UCR PHYSICS & ASTRONOMY

Newsletter, Spring 2020

Give Now LIVING THE PROMISE THE CAMPAIGN for UC RIVERSIDE

A continued rise to prominence

Greetings from the UC Riverside Department of Physics and Astronomy and from a campus enduring a quarter like none before. In this time of global pandemic, we send you our sincere wishes for your safety, health, and well-being !

UCR Physics and Astronomy by the Numbers:	
Faculty:	45
Undergraduate students:	172
Graduate students:	155
Bachelor degrees awarded in 2019:	40
Ph.D degrees awarded in 2019:	21

Because of the COVID-19 threat, the university has been closed since March 14. The health crisis escalated quickly and, with a few days notice only, the faculty needed to move Winter Quarter final exams online. Then, over a hectic Spring Break, course curricula were revised and procedures quickly implemented so that mandatory remote instruction for the Spring Quarter could begin. Since then, the faculty have been coping as best they can, exchanging information and sharing experiences to develop best practices for the online instruction. The remote instruction has been a challenge for faculty and students alike, with issues such as failures in wireless connections and videoconference software. We have needed to learn how to protect ourselves against disruptive “zoom bombing” by people from outside UCR. A still-evolving issue is how to best proctor exams in the online environment. Most students and faculty would sorely like to return to campus. Nonetheless, at the time of this writing, it seems likely that remote teaching will continue into the Fall Quarter, at least for large classes.

This is our annual newsletter, sent out in the Spring to our former students, retired faculty, and other supporters and friends. For the 2019-2020 academic year, we were pleased to welcome a new faculty member: Professor Miguel Arratia. We now have 45 faculty members, similar to physics and astronomy programs at other UC campuses. Professor Arratia earned his Ph.D. at the University of Cambridge in the UK. He joins us from a postdoctoral position at the Lawrence Berkeley National Laboratory. His research is in experimental nuclear physics, in particular the physics of the upcoming electron-ion collider (EIC) to be constructed at the Brookhaven National Laboratory. The EIC is a major international facility and the next “big thing” in the field. It is expected to resolve long-standing issues in nuclear physics such as how the mass and spin of the proton arise from its underlying constituents. Working with our other nuclear physics faculty, Professor Arratia positions the Department to be a major contributor to the EIC.

The last few years have seen a large increase in the number of undergraduate physics majors at UCR. With enrollments above 60, our junior-level courses have outgrown classrooms in the Physics Building and must now meet elsewhere on campus. Nonetheless, student-to-instructor contact and in-class discussion and interaction remain the norm. Undergraduate student retention and opportunities for

undergraduate research remain amongst our highest priorities. Our Physics 39 course, “Adventures in Physics”, and 8-unit Physics 41 course, “Introductory Physics for Physics Majors”, have proven to be very successful at creating a sense of community for incoming freshman, at retaining them in the program, and at preparing them for upper-division work.

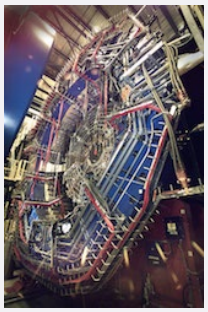
Because of health precautions, the Department graduation ceremonies will be held online this year. It will be a new experience for all of us. The ceremonies are planned for Saturday June 13, beginning at 2 p.m. All of you are invited. A formal invitation with instructions on how to connect via zoom will follow in a separate email. For those who do not wish to use the zoom software, there will be a utube stream. The keynote speaker will be Ray Orbach, Chancellor of UCR from 1992 to 2002 and now at the University of Texas at Austin. Each graduating student will be individually recognized, and undergraduate and graduate awards will be given. We will sorely miss seeing friends and alumni in person and meeting the graduating students' families. Nonetheless, we expect it will be a joyful and celebratory event. We hope you will be able to join us via zoom on June 13.

