

**FALL 2018**



Department of Physics  
& Astronomy



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## DEGREE CANDIDATES

**FALL 2017/SPRING 2018: UNDERGRADUATES**

### Engineering Physics—BS

*\*Outstanding Senior in Engineering Physics*

Azmi Azahari\*                      Cesar Avalos Baddouh

### Astronomy - BA

Ludwig Johanning

### Astronomy - BS

Carin Gavin                      Hannah Gibson                      Zachary Warner

### Physics—BS

*\*Stranathan Award: Outstanding Senior in Physics/Engineering Physics*

Keon Amini	Mario Balcazar*	Jamey Ballard
Cameron Buster	Carin Gavin	Eilish Gibson
Jazmine Jefferson	Dalton Jorns	Alex Kolomaya
Grayson Langham	Marcus Pepperdine	Trevor Scheopner*
Sierra Seacat	Zachary Warner	Quade Woofter

## GRADUATE STUDENTS *\*With Honors*

### Physics—MS

Justin Anguiano\*                      Jenny Nielsen

### Physics—PhD

Ayman Al-Bataineh	Matt Bellus	James Castle*
Alex Ford	Sarah LeGresley Rush	Hadi Madanian
	Jamie Wilt*	

## E. E. SLOSSEN AWARD

*For outstanding graduate teaching assistants*

Aaron Morgan                      Tony Renzaglia                      Yuyu Wang

## DEPARTMENT TEACHING AWARD

**Graduate**

Jack Shi

**Undergraduate**

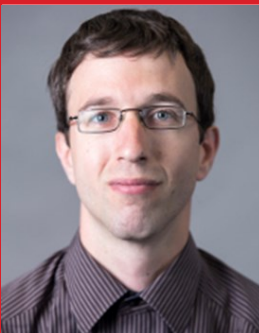
Chris Rogan

## COMINGS & GOINGS



### DR. ALLISON KIRKPATRICK—ASSISTANT PROFESSOR

Dr. Kirkpatrick grew up in Orlando, FL and Atlanta, GA. She is proud to be a former Florida Gator and received her B.S. in Mathematics from the University of Florida in 2007. While a sophomore at UF, she took an introductory astronomy course to fulfill a physics general education requirement and wound up changing her career path. She picked up a minor in Astronomy and completed three years of research on star clusters in the Milky Way. After graduation, Allison worked for a year at Astrocamp in Idyllwild, CA, where she taught physics and astronomy concepts in a hands-on setting to visiting elementary and middle school students. From there, she moved coasts again and received her Ph.D. in Astronomy from the University of Massachusetts. Her Ph.D. work consisted of several publications characterizing the emission of dust in galaxies 10-12 billion years ago. The dust in these galaxies hides massive amounts of new born stars and growing supermassive black holes. Her research is widely used to find hidden supermassive black holes in the very distant universe. She completed her Ph.D. in 2016 and won a prize postdoctoral fellowship at the Yale Center for Astronomy and Astrophysics. While at Yale, she made predictions for how the upcoming James Webb Space Telescope (JWST) could find significantly more supermassive black holes than previously identified. In 2017, NASA held a competition to get observing time on JWST, its next flagship mission. Allison helped design and write an ambitious observing proposal for JWST that was one of 11 selected out of over 100 submitted. She will be a part of the team to use some of the first observations from JWST, due to launch in 2021.



### DR. HARTWIN PEELAERS—ASSISTANT PROFESSOR

Hartwin grew up near Antwerp, Belgium. He has always been interested in discovering why materials have the physical properties they have. He uses advanced first-principles calculations as a powerful method to describe this. These kinds of calculations do not rely on empirical parameters, but solve Schrödinger's equations, based on atomic positions and using the electronic density as the main quantity. Therefore these methods can not only be used to describe and explain the physics of materials, but also to predict and optimize materials properties. During his Ph.D. at the University of Antwerp, Belgium, he focused on the novel properties of nanowires. Next, he got awarded a Fellowship from the Belgian American Educational Foundation to start pursue postdoctoral work at the University of California, Santa Barbara, where he explained the basic physics of 2D materials and the main limitations of transparency of transparent conducting oxides. The latter are materials that combine transparency to visible light with electronic conductivity and are used as transparent contacts in smartphones, computer and tv screens, and solar cells. Currently, he is using his expertise to design and improve next-generation battery and solar cell materials.

