

# UMSL *Physicist*

Department of Physics & Astronomy

<http://www.umsl.edu/~physics>

December 2019

## Note from Chair

The Department of Physics and Astronomy at UMSL has seen many changes since our last update. The renovation to Benton Hall was completed and we moved back in to the new space in August 2018. Among the great changes, we now have a beautiful place to display our mineral and gem collection, improved classroom spaces, and fantastic places for students to study and relax. This includes a new room for the Physics & Astronomy Club to meet, relax, and eat. Each floor has a kitchenette, cozy chairs, and tables for students to work together.

We welcomed Jasmine Maloney as our new administrative associate and Leah Trimble was promoted to our business support specialist. Their services are shared with Chemistry and they are located in the third floor of Benton Hall. The College of Arts and Sciences also welcomed a new Dean, Dr. Andrew Kersten.

We are both sad and happy to announce that Dr. David Horne received and accepted an offer for a tenure track position at Gannon University in Pennsylvania. We extend our congratulations and many thanks for his years of wonderful teaching and service at UMSL. Dr. Tom George, after serving 16 years as the Chancellor of UMSL and member of both the Department of Physics and Astronomy as well as Chemistry, has retired. Also, after 45 years of service to the university, Dr. Bernard Feldman, faculty member since 1974, has retired.

On a very happy note, Drs. Bernard Feldman and Ta-Pei Cheng have very generously contributed funds to a new endowed scholarship to support our students. According to Dr. Feldman, "The decision was motivated by our gratitude for the opportunities the UMSL Physics and Astronomy Department has given us for over 45 years to pursue our research and pedagogical interests, to teach, advise and inspire our students, and to contribute to the direction and leadership of the department. In other words, this department has given meaning and purpose to our lives and we want, in a small way, to give back to the department for all it has done for us." We would like to extend our sincere gratitude for this wonderful gift.

Please keep us up to date on your activities. As always, we thank you for your continued support and encourage you to read the short biographies on our scholarship recipients. We wish you and your family all the best in 2020.

**Erika Gibb,  
Chairperson**

## Mark Your Calendar: May 8

The annual Alumni Luncheon and Lecture will be held Friday, May 8 in Benton Hall on the UMSL campus. The guest speaker will be Dr. Michael J. Way (M.S. 1991, Ph.D. 1998) who is a Research Scientist and Information Technology Specialist at the Goddard Institute for Space Science in New York City. Dr. Way's current research makes use of GISS General Circulation Model to investigate the atmospheres of paleo Earth, modern and paleo Mars, paleo Venus, and Saturn's moon Titan. He was the lead author on the paper "Was Venus the first habitable world of our solar system?", published in *Geophysical Research Letters* in 2016 and covered by numerous national and international news outlets. The lecture will be preceded by the presentation of student academic and teaching awards. We hope you can join us.



*Nathan Roth (photo courtesy of August Jennewein)*

## Graduate Program Update

Six students completed their doctoral degrees in 2018-2019. Chris Carr, Shane Meyer, Waruni Jayawardana, Tim Sullivan, Nathan Roth, and Tera Glaze all successfully defended their dissertations. Copies of their dissertations can be found on our web page (see link under Graduate Programs) and information on their career plans under Alumni Information in this Newsletter. Nathan Roth was featured in the UMSL Magazine (<https://blogs.umsl.edu/news/2019/11/30/nathan-roth/>). He has been awarded a NASA Postdoctoral Fellowship and is currently

working at Goddard Space Flight Center. He is moving from infrared to millimeter-wave spectroscopy to study the complex molecules in comets using the Atacama Large Millimeter Array located in northern Chile.

We welcomed several full-time students to our graduate program including Philip Chrostoski (arriving with a M.S. degree from Delaware State), Younas Khan (Central Michigan), Ishan Pathak (Tribhuvan U., Nepal), Kevin Renick (Missouri S&T), and Evan Schmitz (Maryville U.).