Best wishes to all and stay safe !
Ken Barish
Chair and Professor, UCR Physics and Astronomy

Recent Awards and Honors

Professor Ken Barish named deputy spokesperson for major international experiment

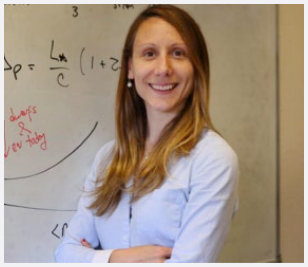
Professor Ken Barish, chair of the UCR Department of Physics and Astronomy, has been appointed one of two deputy spokespersons of the STAR experiment at the Brookhaven National Laboratory.
https://insideucr.ucr.edu/awards/2020/05/18/physicist-named-deputy-spokesperson-major-international-experiment-brookhaven



Professor Boerge Hemmerling to lead multi-campus effort on scalable quantum computing

The project also involves researchers from UC Berkeley, UCLA, UC Santa Barbara, and the Lawrence Berkeley National Laboratory.
https://news.ucr.edu/articles/2020/03/05/quantum-leap-quantum-computing

Professor Laura Sales wins NSF career award



The prestigious award, worth $720,000, will fund her study of the distribution of dark matter in dwarf galaxies.
https://www.eurekalert.org/pub_releases/2020-02/uoc--nca020320.php

Professor Michael Mulligan receives grant to study strongly interacting condensed matter systems

The grant, from the US Department of Energy, will fund research on emergent behavior that appears when electromagnetic forces inside materials become very strong.
https://physics.ucr.edu/news/2019/07/30/grant-physicist-gives-study-strongly-interacting-systems-boost

White House honors Professor Nathan Gabor with early career award

The Presidential Early Career Award for Scientists and Engineers is a highly prestigious honor.
https://insideucr.ucr.edu/awards/2019/07/09/white-house-honors-two-ucr-professors-early-career-award

Professor Joshua Lui wins a 2020 NSF career award

The five year grant is for a proposal entitled “Controlling unconventional interactions between 2D excitons and novel quantum excitations.” A campus press release is under preparation.

Research News

Professors Laura Sales and Haibo Yu test models of self-interacting dark matter

The studies, based on the nearby Draco and Fornax dwarf galaxies, show that models with self-interacting dark matter better describe the data than prevailing models, which do not allow self interactions.

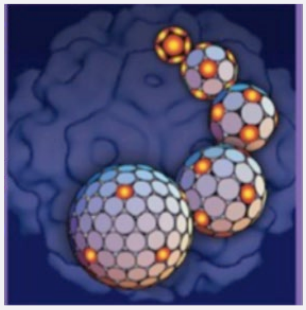
https://news.ucr.edu/articles/2020/04/15/satellite-galaxies-milky-way-help-test-dark-matter-theory

Professor Peng Wei obtains evidence for Majorana fermions

The results have implications for the field of quantum computing.
https://news.ucr.edu/articles/2020/04/10/first-sighting-mysterious-majorana-fermion-common-metal

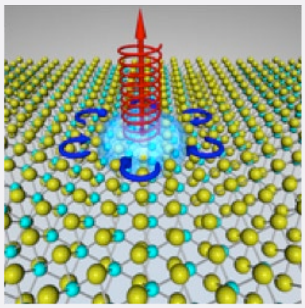
How a virus forms its symmetric shells

A UCR team led by Professor Roya Zandi has made progress in understanding how spherically shaped viruses form, information that can aid attempts to block viral replication and infection.
https://news.ucr.edu/articles/2020/03/09/how-virus-forms-its-symmetric-shells



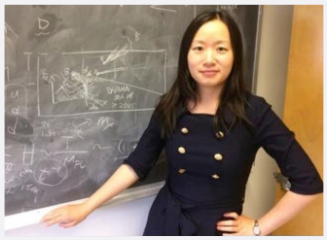
New insights into the properties of valley semiconductors

Professor Joshua Lui has presented results on novel two-dimensional materials, with possible implications for the next generation of nanotechnology.
https://physics.ucr.edu/news/2020/05/14/observation-intervalley-transitions-can-boost-valleytronic-science-and-technology