**PROFESSORS EMERITI**— Following in the footsteps of Professor Adrian Melott in May 2017, half of the astronomers within the program, **Professor Barbara Anthony-Twarog** and **Professor Steve Hawley**, retired in May 2018. **Dr. Anthony-Twarog** was the first female student to receive a BS degree in Physics from Notre Dame in 1975 and completed her PhD at Yale in 1981 under the direction of the late Beatrice Tinsley. She joined the Department in 1982 as the first tenure-track female faculty member in Physics and Astronomy. An initial shared appointment with Professor Twarog became a full-time appointment in 1985, followed by promotion to Associate Professor in 1988 and Full Professor in 1993. In addition to an ongoing active research career studying stellar and galactic evolution, Barbara has received numerous awards for her contributions to teaching, including a Kemper Prize and a Chancellor's Club Teaching Award. Her service contributions to the Department and the Astronomy program are too numerous to mention. **Dr. Steven A. Hawley** is a native Kansan, born in Ottawa, and a 1973 graduate of the Department of Physics and Astronomy with BS degrees in Physics and Astronomy. Steve attended graduate school at the University of California, Santa Cruz, receiving his PhD in Astronomy and Astrophysics in 1977. He served one year as a postdoc at Cerro Tololo InterAmerican Observatory in Chile before being selected for the astronaut program in 1978. Between 1984 and 1999, Steve logged over 770 hours in five space flights, including the launch of the Hubble Space Telescope in 1990, the 2nd Hubble Maintenance Mission in 1997, and the 1999 STS-93 Columbia Mission which launched the Chandra X-Ray Observatory and the Compton Gamma-Ray Observatory. Steve retired from NASA and joined the KU faculty in 2008, taking on the role of Director of the Engineering Physics Program. Over 10 years, Steve guided the program through two accreditation cycles and helped upgrade it to one of the top undergraduate engineering physics degrees in the country. His insight and expertise greatly enhanced the diversity of the astronomy program, particularly through the addition of an astrobiology minor, currently the most popular minor within the department, and the expansion of research profile beyond just stellar astronomy.



# ALUMNI NEWS



**Dimitra Atri** (PhD 2011) is now a Research Scientist at New York University in Abu Dhabi. His research is focused on planets beyond the solar system, known as extrasolar planets or exoplanets. He will be modeling the impact of stellar radiation on exoplanets and assess their suitability to host life. Dimitra can be reached via email at [da99@nyu.edu](mailto:da99@nyu.edu).

NEW YORK  
UNIVERSITY



ABU DHABI

## LOWRY GRADUATE



**Clint Wiseman** (BS Physics '11) graduated with a PhD in particle astrophysics from the University of South Carolina this summer. Dr. Wiseman writes:

*The title of my thesis was "An Axion Search With the Majorana Demonstrator." I just started a 3-year postdoctoral position at the University of Washington in Seattle, at CENPA (the Center for Experimental Nuclear Physics and Astrophysics), working on neutrinoless double-beta decay and dark matter direct detection experiments.*

*My wife Shannon and I have moved out to Seattle, and she'll be working as an Occupational Therapist.*



## PROSSER UG PHYSICS



**Danny Noonan** (PhD Physics 2015) was just selected as a Distinguished Researcher at Fermilab. He's currently a postdoc at Florida Tech. As an LPC Distinguished Researcher, he will be working on measurements of the top quark and the Phase 2 HGCAL detector upgrade. In particular he will be working on precision measurements in the top quark pair plus photon production channel ( $t\bar{t} + \gamma$ ). The associated production of top quark pairs with bosons allows for the probing of the top quark couplings. He plans to continue the measurements of the  $t\bar{t} + \gamma$  channel, including using this channel to probe effective field theories beyond the standard model which would effect the coupling of the top quark to photons and the potential for measurements of the top quark charge asymmetry in this channel. For the Phase 2 upgrade, he will be working on the development of the endcap concentrator ASIC for the readout of the HGCAL subdetector.



