

WINTER 2014/15



Department of Physics & Astronomy



Inside this issue:

Faculty News	2
Faculty (continued)	3
Alumni News	3
From the Chair	4



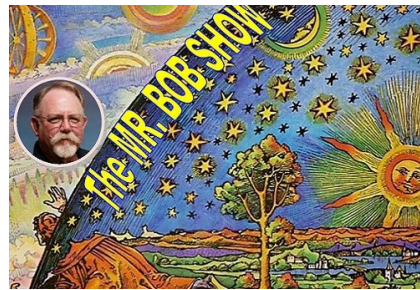
LINKED-IN: Physics and Astronomy Networking

Linked



One the many goals perennially discussed by faculty, students, and the department Alumni Advisory Board is the enhancement of communication between the Department and alumni after they've left the program. Newsletters like this one represent one-way communication, the

Department attempting to keep it's academic offspring aware of the situation back home, with the paradoxical twist that it's usually the parents asking for money from the kids. While, as yet, the Department doesn't have a Twitter account, we do have a Facebook presence (please check it out if you haven't already), but this is still mostly a one-way, social interaction open to anyone and everyone. Given the exceptional talent and skills of our alumni and the value of networking with professionals who appreciate and desire access to that quality of talent, the Department has established a **Linked-in Group** site. If you are a member of Linked-in, the group is listed as **KU Physics & Astronomy Alumni** and is a Members-Only site. We hope all Linked-in departmental alumni will request membership in the site and use it as a means to exchange advice, ideas, and info that benefit all sides of the communication. As the membership grows, we will attempt to make contact with as many alumni as we can find who may not be aware of the site because they don't receive this newsletter. If you have connections with any of them, please pass the info along. Though it may sometimes seem difficult to believe, the goal of initiatives such as this is not to harass you for money or resources, but simply to add value to the education you received at KU, hopefully value that grows with time. Rock Chalk, Jayhawk, KU!



A Star Is Born!

While the use of online media and 24/7 digital access can often be more of a distraction to learning than a benefit, an unquestioned success within the Department has been **The Mr. Bob Show**, one of the most watched collections of videos associated with KU on YouTube. The videos were created to provide students within the freshman/sophomore Physics labs with some background about the equipment use and goals of a given lab prior to their arrival at the lab, thereby reducing the level of confusion and

minimizing the time lost to basic explanations which could be better used accumulating insight from the lab exercise. **Mr. Bob Curry**, Director of Labs, is the star of these informative sessions and has created a following among students both in and out of KU. For a return to the labs/equipment which may have haunted your years at KU, check out the videos at [this link](#).

KU Becomes Partner In The Astronaut Scholarship Foundation



Professor Steve Hawley has led a successful effort to have KU accepted as a partner institution with the **Astronaut Scholarship Foundation**. The ASF was established by the Mercury 7 astronauts as a way to identify and enable students who have the potential to be tomorrow's leaders in science and technology. As a partner institution, KU will be able to award two

\$10,000 scholarships per year to juniors and seniors in science, engineering, and math. The first **KU Astronaut Scholars** will be selected by ASF in April 2015. For details, check out [this link](#).

College Staff Honored at Reception



Congratulations to **Kristin Rennells** and **Kim Hubbel** for being selected and honored by the College of Liberal Arts and Science. They were among 36 staff members recognized at a reception on Nov. 20 for their exceptional work for the Department over the past year. The appreciation reception was held at the Oread and more than 100 staff members were in attendance. The complete press release can be accessed at [this link](#).



