



California State University, Long Beach
Department of Physics and Astronomy
2018-2019 Newsletter

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2019 PhysTEC Open House



Professor Chuhee Kwon's Research Group



2018-19 APS Bridge Program Cohorts

The Year in Review

Dr. Andreas Bill



Dear Colleagues, Alumni and Friends of the department,

This academic year has been lively! Packed with achievements, challenges, new events and positive outcomes! This is also my third year as chair of the department. So, this year in review is longer than usual and ends with a look back at the past three years and the future.

The newsletter presents a thriving department with activities that you are part of, or can be! Our achievements are not only the hard work of students, staff and the faculty, but also the

support of our college and the commitment of our alumni and friends. As a Chair, I am grateful to each person who contributed in one way or another to the achievements described in the following pages.

Some highlights! After a careful search led by Dr. Chuhee Kwon, the department hired Dr. Alexander (Alex) Raphael Klotz. He will join the department this coming Fall 2019. Alex is an experimental physicist with an original approach to physics: he uses living matter to study physical properties of polymers. He is thus an interdisciplinary hire bridging physics, biology and chemistry. More about him will be presented in next year's newsletter.

In the Fall 2018 Google Inc, reached out to us through one of their physicists, Dr. Josh Mutus. Google Inc is interested to invest in activities and initiatives that improve the number of underrepresented minorities who obtain a physics degree and join the workforce. Dr. Mutus contacted us and came to give a colloquium talk entitled "What we're up to at the Google quantum hardware lab". As a result of this nascent relationship one of our graduate students, Ryan Reno (BS 2018), is now working in the group of Prof. Ojeda-Aristizabal, was chosen after several interviews to do a summer internship at the Google Quantum Information Group in Santa Barbara. More will be said in next year's Newsletter.

We are particularly grateful to have received funding from an anonymous donor to start a Physics Distinguished Lectures Series. This letter presents two prominent lecturers of the series. More on the Distinguished Lecturers can be found in this newsletter.

This newsletter reports on the department's first scholarship and assistantship award dinner to honor students, their families and donors of our three named scholarships, four endowed scholarships, and a named summer research assistantship. Through the generosity of our donors, and some departmental support, we could provide scholarships and assistantships on a competitive basis for 7 undergraduates and 9 graduate students. A major time of the scholarship and assistantship dinner was the awarding of the first three endowed Luke scholarships. You will remember that last year's newsletter described Professor emeritus Keung Luke's three newly endowed scholarships. This letter presents the first K. Luke Scholarship recipients! The department is grateful to all those who committed funds for this additional educational experience.

Our undergraduate and graduate advisors tell you in this letter that our department had the largest graduating class ever! 44 BS/BA and 19 MS degrees in physics.



**Joe Day, Graduate Alumnus,
2010**

Noteworthy is also the organization by Dr. Chuhee Kwon of two invited sessions at the APS March meeting in Boston: One entitled “Live long and prosper as physicist, innovator, and entrepreneur” and the other “Launching a successful career as a physicist”. Among the prominent invited speakers was one of our alumni, Dr. Joseph Day (now working for Bridgewater Assoc.); he spoke on “The value of curiosity”. Like last year, we were also fortunate to have a faculty member from another institution spending a sabbatical semester at the department. Dr. Lee Loveridge from Pierce College worked and published with Dr. Thomas Klaehn. We very much welcome such initiatives as they provide faculty and students a collaborative experience beyond the department’s standard offerings.

Some challenges! This year, three of our faculty members (Drs. M. Peterson, G. Pickett and Z. Papp) were on a much deserved and needed sabbatical for a semester or a year. In addition, one faculty was on medical leave. Because of the otherwise chronic severe shortage of tenure and tenure track faculty the department came under extreme pressure. It is good news that we welcome a new faculty for the fall 2019 but we are still short of about three faculty members for sustaining the successes and providing a healthy environment for students and faculty. We have less tenured and tenure track faculty than most comparable universities (even within the CSU) both in terms of the number of faculty members per number of majors and number of faculty per students served. Unlike many comparable institutions, over 90% of our MS students do a Master’s thesis. The past 10 years have provided overwhelming evidence for the thesis route as it provides our students with quality education that leads them to successfully transition to highly qualified and well-paid industry and teaching jobs, or a successful entry *and* retention in highly ranked PhD programs across the nation. It would be great if the institutional support of our department would match these efforts and successes.

In this context, the demands on our program continue growing. This past year, we started offering two sections of our first upper division class Analytical Mechanics (PHYS 310) and each section had over 20 students. This was not only necessary for our own students but was also the result of a request from the department of Mathematics.

We acknowledge the untimely loss of Kent Merryfield, a dear colleague from the department of Mathematics. We mourn his passing with his family and the department of Mathematics. Our department had a special connection to Kent because he was the Mathematics undergraduate advisor who knew what our students need and was able to resolve issues related to sequences of classes; one of his suggestions was to offer a section of PHYS 310 each semester, which was implemented this year. Kent’s presence and knowledge will be missed.