## TOMBAUGH ASTRO



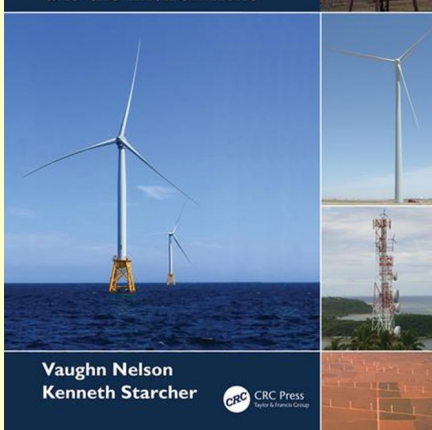
**Dr. Vaughn Nelson** (PhD Physics, 1967) has just published a new edition of **Wind Energy**. The 3rd edition explores the wind industry from its inception in the 1970s to today; presents the design, aerodynamics, operation, control, applications, as well as different types of wind turbines. An overview of energy examines world consumption and use of fossil fuels,

and includes a section on global climate change. Dr. Nelson has been involved with renewable energy, primarily wind energy, since the early 1970s. He is the author of four books (five books on CD) and has published more than 50 articles and reports. He also served as the principal investigator on numerous grants and conducted more than 60 workshops and seminars from local to international levels. Copies of the book are available until year's end at a 20% discount at [CRC Press](http://CRC Press).

ENERGY AND THE ENVIRONMENT  
Abbas Ghassemi, Series Editor

**WIND  
ENERGY**  
Renewable Energy  
and the Environment

THIRD  
EDITION



Vaughn Nelson  
Kenneth Starcher

CRC Press  
Taylor & Francis Group

## ENGINEERING PHYSICS



## ZELLER INSTRUMENTATION



## MLO 1.25M TELESCOPE

# DEPARTMENT HIGHLIGHTS

## Congratulations KU Nominee

### RHODES SCHOLARSHIP



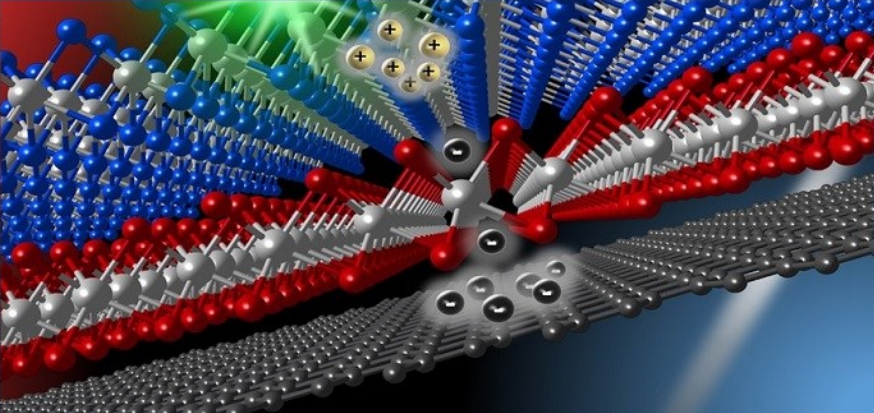
## EPHX MAJOR - NICOLE JOHNSON

### PHYSICS GRAD RECEIVES



### GRADUATE FELLOWSHIP

## Researchers Advancing Promise of Solar Technology



**STRANATHAN  
PROFESSORSHIP  
FUND**

**CURRY  
TEACHING  
LABS**

**REDEKER  
GRADUATE  
FELLOWSHIP**

**STRANATHAN  
FUND**

**UNDERGRADUATE  
SCHOLARS**

**JOHNSON  
UG ASTRONOMY**



SATURN'S RINGS CHEMICAL COMPLEXITY REVEALED

**Department of  
Physics &  
Astronomy**



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FAX: 785-864-5262



## From the Chair

As noted in past editions of the newsletter, change often comes quickly and from unexpected directions. Only two years ago ([Fall 2016](#)) in this column, we were discussing the significant arrivals of a new Dean of CLAS, Carl Lejuez, and a new Provost, Neeli Bendapudi. While such leadership changes often generate varying degrees of uncertainty and turmoil, positive outcomes can emerge for those prepared to respond quickly and effectively to the surrounding chaos. With the changes in the state legislature from the 2016 election, there appeared to be reason for optimism that some of the significant cuts to higher education that had accumulated over the previous 6 years would be partially reversed and that the hemorrhaging of academic resources, both in personnel and in material, would be slowed.

