

Newsletter, Spring 2018

## **An Exciting Time of Growth for Physics and Astronomy at UCR**

**Department Chair Ken Barish discusses recent highlights from a rapidly evolving department**



This is the first of what we intend to become a regular newsletter from the UCR Department of Physics and Astronomy. The Department has been evolving rapidly in recent years. We want to keep in touch with our former students and the broader community as our network of friends and alumni grows. Exciting recent developments in the Department include the hiring of nine new faculty members in the past two years, in the diverse research areas of spintronics, theoretical cosmology and astrophysics, nanomaterials and

quantum computing, observational astronomy, condensed matter theory, and ultracold atomic physics. Our faculty are now 42 strong, making us comparable, for the first time, to other University of California Physics and Astronomy Departments. New faculty for the 2017-2018 academic year are Assistant Professors Barton, Bird, D'Aloisio, and Hemmerling. They join us following postdoctoral work at MIT, Johns Hopkins, the University of Washington, and UC Berkeley, respectively. Of particular note is that Professor D'Aloisio is a UCR grad, having earned a bachelor's degree in physics from our department in 2005. Also notable is the retirement last year of Distinguished Professor Chandra Varma, a leading authority on theoretical condensed matter physics and high-temperature superconductivity.

Our undergraduate and graduate student enrollments also continue to expand, with (for example) record numbers of applications for admission to our Ph.D. program and a drive to recruit more undergraduate transfer students from California community

colleges. We are now in the 8th year offering our innovative Physics 41 series to first year undergraduate physics majors, an intensive 8 credit (double the normal) class integrating traditional lectures, small group peer learning, and laboratory work into a seamless framework, accelerating student progress and allowing students to take upper-division courses already in their sophomore year. The purpose is to improve the success of our undergraduates for on-time graduation and for the realization of

### **Physics and Astronomy by the Numbers:**

|                          |     |
|--------------------------|-----|
| Faculty:                 | 42  |
| Undergraduate students:  | 152 |
| Graduate students:       | 131 |
| Bachelor degrees (2017): | 13  |
| Ph.D degrees (2017):     | 24  |

their post-graduate goals. We strongly encourage undergraduate research and are proud that over 80% of our undergraduates take advantage of the research opportunities available within the Department.

We cordially invite you to attend this year's Physics and Astronomy graduation ceremonies, to be held on campus June 16, 2018. Our day will begin with lunch in the Physics Building Reading Room at 12:00 p.m (top floor of the Physics building, just above the main entrance). Our award recognition ceremony will be in Winston Chung Hall 138, from 1:00-3:00 p.m., and a reception will follow the award ceremony. Our special keynote speaker this Recognition Day is our alumnus and very own Anson D'Aloisio '05, Asst. Prof. of Physics. I hope that you and your family can join us and celebrate this joyous occasion. To RSVP, please send email to [physics@ucr.edu](mailto:physics@ucr.edu) and let us know the total number of guests you will be bringing. Full information on this year's program and a link to photographs from last year's program are included at the end of this newsletter.

Best wishes to all and we hope to see you soon !

Ken Barish  
Chair and Professor, UCR Physics and Astronomy

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## **Recent Awards and Honors**

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### **Astronomer Gillian Wilson Named an ELATE Fellow**

The one-year fellowship allows awardees to increase personal and professional leadership effectiveness.

<https://ucrtoday.ucr.edu/49494>



### **Physicist Nathan Gabor Named a 2017 CIFAR Azrieli Global Scholar**

UC Riverside's Nathaniel Gabor is one of only 15 exceptional early career investigators to receive this year's prestigious award.

<https://ucrtoday.ucr.edu/49397>



### **Astronomer George Becker wins NSF CAREER award**

UCR Assistant Professor George Becker was a recipient of a 2018 career award from the National Science Foundation, the agency's most prestigious award in support of junior faculty. Professor Becker will study intergalactic gas and the galaxies embedded within the gas to investigate the epoch of the early universe known as "reionization," for which we currently have little direct knowledge.

<https://ucrtoday.ucr.edu/53820>



### **Department chair Ken Barish is this year's recipient of the Distinguished Campus Service Award**

One of the most prestigious annual campus awards was given to Professor Barish for his longstanding and very effective efforts on behalf of the Department of Physics and

Astronomy, the College of Natural and Agricultural Sciences, and the UCR campus.

### **Professor Jose Wudka awarded last year's Distinguished Campus Service Award**

Yes, faculty members of the Department of Physics and Astronomy won this important campus award two years in a row. Professor Wudka was recognized for his four year leadership as chair of the UCR Academic Senate.