Tera Glaze, Evan Schmitz, Tim Sullivan, and Matt Wentzel-Long were supported by graduate fellowships or internships from the NASA/Missouri Space Grant Consortium in 2018/2019. They presented their research at the statewide annual meeting in April at the Missouri S&T campus. Tera Glaze had the best physics poster at the UMSL Graduate Research Symposium in 2018 and her poster “Brain Activity During Sleep: Developing a Functional Model” won first prize in Math, Computer Science, and Natural Sciences division. Her advisor is Dr. Sonya Bahar.

## Reflections of Mars: Alumni Lecture and Awards 2019

Dr. Isaac Smith (M.S. 2007), Professor of Planetary Science at York University in Toronto, was our Distinguished Alumni Lecturer in May. In his lecture entitled “Reflections of Mars: Using Orbital Radar Observations to Discover Climate Signals and More in the Polar Caps”, he discussed how radar observations from Mars Reconnaissance Orbiter are being used to reveal climate shifts imprinted in the polar ice caps of this once habitable planet.



*Dr. Erika Gibb with awardees Gerard Pujol Hernandez and Justin Bryan.*

Prior to the lecture, we held our annual awards ceremony. Seniors Gerard Pujol Hernandez and Justin Bryan shared the Jeffrey Earl Award for the Outstanding Physics Seniors and each received a \$500 gift card. Junior Veronika Redensek received the Senior Alumni Award (\$500). Chemedra Ejeta received the Outstanding Graduate Teaching Assistant Award, which consists of a \$250 prize and a one-year subscription to the *American Journal of Physics*.

## Neuroscience Research Showcase

On November 15, 2019, the Center for Neurodynamics hosted its Fourth Annual UMSL Neuroscience Research Showcase. The keynote speaker was Professor Deanna Barch, Chair of Psychological and Brain Sciences at Washington University in St. Louis. She spoke about her recent research on “Connectomics and Psychopathology” to a large audience of students and faculty from departments ranging from Physics & Astronomy to Psychological Sciences. Following the keynote talk, there was a poster session in the 2<sup>nd</sup> floor lobby of the Science Learning Building, where UMSL students working in the neurosciences presented their work and had the opportunity to network with each other and with faculty. Posters included recent work on neural synchronization in dynamical models of sleep by Tera Glaze, who had defended her doctoral dissertation in our department just a month prior. Other posters addressed topics ranging from the interaction of amyloid beta fibrils in the development of Alzheimer’s disease (from Prof. Mike Nichols’s lab in Chemistry & Biochemistry) to studies of the interaction between trauma and self-agency (from Prof. Carissa Philippi’s group in Psychological Sciences), to brain function during response to racism in the media (Prof. Bettina Casad’s group, Psychological Sciences), and a model of the impairment of evidence-gathering in psychosis (from Sarah Myers, in collaboration with Prof. Lauren Olin in the Department of Philosophy). Despite the event being concurrent with career symposia hosted by Biology and Chemistry & Biochemistry, the Showcase had a large and enthusiastic turnout. The Fifth Annual Showcase will be held in the fall of 2020. If you are interested in attending next year and want to be on the email list for announcements about the event, please contact Sonya Bahar (bahars@umsl.edu).

## Meet the Scholarship Recipients

The Department supports students annually with \$2000 awards. Veronika Redensek and Tyler Smith are receiving the Richard D. Schwartz Scholarship. Tyler Hanke, Ian Heye, and Steven Tyler are supported with Physics & Astronomy Alumni Scholarships and Cassius Rizer with the Don C. & Susan P. Winter Endowed Scholarship.

**Tyler James Hanke** – Tyler is a senior student majoring in general physics with a minor in math. He has been an SI leader for Astronomy 1001 for two semesters and will be an SI leader for Physics 1012 for the Spring 2020 semester. He also is currently running the Richard D. Schwartz Observatory at UMSL. Since his sophomore year, he has had the opportunity to complete research in the field of astronomy with Dr. Wilking and Dr. Gibb, and is currently conducting research with Dr. Bahar in the field of biophysics. His research with faculty in the Physics Department has allowed him to present his research at the NASA Space Grant Annual Meeting in Spring 2019 and the American Physical Society’s meeting in Spring 2020. Tyler is expected to graduate in Spring 2020 and is currently waiting for responses from graduate schools to pursue a PhD in either atmospheric science or biophysics.

