generate electricity during the   
 flight, the team used a ducting system that allowed air through an inner turbine system.   
 On competition day, three safe flights were completed, with altitude, velocity, and   
 acceleration data recorded. Electric generation data was recorded during the first   
 flight, but due to environmental factors data was not recorded for voltage   
 generation on the second and third flight.

Congressional District: 6

Congressional Representative: Glenn Grothman

Tyler Rasmussen

Award: Elijah Balloon Payload; $4000.00

Advisor: Dr. William Farrow

Research Topic: The Elijah Project -- 2017 High Altitude Balloon Project

Abstract: The 2017 WSGC Elijah High-Altitude Balloon Payload Fellowship focused on three different topics for high altitude research: Modular Payload Design, Balloon Dynamics, and Energy Harvesting. A modular payload system was created using advanced manufacturing methods, which improved assembly and field operation. Minor structural fracturing was observed upon recovery. All instrumentation recovered were functioning. Vertical flight dynamics of a high-altitude balloon were studied to create a model that was compared against experimental data. Predictions did not accurately replicate GPS altitude data, possibly due to incorrect internal-balloon pressure readings and underlying assumptions. Habitability of high-altitude environments were explored by monitoring insect analog in pressurized environment. A slow pressure leak induced insects into a comatose state. Radiation was detected visually with camera.Investigated energy generation from balloon kinematics. Flight data not obtained but flight simulation data produced average voltage = 0.0039 V and total energy = 245.13 J.

Biography: Tyler Rasmussen is a sophomore at University of Wisconsin-Fox Valley majoring in Mechanical  
Engineering. He presently holds a position in parcel recovery for various airlines at the Austin Straubel  
and Appleton International Airports. Tyler has been elected president of the 2016-17 Chemistry Club on campus and is also a member of the Engineering Club. In his free time, he utilizes his mechanical  
aptitude by customizing his car. After attaining his bachelor’s degree, he plans to further his education in areas such as astrophysics, chemistry, and nanotechnology. Tyler plans to utilize his education by  
working in the aerospace industry.

Congressional District: 6

Congressional Representative: Glenn Grothman

Tyler Rasmussen

Award: Elijah Balloon Payload; $3000.00

Advisor: Dr. William Farrow

Research Topic: The Elijah Project -- 2017 High Altitude Balloon Project

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aptitude by customizing his car. After attaining his bachelor’s degree, he plans to further his education in areas such as astrophysics, chemistry, and nanotechnology. Tyler plans to utilize his education by  
working in the aerospace industry.

Congressional District: 6

Congressional Representative: Glenn Grothman

Richard Stewart

Award: Higher Education Initiatives; $9993.00

Title: Professor, Transportation and Logistics

Project: Developing a Model for Supply Chain Management Internships  
 in the Aeronautics and Space Industry and Government

Abstract: (First and Third Paragraph of Introduction of Proposal) The Transportation and Logistics Research Center is proposing to the Wisconsin Space Grant  
Consortium to develop an academic Supply Chain Management internship model that can be used throughout by the Aeronautics and Space Industry and Government agencies such as NASA. The model would consist of an electronic booklet with information for companies, faculty and students. Information would include background information on SCM, a listing of  
undergraduate programs in Wisconsin, with SCM or related undergraduate majors, and institutions offering courses, methodology for setting up an SCM internship, a sample 10 week SCM internship program and a sample evaluation and other relevant forms.

Biography: Richard Dow Stewart is a Transportation and Logistics Professor at  
the University of Wisconsin Superior and Director of their Transportation  
and Logistics Research Center. He earned his Doctorate from the Lally  
School of Management at Rensselaer Polytechnic Institute.  
Dr. Stewart is a licensed Master Mariner and has commanded ocean  
vessels. He managed a fleet of vessels valued at $300 million and has been a  
Wisconsin small business owner. He was a Captain in the U.S. Naval  
Reserve. Dr. Stewart has taught undergraduate and graduate courses at  
universities for thirty years. He has been the Principal Investigator (PI) for  
over $10 million in grants. He has extensive publications and presentations.  
He is active in professional organizations, boards of directors, and  
Transportation Research Board committees. He is a member of: Board of  
Directors of the North Shore Scenic Railroad and Museum Board, the  
Duluth Airport Authority Commission, Green Marine, the Wisconsin DOT  
Freight Advisory Committee and the EPA’s Great Lakes Advisory Board