In Fall 2018 there is some sense of *deja vu* all over again. We have a new Chancellor, Douglas Girod, who is entering his 2<sup>nd</sup> year on the job. Provost Neeli Bendapudi has left for the presidency of the University of Louisville, to be replaced on an interim basis by former CLAS Dean, Carl Lejuez, who has been replaced on an interim basis in CLAS by Professor Clarence Lang. Such changes have become a frequent and almost expected occurrence within administrative academia, comparable to the turnover rate among Division I football coaches, and one learns to adapt to the new environment. Unfortunately (or fortunately in this case, depending on your point of view), new eyes on a situation often reveal issues that have been ignored by previous administrations, particularly where enthusiasm for the short-term benefits outweighed the practical, long-term systemic deficiencies (think, e.g. the federal deficit).

Upon taking charge of the Provost's office in May 2018, Provost Lejuez began a serious review of the university budget, primarily to familiarize himself with the current and long-term financial status of KU, critical for any discussion of future university planning. Surprisingly, the Provost found that "the University of Kansas Lawrence campus faces substantial, **but reparable**, budget circumstances that require our immediate attention and action." Provost Lejuez took the bull by the horns (or some other part of the bovine anatomy) and enacted measures to cut the KU budget by 5.87 percent across the board (\$20 million). This is a \$20 million cut to the base budget, not a one-time reduction in

expenses. (The full text of his statement can be found at [this link](#).)

The bad news is that a large fraction of the cuts will come from a reduction in faculty positions, on top of the previous replacement rate of 1/3 for retiring faculty during the fiscal crises of the last few years. To allow some flexibility in future planning and resource distribution, the University offered a voluntary retirement incentive program for tenured and tenure-track faculty, an offer taken up by [65 senior faculty](#) at KU. New hires for 2019 were only approved if the department/program could supply internal financial support to cover the costs of the hire for two years.

The good news (yes, there is good news!) is that the Department of Physics and Astronomy will emerge from this crisis in relatively good shape. Thanks to the extraordinary efforts of the Alumni Advisory Board, our exceptionally generous alumni, and our very talented faculty and students, the Department received approval for a new hire within Astronomy/Astrophysics to begin in Fall 2019. Over the last 5 years, despite the financial crises, we have been able to hire 6 new faculty. This, again, has only occurred because: (a) the University recognizes the value that young, talented Physics and Astronomy faculty bring to CLAS in terms of research funding, teaching, and international recognition and, (b) in every instance, the Department was able to bring something to the table, i.e. leverage program resources supplied by alumni and external sources, to demonstrate our commitment to the future of Physics and Astronomy at KU. Though the administrators sometimes find the constant drumbeat annoying, the value of positive feedback from our alumni and supporters cannot be overstated.

To close, after a few years at this institution, it becomes apparent that the level of talent within the Department, from the top down, from faculty to students, is competitive with the majority of the top-ranked programs in the US. Just this week, we learned that Prof. Cravens has been named a Fellow of the AAAS, Prof. Medvedev has been named a Fellow of the APS, and Prof. Royon has received the Humboldt Research Award from Germany. What separates a top 50 program from the rest is only marginally the talent of the people involved; the dominant factor is the quality of resources these exceptional individuals can access. Hopefully, with the new year we can continue to kick down new doors and provide our students and faculty with the tools they need to flourish.



**THE MR. BOB CHALLENGE: 100<sup>2</sup>**  
**Support Undergraduate Labs in Physics & Astronomy**  
**Donate \$100 and Receive a MR. BOB T-shirt – FREE!**

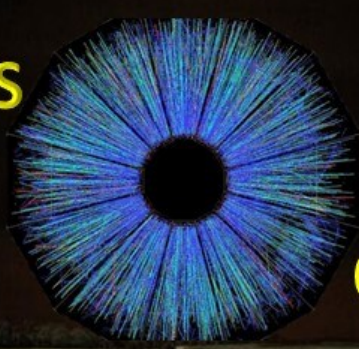


From the Summer Newsletter of Retired KS 2nd District Congresswoman Lynn Jenkins



Thank you to Dr. Hume Feldman, the Chair of Kansas University's Department of Physics and Astronomy and his colleagues Dr. Alice Bean and Dr. Graham Wilson for taking time out of their week to meet with me and give me a quick tour of the Department's facilities. I was able to see firsthand some of the technological advances being worked on at KU and it is quite impressive. Dr. Feldman also offered his thoughts on the importance of continued Federal funding for the sciences. In particular, I appreciated his focus on how to get more women involved in physics and other STEM fields. Thank you for having me.