FACULTY NEWS



MOMENTUM

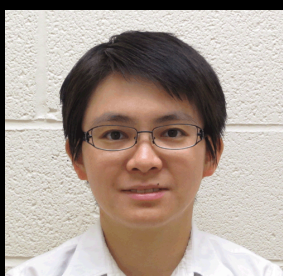
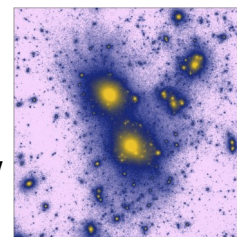
KU Women of Distinction—2014/15

The Emily Taylor Center for Women & Gender Equity announced 27 honorees for the 2014-15 Women of Distinction calendar. The Women of Distinction Calendar recognizes KU women students, staff, faculty, and alumnae for their achievements, i.e. KU women who have distinguished themselves through outstanding achievement and contributions to KU and/or the community, serving as a role model, and challenging gender stereotypes. Congratulations to Distinguished Professor **Judy Wu** on her selection for the **Women of Distinction** calendar. Among her many achievements, from 2000-03, Dr. Wu was a Meredith Docking Scholar. She also received the Kemper Fellowship Award from KU in 2006. In 2012, Judy received the Higuchi Olin Petefish Award for Basic Science. The press release can be found at [this link](#).



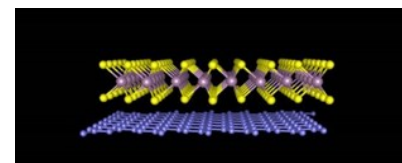
Researcher Advances a New Model for Dark Matter

Astrophysicists believe that about 80 percent of the substance of our universe is made up of mysterious “dark matter” that can’t be perceived by human senses or scientific instruments. **Dr. Mikhail Medvedev**, professor of physics and astronomy at the University of Kansas has published breakthrough research on dark matter that merited the cover of **Physical Review Letters**, the world’s most prestigious journal of physics research. Medvedev proposes a novel model of dark matter, dubbed “flavor-mixed multicomponent dark matter.” For more insight, the full press release can be found at [this link](#).



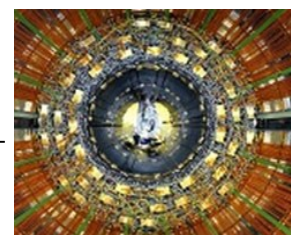
Research yields material made of single-atom layers that snap together like Legos

KU physicists **Dr. Hsin-Ying Chiu** and **Dr. Hui Zhao** have fabricated an innovative substance from two different atomic sheets that interlock much like Lego toy bricks. The researchers said the new material — made of a layer of graphene and a layer of tungsten disulfide — could be used in solar cells and flexible electronics. Dr. Chiu and grad student **Matt Bellus** fabricated the new material using “layer-by-layer assembly” as a versatile bottom-up nanofabrication technique. Then, **Jiaqi He**, a visiting student from China, and **Nardeep Kumar**, a grad student now at Intel Corp., investigated how electrons move between the two layers through ultrafast laser spectroscopy in KU’s Ultrafast Laser Lab, supervised by Dr. Zhao. The complete press release can be found at [this link](#). The news item has been featured on the NSF web site at [this link](#).



KU Hosts Forward Physics Workshop & ...

Physics and Astronomy, in collaboration with the College of Liberal Arts and Sciences, the KU Office of Research, and CERN, is hosted the **Forward Physics Workshop**. The meeting brought together members of all CERN LHC collaborations and other U.S. national labs, as well as colleagues from the theory community to discuss their latest research progress, upgrade LHC plans and future ideas on forward physics, diffraction, ultra-peripheral collisions and forward heavy-ion physics in general. This is the first time that this CERN LHC Working Group meeting has been held outside Europe.



Art Meets Science Meets Art

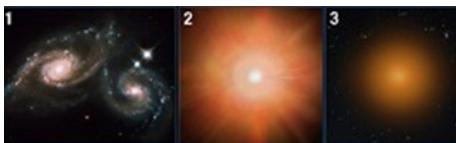
Scientists and artists, including representatives from CERN, came together last November at the University of Kansas to discuss how their disciplines stimulate and inspire one another. The roundtable, **Excavating the Universe: Physics Interacts with the Arts**, took place at The Commons, Spooner Hall in the Spencer Museum of Art. The Spencer Museum of Art houses an internationally known collection that is deep and diverse, with artworks and artifacts in all media. ALICE Spokesperson **Paolo Giubellino** (left) gave a public lecture: “The Big Bang in the Laboratory”. Assistant **Professor Daniel Tapia Takaki** (upper left), who has worked with ALICE, helped organize the roundtable discussion. The discussion and Dr. Giubellino’s public lecture are available in their entirety on YouTube at [this link](#). (The discussion is the 2nd hour of the video.)