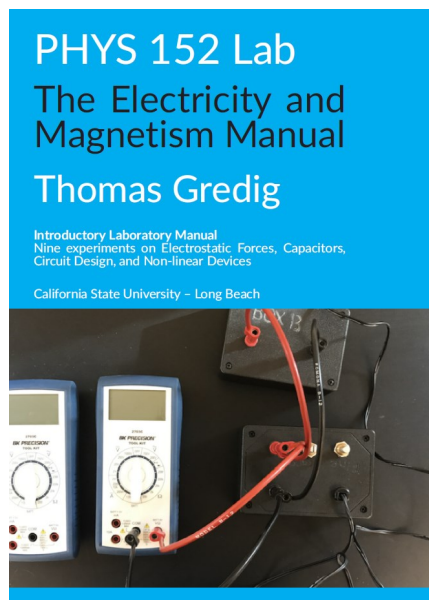
It is both with pride and heartache that we congratulate one of our MS alumni (2014), Jessica Asbell, who was hired this year as a tenure track faculty at the Orange Coast Community College. As a lecturer in our department she implemented the redesign of the Astronomy laboratory ASTR 100L and developed the upper division astronomy course “Planetary Environments” ASTR 370. Fortunately for us, she will continue teaching the latter class for our department and take care of the “Nights at the Observatory.”



**Lecturer, Jessica
Asbell ,setting up for solar
viewing**

Jessica Asbell is one of several recent examples of the department's work to increase and improve the physics teaching offering in community colleges and high schools. The effort of the local PhysTEC initiative is bearing fruit. Quite a few BS and MS students are now physics teachers in nearby high schools but also part-time lecturers in surrounding community colleges.

This is my third year as chair. In the Spring 2019 I have been elected for another three years. I am grateful to the department, the dean and the administration for their trust and support! This letter is a good opportunity to look back at the past three years and look ahead at the next three years. Many of the department's activities and achievements during my first term are summarized in this and the previous two newsletters. Here I wish to point out only a few changes and improvements that were not mentioned in the newsletters.



**Redesigned manual for PHYS 152,
created by Dr. Thomas Gredig**

During the first term I led two task groups, the 100-laboratory task group and the computational physics task group. The first group dealt with an issue the department struggled with for many years, namely the redesign of all our lower division undergraduate laboratories. The task group oversaw the redesign of the various labs and we gratefully obtained support from the provost and the dean to undertake some of the changes. The underlying motivation in the redesign is to move from a “cookbook-like” laboratory to a format that mimics scientific investigation and problem solving approaches. This new format engages students in the thought process and teaches them methodologies and activities that relate to what students will actually do once in industry, teaching or PhD programs. The endeavor is ambitious and is a substantial effort. So far, we completed the redesign of the Astronomy laboratory 100L and the PHYS 152 laboratory (Electricity & Magnetism). We are on the way to redesign the PHYS 100A lab (General Physics A), and the PHSC 112 lab (Intro to Physical Sciences). During my second term we will redesign the PHYS 151 and PHYS 100B laboratories.

The computational physics task group worked on developing a vision of the field for the department and how it relates to the other thrusts of physics, namely experimental, theoretical and professional physics. In this context, the group gathered ideas and documentation to have computational physics recognized as an option of the Master's program. This option has been implemented and developed over the past 11 years and about half of our students choose that path. The task group formalized that path. The proposal will be discussed and hopefully accepted next year by the University. Participating in various workshops and reading reports from the APS reveal that the teaching of computational physics for undergraduates is necessary but challenging. The need is recognized by all, but there is no consensus on how to introduce computational tools for physicists at the undergraduate level. The next three years will be devoted to think about that and develop a cohesive sequence of courses that teaches computational skills focused on the needs of physicists.

As part of the continued development of the physics program several new classes were taught. For example, the new Experimental Methods in Nanoscale Physics class of C. Ojeda-Aristizabal or the Data Science for the Physical Sciences taught by D. Benveniste. With the hiring of faculty on interdisciplinary topics several new courses will be developed in the near future. We will also continue working on a healthy balance between core courses and various electives to respond to the needs of our students and the workforce.

In the context of Beach 2030 to develop the University of the future our faculty members were also involved in a variety of activities and initiatives.

Finally, my first term as chair has seen quite substantial changes on the administrative side, both in personnel and leadership. At the college level we have a new dean, which brings opportunities and challenges for the department; overall a good experience so far. At the department, our administrative coordinator, Irene Howard, retired after 39 years of loyal services to the department. The office may seem the same to those who visit, but the way we operate has been modified drastically (paper to electronic documents, new technologies such as LinkedIn, twitter and soon Instagram). The department office greatly benefited from the impactful short term of Nicole Torres. Today, we are glad to have Korin Coombs and Lisa Dignadice run the department office smoothly and continuing to make improvements to the way we do business.

During my first term, we adjusted to the funding changes and substantial cuts imposed on the department. We also adapted to a complete change of the way scholarship applications are received, assessed and distributed. These tasks now occur under the umbrella of Beach Scholarships.