**Ian Heye** – Ian is a student-athlete at UMSL majoring in physics with an emphasis in astronomy. Next semester, Ian will work as a tutor for Physics 1011 and Physics 2111. Along with entering his fourth academic semester at UMSL, Ian will also be competing in his fourth semester of swimming with the UMSL Men’s Swim Team. In his downtime, Ian enjoys photography and spending time with his teammates. Ian is from Little Rock, Arkansas and first became interested in physics his junior year of high school. “My interest in physics began when I became interested in astronomy” said Ian, “I originally planned on taking AP chemistry but decided to change to physics since it made sense to take with the astronomy class they offered. Senior year I decided to take the AP Physics C: Mechanics course offered, and it piqued my interest in physics.” Once Ian finishes college he plans on returning to the Little Rock area to become a high school physics teacher. “I first became interested in being an educator after I spent an entire summer being a swim coach. Planning on finishing in 4 years, Ian is excited to learn from the great minds in the physics department and can’t wait to learn classical mechanics and modern physics.

**Cassius Rizer** – Cassius is a sophomore majoring in physics with an emphasis in engineering and minoring in both engineering and mathematics. A full-time student, he has devoted much of his time towards academics and has achieved placement on the Dean’s List for the Pierre Laclède Honors College. Cassius is an active hobbyist and member of the UMSL Gaming Society, and strives to become an officer to enhance the UMSL experience for other students. Additionally, he has an interest in the Japanese language and would like to learn it if he had the time. Although in the middle of his undergraduate education, he aims to become a researcher and achieve a Master’s degree or even a Ph.D. if possible.

**Veronika Redensek** – Veronika is a senior undergraduate majoring in general physics with minors in mathematics and computer science. She is currently doing interdisciplinary research with Dr. Robert Marquis (Biology) and Dr. Sonya Bahar studying the relationship between climate data and fluctuations in insect populations in southern Missouri and modeling the impact. She has worked as a lab TA, SI, and tutor on campus in addition to her position as Vice President of Physics Club. Veronika plans to pursue a PhD in atmospheric science with research in anthropogenic aerosols and climate change. Off campus, Veronika enjoys competitive cycling and rock climbing.

**Tyler Smith** – Tyler is a junior pursuing a physics degree with an emphasis in astronomy as well as a minor in mathematics. He originally went to community college working towards a business degree a decade ago. At that time, he battled with a heroin addiction for over eight years. Once with a clear mind, he chose to follow his passion over suggestion and began his studies at UMSL. On his first day of classes, Dr. Wilking made his optional due to the solar eclipse occurring - coolest class ever! Since then he has had the opportunity to view a comet remotely from the lab with Dr. Gibb and will be doing research with her this spring.

**Steven Tyler** – Steven is currently a junior working towards two degrees, both of them in science. One is for astrophysics, and the other is for mathematics. Very recently, he has become very interested in the fields of nuclear physics, electricity and magnetism, quantum mechanics, relativistic physics, and the researches and inventions of Nikola Tesla, as well as the idea of the zero-point energy. As of now, he works at Grant’s Farm filling a seasonal position within the food service department. Since the working season does not start until mid-April or early May, and since he has no classes scheduled for Fridays, Steven is interested in doing any kind of research related to the fields listed above. Although his knowledge in these fields is more basic than advanced, Steven is interested in learning and understanding as much as he can about them. While he is not in school, Steven is pursuing his other interests which lie in music, reading, writing, and philosophy.



*2019 Space Grant participants from left: Kyra Chappell, Tera Glaze, Justin Bryan, Augusto Puig, Matt Wentzel-Long, and Tyler Hanke.*

## NASA/Missouri Space Grant Consortium

This is the 28<sup>th</sup> year of our association with the NASA Missouri Space Grant Consortium. Thanks to the Consortium Director at MS&T, our next 4-year proposal will provide increased funding and allow expansion to include research projects for students in the UMSL/Washington University Joint Engineering Program. We are also funding an interdisciplinary physics/biology project related to climate change.