Professor Yanou Cui presents results on boosted dark matter

Two recent publications, performed in the context of the large international DUNE neutrino experiment, focus on models in which—unlike the conventional paradigm—dark matter can be relativistic, namely moving at speeds comparable to the speed of light.
https://insideucr.ucr.edu/stories/2020/02/26/major-neutrino-experiment-yields-new-publications



Monster galaxy in very early universe discovered

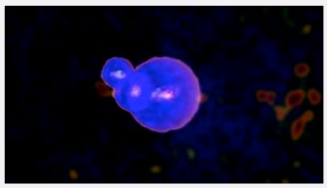
The result, from Professor Gillian Wilson's group, challenges the conventional model of how stars in galaxies formed in the early universe.
https://news.ucr.edu/articles/2020/02/05/astronomers-discover-unusual-monster-galaxy-very-early-universe

Detection of very high frequency magnetic resonance could revolutionize electronics

A team led by Professor Jing Shi has discovered a way to detect ultrahigh-frequency electromagnetic waves.
https://news.ucr.edu/articles/2020/01/27/detection-very-high-frequency-magnetic-resonance-could-revolutionize

Astronomers find farthest galaxy group ever observed

A team led by Professor Bahram Mobasher contributed to the discovery.



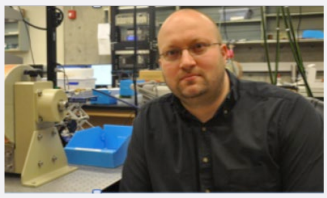
https://insideucr.ucr.edu/stories/2020/01/13/astronomers-find-farthest-galaxy-group-identified-date

Gamma-ray laser moves closer to reality

Professor Allen Mills is attempting to develop a positronium atom laser beam, with possible applications to quantum computing.
https://news.ucr.edu/articles/2019/12/05/gamma-ray-laser-moves-step-closer-reality

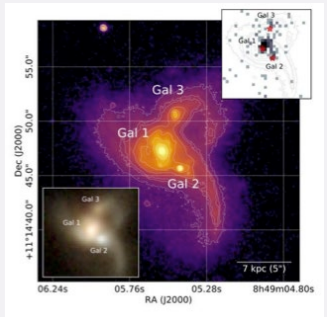
Small magnets reveal big secrets

An international team led by Professor Igor Barsukov has identified a process in electron spin dynamics with possible implications for medicine and quantum computation.
https://news.ucr.edu/articles/2019/10/24/small-magnets-reveal-big-secrets

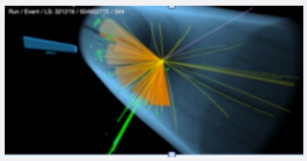


Astronomers discover triplet of black holes on collision course

Professor Gabriela Canalizo and her group contributed to the results, which might help to better understand the dynamics of black hole mergers.
https://news.ucr.edu/articles/2019/09/23/astronomers-discover-triplet-black-holes-collision-course



Professors Bill Gary and Owen Long present results for dark matter search at the Large Hadron Collider



The study is based on data collected with the Compact Muon Detector experiment at the CERN Laboratory in Geneva Switzerland.
https://insideucr.ucr.edu/stories/2019/08/23/physicists-present-results-updated-search-new-invisible-particles

Outreach

Simple experiment explains magnetic resonance

UCR undergraduate physics students, working with Professor Igor Barsukov, designed a table-top experiment for high schools and colleges.
https://physics.ucr.edu/news/2019/12/05/simple-experiment-explains-magnetic-resonance

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

UCR undergraduate students presented demonstrations in physics and astronomy at the annual downtown Riverside event.
https://physics.ucr.edu/news/2019/10/21/ucr-physics-and-astronomy-long-night-arts-and-innovation

UCR's FIELDS program brings students to NASA's Jet Propulsion Laboratory for summer internships and future employment

A record number 22 UCR undergraduates participated this past summer. A previous participant, Brittany Seto, now works at JPL.
https://news.ucr.edu/articles/2019/08/06/out-world-alumnas-dream-comes-true