[http://senate.ucr.edu/awards/dcs/recipients\\_2016-17.html](http://senate.ucr.edu/awards/dcs/recipients_2016-17.html)

### **UCR Physics and Astronomy undergraduates Renata Koontz and Nicholas Pham awarded Goldwater Scholarships**

The Goldwater Scholarship, established by Congress, is considered to be the most prestigious undergraduate award in the United States for the natural sciences, mathematics, and engineering. For the 2018-2019 academic year, 211 scholarships were awarded nation-wide, with only 16 in California. Renata works with Professor Haibo Yu while Nicholas works with Professor George Becker.

<https://ucrtoday.ucr.edu/53282>

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## **Research News**

### **Prototype Shows How Tiny Photodetectors Can Double Their Efficiency**

UC Riverside research led by Professor Nathan Gabor invokes quantum mechanical processes that occur when two atomically thin materials are stacked together.

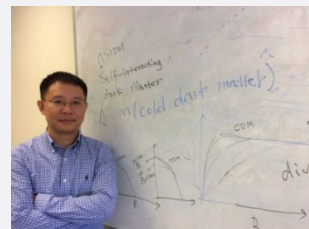
<https://ucrtoday.ucr.edu/49282>



### **Physicists Offer Explanation for Diverse Galaxy Rotations**

A UC Riverside-led study led by Professor Haibi Yu invokes intriguing self-interacting dark matter theory.

<https://ucrtoday.ucr.edu/48870>



### **Scientists Get Best Measure of Star-forming Material in Galaxy Clusters in Early Universe**

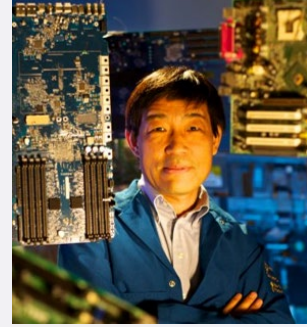
The international SpARCS Collaboration, based at UC Riverside and led by Professor Gillian Wilson, has made the best measurement yet of the amount of fuel available to form stars in clusters of galaxies in the early universe.

<https://ucrtoday.ucr.edu/48292>



## Research Accelerates Quest for Quicker, Longer-lasting Electronics

UC Riverside research led by Professor Jing Shi leads to magnetic topological insulators well above room temperatures.  
<https://ucrtoday.ucr.edu/47247>



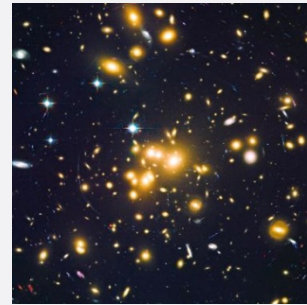
## Physics, Photosynthesis, and Solar Cells

Researchers led by Professor Nathan Gabor combine quantum physics and photosynthesis to make discoveries that could lead to highly efficient, green solar cells.  
<https://ucrtoday.ucr.edu/42499>



## Large Numbers of Dwarf Galaxies Discovered in the Early Universe

A UC Riverside team of astronomers led by Professor Brian Siana has discovered a large number of dwarf galaxies in the early universe by using the gravitational lensing phenomenon, completing an important census of star-forming galaxies.  
<https://ucrtoday.ucr.edu/42353>



## Do Extremely Reddened Quasars Extinguish Star Formation?

A UC Riverside team of astronomers led by Professor Fred Hamann has linked extremely reddened quasars to strong galactic outflowing winds that inhibit star formation in the early universe.  
<https://ucrtoday.ucr.edu/42119>



## Using Oxygen as a Tracer of Galactic Evolution

Results from a team led by Professor Bahram Mobasher help explain how the properties of oxygen in the early universe affect the evolution of galaxies through time.  
<https://ucrtoday.ucr.edu/40554>

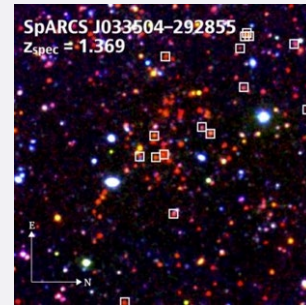




## Cosmic Neighbors Inhibit Star Formation, even in the Early-universe

An international team led by Professor Gillian Wilson has collected a sample of data that provides the best measurement yet of when and how fast galaxy clusters stop forming stars in the early universe.

<https://ucrtoday.ucr.edu/39251>



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## Outreach

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### Physicists Win Two Awards at Science Hack Day

UC Riverside scientists led by Professor Flip Tanedo won the “Best in Show” and “Most Whimsical Hack” awards at the eighth-annual “Science Hack Day: San Francisco.”

<https://ucrtoday.ucr.edu/49505>

### Professor Leads Local High School Students in an International Particle Physics Masterclass at UCR

Students from Murrieta Valley High School, Centennial High School (Corona) and Sage Hill High School (Newport Beach) visited the Department of Physics and Astronomy in March 2018 to participate, under the tutelage of Professors Bill Gary and Owen Long, in the International Particle Physics Masterclass.