The Annual Meeting was held on the Missouri S&T campus in April 2019. Undergraduate Tyler Hanke discussed his analysis of very high-resolution infrared spectra of parent volatiles in comet C/2015 ER61 (advisor: Dr. Erika Gibb). Graduate student Matt Wentzel-Long and undergraduate Justin Bryan presented their research on identifying and modeling circumstellar disks around young stars in the massive star-forming region IC 1805 (advisor: Bruce Wilking). Graduate Student Tera Glaze presented her computational study of sleep, synchronization, and hemispheres of the brain with possible applications to long duration space travel (Advisor: Dr. Sonya

Bahar). Kyra Chappell and Augusto Puig described the UMSL Planetarium Program which brings 5<sup>th</sup> grade students and teachers from North County to UMSL for a planetarium presentation and classroom demonstrations, and then to the Challenger Learning Center in Cool Valley, MO for a simulated NASA mission.

## Physics & Astronomy Club News

The Physics and Astronomy Club had a very successful semester in fall of 2019 with growth in interest and lots of new participants! The club strives to provide fun and informative events accessible to all UMSL students, including game nights, study nights, professor lectures, and collaborations with other departments. This past fall, Dr. Erika Gibb gave a presentation on some of her research on comets, the club held its annual Pumpkin Drop, and it held a panel discussion with guest speakers to answer questions about graduate programs and careers in physics. Club members also worked on improving the Physics Suite in Benton Hall to make it a more appealing place for students to study and hang out. In spring of 2020, the club will have a movie showing at UMSL's planetarium, another professor lecture, the club's fifth annual Physics Olympics, and more! - *Lindsay Salassi (President)*

## Observatory Upgrade

The Richard D. Schwartz Observatory underwent an overdue renovation of the Ash Dome in November by Observatory Solutions out of Durango, CO. This included replacement of the rotation motor assembly and lubrication of the dome rollers. Seals were replaced and caulked to address leaks. The dome shutter motor is also being replaced with plans for the Observatory to be back in operation by late January. Visitors to the Observatory will no doubt miss the resident astronomer pounding on the stalled dome motor with a rubber mallet.

## FACULTY UPDATES

### Sonya Bahar

The primary focus of my research group is on models of evolutionary dynamics and synchronization in neural systems. In our evolutionary work, doctoral student Stephen Ordway is continuing a project started by Dr. Dawn King, a former PhD student and postdoc in the group, with Prof. Wendy Olivas in the Department of Biology, to investigate phase transition behavior in yeast populations under stress. With additional experimental contributions from Prof. Fred Inglis's laboratory in the Department of Biology, we have just submitted a paper on this work to the *Journal of the Royal Society Open Science*. With undergraduate student Tyler Hanke, we are investigating changes in lineage branching in evolutionary models in response to mass extinction events.

Several graduate students have recently completed their PhDs in the lab. Shane Meyer defended his PhD dissertation on computational models of the evolution of the division of labor in the spring of 2018, and moved on to postdoctoral work at

Stanford University. For her dissertation, Tera Glaze designed computational models for the neurodynamics of sleep; she defended her dissertation in October 2019, and is currently doing postdoctoral research at Washington University in St. Louis.

Administratively, I have continued to expand the Center for Neurodynamics, which hosted the Fourth Annual UMSL Neuroscience Research Showcase in November 2019. I recently completed a book titled *The Essential Tension: Cooperation, Competition and Multilevel Selection in Evolution*, which explores collective dynamics in biological systems and its implications for evolutionary biology. The book was published by Springer as part of their Frontiers Collection in 2018. I am currently work on a sequel, to be titled *The Tangled Hierarchy*.