Congressional District: 7

Congressional Representative: Sean Duffy

Coggin Heeringa

Award: Aerospace Outreach Program Informal Education; $2500.00

Title: Program Director, Crossroads at Big Creek

Project: A Spectrum of Aerospace Outreach

Abstract: (Alignment with NASA Goals in Proposal) This project will “raise the level of exposure and interest of K-8 teachers, students and the general public and will be the first step toward recruitment of students to enter the STEM pipeline.” We target elementary and middle school teachers, and by extension, their students. Secondarily, we feel that focusing on families, now extending to grandparents, we will not only educate the general public, but will encourage families to support students who demonstrate an interest and aptitude for STEM disciplines. This program could be replicated anywhere in the state, and if the UW-GB Education Outreach Office requests it, we would be happy to offer the class in other locations.

Biography: Coggin Heeringa is the Director at Crossroads at Big Creek, a preserve in Sturgeon Bay, Wisconsin  
dedicated to experience-based learning in science, history and the environment. She is a graduate  
of the University of Nebraska and earned a MS in Environmental Studies at Western Illinois University  
During the summers, she is the instructor of Environmental Education at the Interlochen Center for the Arts. She is an adjunt Instructor for the Education Outreach Program of the University of Wisconsin-Green Bay.

Congressional District: 8

Congressional Representative: Mike Gallagher

Quinlan Bock

Award: Elijah Balloon Launch; $3000.00

Advisor: Dr. William Farrow

Research Topic: The Elijah Project -- 2017 High Altitude Balloon Project

Abstract: The 2017 Wisconsin Space Grant Consortium Elijah High-Altitude Balloon Launch Team was comprised of one student from Lawrence University, two students from the Milwaukee School of Engineering, and one student from the University of Wisconsin – Fox Valley. This year, three members of the team had experience with high altitude balloon launches due to previous participation on either the Elijah Payload or Launch Team, or both. A training session was hosted by Dr. Farrow to familiarize or refresh the team with the physical setup of a launch train as well as how to run track predictions and how to read the jet stream charts. Launches were planned and carried out for the Elijah High-Altitude Balloon Payload Team. This launch was successful, reaching a peak altitude of over 115,000 ft (35 km) above mean sea level.

Biography: Quinlan Bock will be a sophomore in the fall of 2017 at Lawrence University. Quin is a math and computer science major with a physics minor and is considering a 3-2 program in engineering. Quin's main focus of study during his first year was math, coding, and programming Arduino. Lawrence University also fosters Quin’s other passion, oboe. Quin is from Viroqua, Wisconsin where he graduated from high school at the top of his class. When Quin is home on breaks you can find him on his mountain bike riding the single track of Wisconsin’s driftless region.

Congressional District: 8

Congressional Representative: Mike Gallagher

Jeffrey Clark

Award: Higher Education Initiatives; $9733.00

Title: Professor, Geology

Project: Developing Spacial Intiution Using an Augmented Reality Sandbox

Abstract: (First Paragraph of the Proposal) Spatial reasoning skills such as pattern recognition, interpretation of topographic maps, and contouring are fundamental to interpreting our modern world (NRC, 2006). Through the course of an ordinary day we are bombarded with contoured maps cleverly disguised as weather maps, mobile-device terrain maps, and geospatial infographics. However, our familiarity hides the fact that few understand how we get from the underlying data to the pretty color-coded weather maps we use to plan our weekend outings. Moreover, interpretation of these images can be difficult for the uninitiated. Spatial reasoning is a special subset of quantitative literacy, yet it is an underdeveloped skill for college students and the general population (Ishikawa and Kastens, 2005). The work proposed here aims to address this weakness. The project goals are well aligned with those of NASA’s Science Mission Directorate by educating a science literate workforce and citizenry, and the skills developed herein are essential for future earth and planetary scientists.