Campus celebrates the 50th anniversary of the moon landing

The event, held July 11, featured telescope viewings organized by the Department of Physics and Astronomy.
https://physics.ucr.edu/news/2019/07/08/campus-celebrate-50th-anniversary-historic-moon-landing

Girl Scouts visit campus to get a dose of physics and astronomy

The visit was arranged by Professor Vivek Aji, whose daughter is a girl scout.
https://physics.ucr.edu/news/2019/05/03/girl-scouts-get-good-dose-physics-and-astronomy

NASA-funded program to train K-12 students in STEM fields

The program, managed by Professor Bharam Mobasher, was awarded $320,000.
https://physics.ucr.edu/news/2019/04/08/new-nasa-funded-program-train-k-12-students-stem-fields-outreach-components-include

Photos from Physics and Astronomy graduation, June 15, 2019

In Memoriam

Emeritus Professor Anne Kernan, UCR Professor of Physics from 1968 to 1994, passed away at age 87 on May 11, 2020. She had retired to Danvers, Massachusetts before moving four years ago to Panama City Beach, Florida. Anne was a remarkable person and a pioneering woman physicist. She held major leadership positions at UCR, serving as chair of the Department of Physics from 1973 to 1976 and as Dean of the Graduate Division and Vice Chancellor for Research from 1991 until her retirement. She was the Faculty Research Lecturer in 1984. Following her retirement, she held leadership positions at the American Physical Society and donated funds to establish the Anne Kernan Endowment, which is used to support annual graduate student awards in the Department of Physics and Astronomy. Those of us who knew her remember her kindness, her keen grasp of issues, her strong leadership abilities, her good judgment, her strong concern for students, and her first-rate talents as a physicist. She will be greatly missed. An In Memoriam from the University can be found here:
https://cnas.ucr.edu/news/2020/06/01/memory-anne-kernan

An obituary from the Irish Times can be found here:
https://www.irishtimes.com/opinion/anne-kernan-obituary-trailblazing-irish-physicist-1.4264877

Invitation to the 2020 Physics and Astronomy Graduate Recognition Ceremony

On behalf of the UCR Department of Physics and Astronomy, we cordially invite you to our 2020 Department Graduate Recognition Ceremony, to be held Saturday June 13 starting at 2 p.m. Because of the COVID-19 threat, the ceremonies will be held online. The keynote speaker will be Ray Orbach, Chancellor of UCR and UCR Professor of Physics from 1992 to 2002, Director of the Office of Science at the US Department of Energy from 2002 to 2009, and now at the University of Texas at Austin. A tribute to Emeritus Professor Anne Kernan will be given by UCR Professor of Physics and Nobel Prize winner Barry Barish. Further details, including information on how to connect through the zoom videoconference platform, will be sent in a separate email. There will also be a utube stream. It should be a wonderful event for the graduating students and their families and we hope you will be able to attend.

The Department of Physics and Astronomy

at the

University of California, Riverside

cordially invites you to attend the

Department Graduation Recognition Ceremony

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

Awards to be Given

Robert L. Wild Family Award—Outstanding 1st Year Undergraduate Student

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R. Stephen White Endowed Fund for Physics Award—Outstanding 2nd Year Undergraduate Student

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R. Stephen White Endowed Fund for Physics Award—Outstanding 3rd Year Undergraduate Student

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Brown Williams Undergraduate Student Award—Outstanding Senior Undergraduate Student

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Outstanding Teaching Assistant

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Albert Staats Award for Exceptional Skills in Designing and Building an Apparatus

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Benjamin C. Shen Memorial Award—Outstanding 1st Year Graduate Student

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Benjamin C. Shen Memorial Award—Outstanding Junior Graduate Student Researcher

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Anne Kernan Award—Outstanding Senior Graduate Student Researcher

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Robert T. Poe Memorial Scholarship Award for Outstanding PhD Graduate

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Saturday, June 13, 2020, 2 p.m.
(to be held online; details to follow in a separate email)

This email was sent by:
University of California, Riverside
College of Natural & Agricultural Sciences
Department of Physics and Astronomy
900 University Avenue
Riverside CA 92521