[bahars@umsl.edu](mailto:bahars@umsl.edu)

<http://www.umsl.edu/~neurodyn/faculty/bahar.html>

### Bernard J. Feldman

Since my last report to you, I have written three papers that expand on my initial work on cell phone radiation and cancer. They are “Comments on the National Toxicology Program Report on Cancer, Rats and Cell Phone Radiation,” ([www.arxiv.org/abs/1805.09143](http://www.arxiv.org/abs/1805.09143)), “Thermoregulation in Mice, Rats and Humans: An Insight into the Evolution of Human Hairlessness”, ([www.arxiv.org/abs/1812.02003](http://www.arxiv.org/abs/1812.02003)), and “Energy Balance in Cell Phone Radiofrequency Radiation Exposed Mice and Rats” ([www.arxiv.org/abs/1904.12895](http://www.arxiv.org/abs/1904.12895)). Let me also mention that in August of 2019 I retired after 45 years at UMSL. It has been such a pleasure to have so many of you in my classes and to hear of your successes after graduation. Thank you for being a major part of my life and I wish you all the very best.

<http://www.umsl.edu/~phybfeld/>, [feldmanb@msx.umsl.edu](mailto:feldmanb@msx.umsl.edu)

### Michael Fix

I am continuing to participate in a new excavation at the Missouri Dinosaur Site, in collaboration with a group from the Field Museum in Chicago, under the direction of Dr. Peter Makovicky. A recent discovery there strongly suggests that our most common dinosaur is not a hadrosaur (duck-bill dinosaur) after all, but either an iguanodont or a transitional form between iguanodonts and hadrosaurs. We hope to find more remains of the other two known dinosaurs previously found at the site, a relative of *T-rex* and a relative of *Velociraptor*, and perhaps remains of dinosaurs not previously known from the site. Also, we seek to increase our knowledge of the other species of animals and plants that lived alongside the dinosaurs, to learn more about the paleoenvironment and how the deposit that contains the fossils was formed.

[fixm@umsl.edu](mailto:fixm@umsl.edu)

### Ricardo A. Flores

My research interests are astrophysical cosmology and applications of quantum field theory to the physics of elementary particles but I am not active in these fields. Recently I had the opportunity to teach an introductory course in Global Geodynamics that left me with an entirely changed view of Plate Tectonics, with an immensely dynamic view of our planet—just on a time scale we cannot comprehend—, and a field chock-

full of Physics that appears one way or another in the descriptions of the Earth. Did you know that the depth of the oceans can be predicted? *It can*, because seafloor behaves just like the metal of your car when you turn the engine off and the metal shrinks as it cools.

### **Philip B. Fraundorf**

Our focus here has been to offer nanoscale exploration tools to regional industry and university researchers, for the study of solids on the atomic scale, along with a special focus on the characterization and modeling of: (a) oxygen-related defects in integrated-circuit and photovoltaic device silicon, and (b) interplanetary dust collected in the earth's stratosphere as well as diffusion-barrier graphene in presolar particles extracted from meteorites following their formation in the atmosphere of red giant stars. Of increasing importance now is the development and application of mathematical strategies for: (i) extracting data from, and on-line simulation of, microscope imaging of condensed matter on the atomic scale, (ii) computational modeling of nucleation in carbon and silicon materials, (iii) visualizing total-sound in real time along with compilation of pictorial field guides, (iv) metric-first approaches to describing motion at any speed in curved spacetimes with 3-vectors like those that students already know, and (v) robust monitoring of community-level health with self-reporting tools like those used by Boston Children's Hospital "flu near you". Methods development in this context, in collaboration with regional researchers on application challenges, has helped put graduates into internships and jobs with companies like MEMC/SunEdison, Amazon, Monsanto, Seagate and Cabot Electronics. Most recently Stephen Wedekind (now in Denver) got the demonstration app for our new patent on total sound visualization running on many browsers. Chathuri Silva and Phil Chrostoski submitted abstracts to the 2020 APS March meeting in Denver & the Spring MRS meeting in Phoenix on their computational results modeling the nucleation of unlayered-graphene sheets in containerless carbon droplets like those found in the presolar particles mentioned above & synthesized in our lab by Tristan Hundley and Melanie Lipp. Matt Wentzel-Long and I are preparing a note for a physics education journal on use of three-vectors at high speeds & in curved spacetime, plus a paper on sanative multi-layer approaches to community-level health was just published by the journal *Complexity*. For more see <http://www.umsl.edu/~fraundorfp>, [pfraundorf@umsl.edu](mailto:pfraundorf@umsl.edu)