<https://ucrtoday.ucr.edu/52358#masterclass>

### Public Invited to View ‘Super Blue Blood Moon’

The Physics and Astronomy Department hosted a free public observation of the January 31, 2018 event.

<https://ucrtoday.ucr.edu/51227>

### UC Riverside overwhelmed by about 2,000 eclipse watchers

About 2,000 people crowded around UC Riverside’s bell tower to squint through a telescope at the partial solar eclipse on August 21, 2017.

<https://www.pe.com/2017/08/21/uc-riverside-overwhelmed-by-about-2000-eclipse-watchers/>

### UCR Physics and Astronomy at the Long Night of Arts & Innovation

The Physics and Astronomy Department participated in this year’s Night of Arts & Innovation in downtown Riverside. The event brings science to a broad audience in the form of hands-on experiments and direct interaction between active research scientists and the public. At this year’s event, Professors Igor Barsukov, Boerge Hemmerling, and Flip Tanedo, with a strong support team of UCR graduate and undergraduate students, demonstrated novel experiments in spintronics, diamagnetism, and liquid nitrogen to hundreds of onlookers. A special feature was a microscope made from nothing but paper.

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[\*\*Photos from Physics and Astronomy graduation, June 16, 2017\*\*](#)

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## **In Memoriam**

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Professor Steve White, UCR professor of physics from 1967 until his retirement in 1992, passed away April 8, 2018 at his home in Santa Barbara. He was 97 years old and lived a very full life. Those of us who knew Steve will always remember his great charm, forthright personality, intelligence, and integrity. He was a very distinguished scientist who made significant contributions to our understanding of the Earth's radiation belts and to gamma ray astrophysics. He will be greatly missed. An obituary can be found here:

<http://cnas.ucr.edu/robertstephenwhite.html>

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## **Invitation to the 2018 Physics and Astronomy Recognition Day**

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On behalf of the Department of Physics and Astronomy at UCR, I would like to cordially invite you and your family to our 2018 Department Recognition Day on Saturday, June 16th. For those attending the undergraduate commencement ceremony in the morning, our day will begin with light refreshments at 10:30 a.m. in the Patio in front of the Physics building. Undergraduate, graduate students and their families are invited to attend lunch in the Physics Reading Room at 12:00 p.m. Our award recognition ceremony will be in Winston Chung Hall 138, from 1:00-3:00 p.m., and a reception will follow the award ceremony. I hope that you and your family can join us and celebrate this joyous occasion.

Our special keynote speaker is our alumnus, Anson D'Aloisio, '05, Asst. Prof. of Physics. Our recognition day will feature short research talks by our Ph.D. candidates, posters by our undergraduate researchers, and departmental awards and recognition of other awards, and individual recognition of all degree recipients (BA, BS, MSc, Ph.D.). This is a wonderful event for students and their parents to be recognized and to meet the faculty.

Please send an RSVP to [physics@ucr.edu](mailto:physics@ucr.edu) and let us know the total number of guests you are bringing.



***The Department of Physics and Astronomy***

*at the*

***University of California, Riverside***

*cordially invites you to attend the*

***Graduation Recognition Ceremony***

honoring the Candidates for the Bachelor of Science, Master's and Doctoral Degree

Awards to be Given

Robert L. Wild Family Scholarship Award for Outstanding Achievement by a  
1st Year Undergraduate Student

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Michael Devirian Award for Outstanding Achievement by a  
2nd Year Undergraduate Student

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Michael Devirian Award for Outstanding Achievement by a  
3rd Year Undergraduate Student

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Benjamin C. Shen Memorial Award for Outstanding Achievement by a  
Senior Undergraduate Student

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The Poe Memorial Scholarship Award for Outstanding PhD Graduate

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Recognition of Outstanding Teaching Assistants

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Benjamin C. Shen Memorial Award for Outstanding Achievement by a  
1st Year Graduate Student

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Anne Kernan Award for Outstanding Junior Graduate Student Researcher

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Anne Kernan Award for Outstanding Senior Graduate Student Researcher

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AI Staats Award for Exceptional Skills in Designing and Building Physics Apparatus

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***Saturday, June 16, 2018***

***10:30 a.m. – 3 p.m.***

***Please RSVP the number of attendees by June 11 to: [physics@ucr.edu](mailto:physics@ucr.edu)***

***3035 Physics Building Reading Room - Light Lunch will be served  
Award Ceremony, Chung Hall 138 & Reception will follow the Ceremony***

*Directions at the kiosk, main entrance  
Use parking lot 13- Parking permits will not be required*

This email was sent by:

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