KU Professor Among Team Analyzing Data from Mars Explorer

MOMENTUM



Physics and Astronomy Professor **Tom Cravens** will be among a number of interdisciplinary scientists analyzing and interpreting data collected by MAVEN about Mars' atmosphere. Last month MAVEN arrived in Mars' orbit after traveling 442 million miles over 10 months. The mission represents an unprecedented study of Mars' upper atmosphere and will help scientists learn more about the history of the planet's climate. The complete story from the Lawrence Journal World can be accessed at [this link](#).



Better to Burn Out Than Fade Away

Like hedonistic rock stars that live by the "better to burn out than to fade away" credo, certain galaxies flame out in a blaze of glory. Astronomers have struggled to grasp why these young "starburst" galaxies — ones that are very rapidly forming new stars from cold molecular hydrogen gas up to 100 times faster than our own Milky Way — would shut down their prodigious star formation to join a category scientists call "red and dead." Dr. Greg Rudnick and his collaborators have exposed the real cause of death for some starburst galaxies. To learn the secret, the complete press release can be accessed at [this link](#).

Department Alumnus Shares BREAKTHROUGH 2015 PRIZE



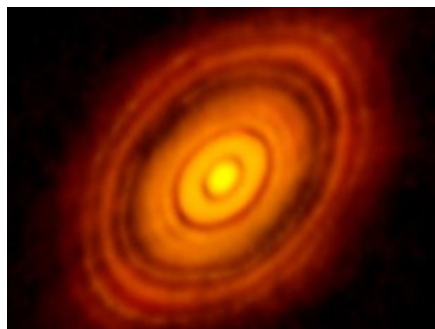
Congratulations to Department Alumnus, **Dr. Ron Gilliland** (BA ASTR, MATH, PHSX 1974), for being one of the scientists awarded the **2015 Breakthrough Prize** in Fundamental Physics. This prize was awarded to two supernova teams for their discovery of Dark Energy. The Breakthrough Prize was started in 2012 by a group of tech giants that includes Facebook founder Mark Zuckerberg. The prize awards \$3 million each to researchers who have made fundamental breakthroughs in life sciences, physics

and mathematics. The complete press release can be accessed at [this link](#).

First Recipients of Physics and Astronomy Scholarship Named

Two University of Kansas juniors have been named the first **Gene R. Feaster Physics Scholars**. **Emily Ann Smith**, majoring in physics and interdisciplinary computing, and **Daniel Rhodes**, majoring in physics, were awarded the scholarship for the 2014-2015 academic year. The scholarship covers tuition costs for one year for each recipient. The scholarship was established by alumnus **Dr. Gene Feaster** (PhD Physics 1953), who invented a medical device called **Superflab** that is used in radiology clinics across the country. The complete press release can be found at [this link](#).

Birth of Planets Revealed in ALMA's 'Best Image Ever'



Astronomers have captured the best image ever of planet formation around an infant star as part of the testing and verification process for the Atacama Large Millimeter/submillimeter Array's (ALMA) new high-resolution capabilities. This revolutionary new image reveals in astonishing detail the planet-forming disk surrounding HL Tau, a Sun-like star located approximately 450 light-years from Earth in the constellation Taurus. "These features are almost certainly the result of young planet-like bodies that are being formed in the disk. This is surprising since HL Tau is no more than a million years old and such young stars are not expected to have large planetary bodies capable of producing the

structures we see in this image," said ALMA Deputy Director **Stuart Corder** (KU ASTR, PHSX BS, 2001). The complete NRAO press release can be found at [this link](#).