### **Erika Gibb**

The focus of my research is on volatile composition of comets, especially molecules like water and methane that are astrobiologically important. Undergraduate and graduate astronomy students again had multiple opportunities to gain real experience in astronomical observations of comets. From my lab in 403 Research we remotely controlled iSHELL, a high-resolution, near-infrared spectrometer on the 3-meter NASA Infrared Telescope Facility on Mauna Kea, HI to observe multiple new comets. With graduate students Nathan Roth and Mohi Saki, we also travelled to Hawaii in December 2018 to use the newly commissioned NIRSPEC 2 instrument on the 10-meter Keck II telescope and iSHELL to observe comet 46P/Wirtanen during its historic close approach to Earth.

These were all part of a project to study volatiles in comets to learn more about how the solar system formed and how molecules that are important for life were distributed. We have been learning new things about comets, including finding that some appear to change composition with time. In coming years, we plan to study comets as they rotate and as they orbit the Sun to determine whether such changes are sampling variations with composition across the comet or whether they represent evolutionary changes.

Recent publications include:

1. Roth, N. X., Gibb, E. L., Bonev, B. P., DiSanti, M. A., Dello Russo, N., et al., *The Astronomical Journal*, 158, 42. "Probing the Evolutionary History of Comets: An Investigation of the Hypervolatiles CO, CH<sub>4</sub>, and C<sub>2</sub>H<sub>6</sub> in the Jupiter-family Comet 21P/Giacobini-Zinner", 2019

2. Roth, N. X., Gibb, E. L., Bonev, B. P., DiSanti, M. A., Dello Russo, N., et al., *The Astronomical Journal*, 156, 251. "A Tale of 'Two' Comets: The Primary Volatile Composition of Comet 2P/Encke Across Apparitions and Implications for Cometary Science", 2018

3. Roth, N. X., Gibb, E. L., Bonev, B. P., DiSanti, M. A., Mumma, M. J., Villanueva, G. L., Paganini, L., "The Composition of Comet C/2012 K1 (PanSTARRS) and the Distribution of Primary Volatile Abundances Among Comets", *The Astronomical Journal*, 153, 168, 2017.

<http://www.umsl.edu/~gibbe/>, [gibbe@umsl.edu](mailto:gibbe@umsl.edu)

### **Bob L. Henson**

Our Department is understaffed, so one of the reasons that I have delayed my retirement is to help with the teaching load. I am continuing to teach heavy loads at both the graduate and undergraduate levels and when time permits, I am doing a couple of studies in mathematical physics.

### **Eric Majzoub**

I am a professor in the Department of Physics and Astronomy. Some theoretical developments in condensed matter physics have been used in high energy physics with great success, perhaps the Anderson/Higgs mechanism being the most well-known. More recently there has been a growing interest among condensed matter theorists in quantum mechanical spin systems with random interaction strengths between pairs of spins. While these models have been studied extensively in spin-glass systems such as the Sherrington-Kirkpatrick model, more recent models have focused on novel non-local interacting systems with interactions between many spins. In particular the model of Sachdev and Ye (SY), initially developed for a study of quantum phase transitions in disordered systems, has been the focus of intense research for its connection to studies in quantum gravity. When the model was modified to include interactions between Majorana fermions it was discovered that in the low-energy limit it is equivalent to a quantum theory of gravity in two dimensions developed initially by Jackiw and Teitelboim (JT gravity). It is important because many calculations are tractable in JT gravity that are not in higher dimensional theories and some aspects of a fully quantum theory of gravity may be explored. Other models used to investigate quantum gravity are also related to the SY model, including random matrix theory in the form of matrix quantum

mechanics in the large N limit. I am currently investigating these models.