Biography: Professor of Geology Jeffrey Clark earned his undergraduate degree at Middlebury  
College as a double major in geology and environmental studies. He began teaching at  
Lawrence University in 1998 after earning his Ph.D. in geography and environmental  
engineering from Johns Hopkins University. Dr. Clark’s research focuses on the  
anthropogenic impact on river systems, and he has evaluated the role of dams changing  
sediment storage dynamics and the impact of land use on channel morphology. As a  
visiting scientist at the NSF-funded National Center for Earth Surface Dynamics, he  
spent a year investigating the role of bed composition and morphology on hyporheic  
flow. In the classroom, Dr. Clark’s pedagogical approach is to establish a stimulating  
learning environment through the innovative use of technology to enhance hands-on  
activities and field experiences. He has written on the use of “field-computers” in the  
outdoor classroom and more recently has turned his attention to the use of indoor  
physical models to demonstrate earth processes at greatly condensed spatial and temporal  
scales—an endeavor that has received past support from WSGC.

Congressional District: 8

Congressional Representative: Mike Gallagher

Marcia Bjornerud, Ph.D.

Award: Research Infrastructure Program; $10000.00

Title: Professor, Geoscience

Project: Drilling into Possible Impact Cracter in Door County, Wisconsin

Abstract: (First Paragraph of Proposal)Impact craters are found on virtually every solid body in the solar system, from planets and moons to asteroids and comets. Crater counting and mapping are essential to estimating thesurface ages of solar system bodies and making inferences about internal and surficial processes that have operated on these bodies. Since the recognition in the 1960s that Earth too has experienced bolide impacts throughout its history, a total of 190 unambiguous impact craters have been documented around the globe (Spray, 2016). Two of these are in Wisconsin: the Rock Elm structure in Pierce County (French et al., 2004; Cavosie et al., 2015) and the Glovers Bluff structure in Waushara County (Read, 1983).

Biography: Marcia Bjornerud is Professor of Geology and Environmental Studies at Lawrence University. Dr. Bjornerud’s research focuses on the physics of earthquakes and mountain building, and she combines field-based studies of bedrock geology with quantitative models of rock mechanics. She has done research in high arctic Norway (Svalbard) and Canada (Ellesmere Island), as well as mainland Norway, Scotland, New Zealand, and the Lake Superior region. She received a B.S. in geophysics from the University of Minnesota and her M.S. and Ph.D. in structural geology from the University of Wisconsin-Madison. Prior to teaching at Lawrence, Dr. Bjornerud held a postdoctoral fellowship at the Byrd Polar Research Center at Ohio State University and a faculty position at Miami University in Oxford, Ohio. Bjornerud is a Fellow of the Geological Society of America and has been a Fulbright Senior Scholar at the University of Oslo, Norway and University of Otago, New Zealand. She is the author of a book for popular audiences, Reading the Rocks: The Autobiography of the Earth, and a contributing writer for “Elements,” The New Yorker’s science and technology blog.

Congressional District: 8

Congressional Representative: Mike Gallagher

James Vasquez

Award: STEM Bridge Scholarship; $1000.00

Status: Senior, Mechanical Engineering

Biography: James Vasquez is enrolled in the mechanical engineernig technology program at the University of Wisconsin-Green Bay. Vasquez was born and raised in Green Bay, Wisconsin, and graduated from Green Bay East High School in 2007. Immediately after high school, he attended the University of Wisconsin-Milwaukee for architecture, but after two years, discovered the program was not as scientific as he had hoped. After working for more than five years in manufacturing, he realized the only way he was going to better himself and become more involved in the design and manufacturing process was to return to school. Completing his degree in UW-Green Bay will allow him to be near his famile while pursuing his goals for a better life.

Congressional District: 8

Congressional Representative: Mike Gallagher