ALUMNI NEWS



Department of Physics & Astronomy



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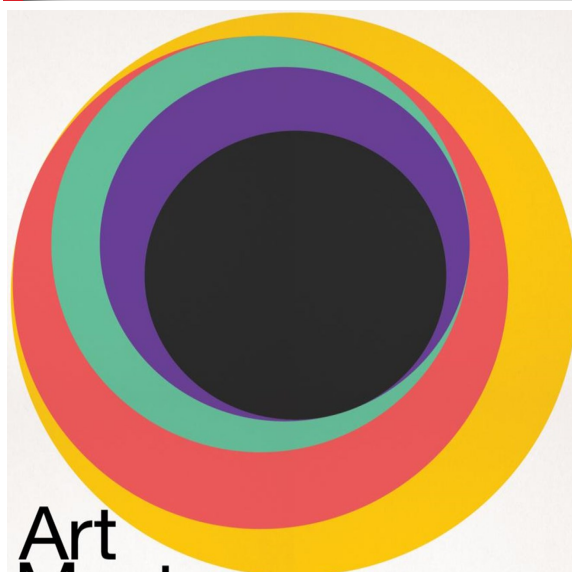
From the Chair

To those unfamiliar with academia, the job of a university faculty member often seems obvious and straightforward - teach your classes and do research. Ignoring for now the chaotic and complex activities that underlie successful achievement of those goals, it is easy for non-academics (and some academics!) to forget the third element in the triad of faculty responsibilities, service.

Once again, what that term encompasses will mean very different things to different faculty — assignment to department, college, and university committees, involvement in college or university governance, supervision of student organizations, administrative responsibility for departmental operations, professional service through refereeing papers, organizing professional conferences, or acting as officers within professional organizations. While the list goes on and on, probably one of the most critical and often overlooked elements is that of educating the public, the individuals who don't read our publications, attend our colloquia, or enroll in the courses we teach. For the general public, basic research within physics and astronomy at a state-supported institution is so far removed from the challenges they face on a daily basis that it can become an easy target for those promoting the cost-saving benefits of cutting or eliminating programs that don't serve the immediate economic interests of the state.

Because of their ties to some of the most fundamental questions of mankind, not to mention some exceptional graphics, Physics and Astronomy hold a special attraction for many non-scientists and we as a department have regularly attempted to communicate both excitement and understanding about what we do and why we do it. Fall 2014 was no exception. Exhibited below are just a handful of the public events which faculty and students organized and/or participated in during the semester, along with presentations at local schools, student and amateur clubs, regional meetings for non-specialists, public observing sessions for astronomical phenomena, etc. A special note of thanks to Assistant Professor Daniel Takaki who, while coordinating the CERN Forward Physics Workshop at KU in Sept. (see pg. 2), organized a public talk in downtown Lawrence on the physics of the early Universe and a roundtable discussion on Art and Science at the Spencer Museum in Nov. These events are crucial, not just because they raise our profile with the administration, but because they hold the possibility of triggering that spark of interest in learning more about the Universe among the young people who will become the next generation of physical scientists, politicians, and, yes, even business leaders. This ongoing challenge, if properly met, may represent a greater legacy than any research we accomplish.

Best wishes for a happy and prosperous 2015!




Art Meets Science Meets Art

—An afternoon at The Commons
21 November 2014



PARTICLEFEVER

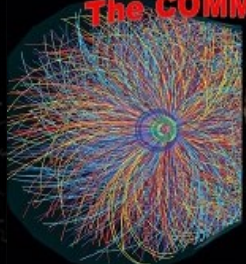



7:30 PM
WEDNESDAY
OCTOBER 1
SPOONER HALL

Documentary Screening
FREE and OPEN to the PUBLIC

WITH ONE SWITCH, EVERYTHING CHANGES.

The BIG BANG in the LAB
NOV. 21, 1:30PM
The COMMONS

EVERYBODY LOVES SCIENCE!



LAWRENCE PUBLIC LIBRARY
MONDAY, OCT. 20 - 7:30 PM

FREE STATE BREWERY - SCIENCE ON TAP

The Evolution of Galaxies
Tuesday, September 23rd