### **David Peaslee**

*(David is currently working at UMSL for SPEC Sensors as a Visiting Research Scientist.)*

Since joining SPEC Sensors in October of 2014, I have developed a keen understanding of how gas sensor development can greatly influence the understanding of our surroundings and environment. While working with electrochemical sensors and their necessary electronics, I have strived to identify and overcome their limitations. While previously these small sensors were intended for identifying high concentrations of toxic air contamination, we have designed and characterized these electrochemical sensors to monitor and measure ambient levels in the atmosphere. These advances will have a direct impact on an individual's ability to monitor their air quality and to reduce the amount of air pollution to which they are exposed.

I first became involved in electrochemical modeling during my pre-doctoral work on double layer supercapacitors at both NASA Ames and the Department of Physics & Astronomy at UMSL. With my math and physics background, I have made advances on modeling and correcting the effects of temperature and humidity, to bring the sensitivity of our sensors from the parts-per-million range, to the parts per-billion-range. While previously studying novel materials for the electrodes and electrolytes of supercapacitors, I have been able to transfer this knowledge of materials into the electrochemical gas sensor design. Working with ionic liquids and ionic gels at NASA Ames, I have a great understanding of their potential to expand gas sensing into previously unreachable areas, such as extreme dry, hot, or cold environments.

I am interested in gas sensing projects including the wireless/powerless gas sensing, novel personal gas sensing apparatus, and computational methods for low power sensing arrays. Recent submissions and presentations include:

1. DOE SBIR Phase I for "Robust and Reliable Hydrogen Leak Detection and Warning Systems" (246170, 2019)
2. Stetter, Joseph R., and David Peaslee. "Wireless near-field gas sensor system and methods of manufacturing the same." U.S. Patent Application 10/241,073, filed March 26, 2019
3. Stetter, Joseph R., David Peaslee, Vinay Patel, and Bennett J. Meulendyk. "Wireless Zero-Power Air Quality Electrochemical Sensor Card for Iot Applications." In Meeting Abstracts, no. 42, pp. 2418-2418. The Electrochemical Society, 2018

### **Bruce A. Wilking**

I am involved in several spectroscopic surveys to characterize the star formation in two very different environments. Using data from several high-resolution infrared spectrometers, we continued our investigation in the dynamics of young low mass stars, including those in the earliest phases of evolution. Spectra were compared to synthetic spectra using a Monte Carlo Markov Chain program to derive radial velocities and suggested that stars form with initially high velocity dispersions. This project was the main part of Tim Sullivan's doctoral dissertation and in collaboration with Dr. Erika Gibb and Dr. Tom Greene (NASA-Ames). The results

were published in July (doi:[10.3847/1538-3881/ab24c0](https://doi.org/10.3847/1538-3881/ab24c0)) and presented at the 234<sup>th</sup> meeting of the American Astronomical Society in June 2019 and at the Crete III: "Through dark lanes to new stars" conference in September. In collaboration with astronomers at the University of Arizona, Matt Wentzel-Long and I are completing a study using optical spectra from the massive star-forming region IC 1805 to identify young stellar objects with disks. When combined with infrared data, we will identify and model the circumstellar disks around young stars to examine the possible effects of hot massive stars on neighboring planetary systems.

<http://www.umsl.edu/~wilkingb>, [bwilking@umsl.edu](mailto:bwilking@umsl.edu)

## **ALUMNI INFORMATION**

### **1974**

Pat Amick (B.S.) is retired from Boeing and spoke to the Windows on Physics class on "A Physicist Working in Industry". Pat is also assisting with our planetarium and astronomy outreach program.

### **1991**

Dr. Michael Meyer (M.S. 1991) is a Professor at the University of Michigan and visited the Department in September. He told us about his exoplanet research in a colloquium entitled "A Water Budget Dichotomy of Rocky Protoplanets from <sup>26</sup>Al Heating".

### **2002**

Jeff Cole (B.A.) is a Logistics Manager at U.S. Ply, INC. based in Bridgeport, TX.

### **2003**

Marcellus Chase (B.S.) is a registered patent attorney at Randall | Danskin in Spokane, WA.