**PARTICLE PHYSICS**  
**on the PLAINS**  
**2018**



**UNIVERSITY of**  
**KANSAS**  
**OCTOBER 13-14**



**Department Awarded Brazil-US Professorship - 2018**





**Thomas Peyton Armstrong**, 76, died peacefully at Bridgehaven Village on June 2, 2018 in Lawrence, KS. Tom is survived by his wife, Jeanette Armstrong; children, Elizabeth Armstrong, Ann Arbor, MI and Stuart Armstrong (Amanda), Lawrence, KS; a sister, Jean Ober (John), Sunrise Beach, MO; grandchildren Jolie Armstrong, Ryan Armstrong, Chelsey Bowers, and Paige Bowers, all of Lawrence, KS, and Aaron Stryker, Ann Arbor, MI; and great-grandchild, Tanner Hall, Lawrence, KS. Tom is also survived by numerous nieces, nephews, and cousins, as both of Tom's parents had eight siblings, from whom flowed more than forty cousins. He is preceded in death by his parents and his brother, Paul Armstrong, Atchison, KS.

Tom was born on November, 24, 1941 in Atchison, Kansas to Floyd Armstrong and Mary Elizabeth Wohlgemuth Armstrong. He attended elementary school at a one room country school, Shannon Hill

and graduated from Atchison High School in 1958. He received a bachelor's degree in Physics from the University of Kansas in 1962, and married Jeanette Fry shortly after graduation. Tom received his master's and doctoral degrees from the University of Iowa in 1964 and 1966, respectively. After postdoctoral appointments at the University of Iowa and Culham Lab in the United Kingdom, Tom joined the KU Department of Physics and Astronomy in 1968 and continued his teaching and research career until retiring as Professor Emeritus in 2003 to continue his research full time at Fundamental Technologies, LLC.

Tom had a prolific research career and garnered numerous awards. He focused on space physics, with heavy involvement in NASA unmanned space flight projects ranging from the Mariner Mars missions of the 1970s to the Saturn Cassini mission in 1998. He was an instrument Co-Investigator with the Voyager, Galileo, and Ulysses missions to the outer solar system, as well as an instrument Co-Investigator on the IMP 7/8 (Explorer 47/50), ACE, and Van Allen Probes series of Earth orbiting spacecraft. Voyager 1 made history as the first human-made object to leave the solar system. Tom managed the Space Physics Laboratory at the University of Kansas for 20 years and supervised departmental computing for 15 years. He was a devoted advisor and mentor, furthering the careers of countless young scientists. These scientists work around the globe, contributing to knowledge and industry.

Although his scientific career occupied most of his energies, he was a man of many talents and interests. He served as President of the Lawrence Aquahawks Swim Team when his children were competing and helped coach his son's football team. He enjoyed his involvement in the Big Blue Sportsman Club, the University of Kansas Discussion Club, and the Faculty of the 1960s Club. Growing up on a farm, he learned how to repair just about everything, and enjoyed woodworking and building, including a house.



**Raymond W. Arritt**, 61, of Ames, passed away unexpectedly of a stroke on Wednesday, November 14, 2018 at Mercy Medical Center in Des Moines. A memorial service was held at Stevens Memorial Chapel in Ames on Tuesday, November 27 at 10:30 a.m. with a reception after at Northminster Presbyterian Church.

Ray was born September 19, 1957, to Muriel Louise Smith and Raymond Ward Arritt, Sr. in Covington, Virginia. He grew up in Lynchburg and Richmond, Virginia, and attended the University of Virginia, where he received his B.A. in Economics and Environmental Science in 1979 and his M.S. in Environmental Science in 1982. It was during the final semester of his undergraduate degree that he met his beloved wife Teresita Navarrete in 1979. They married within a year of their first date, on March 29, 1980. Ray and Tere followed Ray's career as he earned his Ph.D. in Atmospheric Science at Colorado State University in Ft. Collins in 1985 and then **took his first professorship at the University of Kansas in Lawrence in 1988. In Kansas they had their children, Spencer (Tracy) and Kevin (Laura).** The family moved to Ames, Iowa in 1993 and Ray worked at Iowa State University until the day of his death. Ray was a consummate scientist, an avid biker, and most proudly a loving and devoted husband and father. We remember his gentle and generous demeanor, his love of music, and his thoroughly offbeat sense of humor.



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