Daisuke Takeshita (M.S., Ph.D. 2010) is an associate professor in sports science at the University of Tokyo.

### **2005**

Douglas Brumm (B.S., M.S. 2007) is an attorney specializing in biotechnology patents for Global Patent Solutions LLC in Jacksonville, FL.

### **2006**

Justin Braden (B.S.) is a software Engineer at SecureCom Wireless in Ozark, MO.

David Peaslee (B.S., M.S. 2008, Ph.D. 2013) works for SPEC Sensors and is working on the UMSL campus as a Visiting Research Scientist on gas sensing projects including the wireless/powerless gas sensing, novel personal gas sensing apparatus, and computational methods for low power sensing arrays.

### **2007**

Will Lowes (B.S., M.S. 2009) is an Engineering Recruiter at Dedicated Staffing Inc.

**2008**

Zak Jost (B.S., M.S. 2011) is a Research Scientist at Amazon Web Services in Seattle.

**2009**

Adam Scott (M.S., Ph.D. 2014) is a Senior Data Scientist at Bayer Crop Science.

Steve Taylor (B.S.) is a Manager at Press Express LLC and an Adjunct Faculty at St. Louis University.

**2010**

Scott Stephenson (B.S.) was the 2018 Distinguished Alumni Lecturer and related his fascinating career journey in his talk "From Dark Matter to A.I.: Finding Particles and Fundamental Laws of Knowledge in the Intelligence Revolution". He is currently the Founder and CEO of Deepgram which does A.I.-based audio/video indexing and speech recognition.

**2012**

Tera Glaze (B.S., M.S. 2015, Ph.D. 2019) is a postdoctoral research associate in the Anesthesiology Department at the Washington University School of Medicine.

Dawn King (M.S., Ph.D. 2015) is starting a new position at the National Geospatial-Intelligence Agency in St. Louis.

Madison Hayes (B.S.) is a Service Desk Engineer for IT services provider Datotel.

**2014**

Nathan Roth (B.S., M.S. 2016, Ph.D. 2019) has a NASA Postdoctoral Fellowship to continue his comet studies at NASA Goddard Space Flight Center.

Christopher Carr (M.S., Ph.D. 2018) works as a research scientist for Boeing Phantom Works in St. Louis.

**2015**

Michael Cowan (M.S.) has been promoted to Manager, BSC-Logistics at Anheuser Busch.

William Seigel (B.S.) is an apprentice QA Analyst at Stifel Financial Corporation.

**2016**

Brigid Costello (B.S.) is a Neuro Imaging Research Technician at Washington University School of Medicine.

Brock Ebert (M.S.) is a Displays Engineer II at Flight Safety International Visual Systems.

Matt Wentzel-Long (M.S.) is continuing in the UMSL Ph.D. program and starting a research internship at NASA Glenn Research Center in Ohio.

**2017**

Nicholas Moore (B.S.) is a Billing Analyst I at Spectrum.

**2018**

Tristan Hundley (B.S.) is working in the Denver area as a SQL/Python Developer and Data Analyst.

Tianna McBroom (B.S.) is a graduate research assistant in the physics Ph.D. program at Syracuse University.

Harper Smith (B.S.) is in the Computational Biology and Bioinformatics Ph.D. program at the Ohio State University.

**2019**

Justin Bryan (B.S.) is in the physics Ph.D. program at Ohio University.

Ian Edwards (B.A.) works for Boeing in St. Louis as a systems engineer for the reliability and maintainability team.

Gerard Pujol Hernandez (B.S.) is in the MSc program in Astronomy and Astrophysics at the University of Amsterdam.

## Contributors 2018-2019

**Thanks to all for your generous contributions to our scholarship and gift funds!**

Dr. M. Marsha Allen  
 Patricia J. Amick  
 James M. Baker  
 Erika Sofia Balazsi  
 Dr. Ta-Pei Cheng  
 Dr. Dennis M. Elking, Jr.  
 Dr. Bernard J. Feldman  
 David J. Harris  
 Dr. Bo He  
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