The department was fortunate to receive important support from alumni and former faculty members. This led to organize the very first Scholarship & Assistantship Dinner presented in this newsletter.

On a more personal note, one of the activities I particularly enjoy is to work with students on their research for their Master's degree thesis and collaborate with students, alumni and colleagues from other institutions to publish the fruit of our research. This activity is the reason I work at the University, and our mission as faculty members: scholarship and teaching; these remain the most interesting and important activities of a professor. I look forward spending some time at UC Santa Barbara as a 2019-2021 KITP scholar to continue the research and find new, relevant projects for students. My four years on the chair line of the Far West Section of the American Physical Society also kept me in touch with colleagues and work on the needs of the national and international physics community.

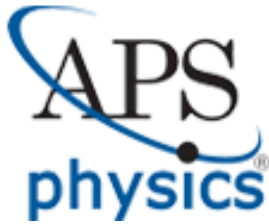
During the next term we will finish the redesign of the lower division laboratories and see the computational physics option officially in the books. We will also work on the computational physics sequence, and develop new programs for our undergraduates. I hope that with new faculty hiring we will be able to better reach out to Community Colleges, high schools and middle schools. Three of our faculty members (Dr. Gredig, Dr. Jaikumar and Dr. Ojeda-Aristizabal) volunteered this past year for such events, but a more regular and organized, turn-key-format outreach activity will be developed. We will also expand the Learning Assistants program to better assist and improve our upper division courses. We will teach new classes in biophysics and polymer physics and renew the teaching of particle physics. We will hire new faculty members. Our faculty members were also active and productive in research, publications and grant writing; this will be further promoted as it benefits the University at all levels. A range of new initiatives are on the way. Expect more innovations and milestones reached by our department the next few years!

As always, I hope to hear from you and enjoy welcoming you in person at the department. CSULB Physics is a great community.

Keep in touch!



The Department is in the News!



PHYSICS TODAY

EdSource

This year the department has drawn the attention of the national physics community. We appeared high up in American Physical Society (APS) statistics (table below). Our department faculty members were also interviewed for two articles. One is an article by Diana Lambert entitled “Plan to expose all students to physics missing one element – teachers” in the July 2019 issue of EdSource. The other is an article by Toni Feder entitled “A physics master’s degree opens doors to myriad careers” in the March 2019 issue of Physics Today. [Phys. Today **72**, 4, 22 (2019)].

The APS ranked all US institutions with a physics department by highest number of physics degree granted. Among Master’s degree institutions, averaging over the years 2015-2017 CSULB Physics appears prominently.

Category	Average number or percentage of degrees awarded per year	Ranking (among all MS degree institutions)
Undergraduate physics degrees	40	1
Fraction of women obtaining an undergraduate physics degree	27%	1
Master's physics degrees to under-represented minorities (URM)	4	1
Master's physics degrees	14	2
Undergraduate physics degrees to URM	17	2
Fraction of women obtaining a Master's degree	19%	7

Remarkably, our department is the only one that appears in all categories. We are on the way to continue improving these statistics!

First Annual Scholarship and Assistantship Awards Dinner



Assistantship recipients at the First Annual Scholarship and Assistantship Dinner with Donors and Faculty



Scholarship recipients, Evan Phelan and Sylvia Chow, dine with Irene Howard, Bob Woodhouse, and Donor, Margaret Heeb

We hosted the very first Annual Scholarship and Assistantship Award Dinner in the Chartroom on April 25, 2019. The dinner gathered nearly 50 students, family members, and donors. It provided a great opportunity for donors and students to meet personally, and their families to be honored for their continued commitment to the success of our students. The evening put on display the strength, diversity and livelihood of the department!

The event sprouted from the generosity of several alumni and faculty over the years who have been instrumental in providing support for our students to progress towards their degree with a scholarship or an assistantship. These two forms of student support have different goals and are administered differently. Scholarships support the work of students in recognition of specific achievements. The support becomes part of their financial aid package. Assistantships support students who submitted a research proposal with a faculty member. The work is performed during the summer months when there is no financial aid and students would otherwise seek employment outside University walls that is unrelated to their studies. At this time the majority of the support offered to students is in form of scholarships, but we are hopeful that more funding will come to support students in the summer or winter break through assistantships (see later in this newsletter).



Scholarship recipients at the First Annual Scholarship and Assistantship Dinner with Donors

Distinguished Lectures Series in Physics

In 2017 the college senior development officer, Maryanne Horton, informed the department that an anonymous donor wished to support the creation of a Distinguished Lectures Series in Physics. The department was thrilled by the opportunity and grateful to the anonymous person who decided to support the education of our students and professional development of our faculty in this unique way. We very much hope the donor reads our newsletters: we express to that person our enthusiastic Thank you!

The Distinguished Lectures Series in Physics started two years ago. Each year we invite a prominent physicist who contributes in a variety of ways to the advancement of knowledge in physics and science, and to the promotion of physics in society. The lecturer gives two talks, one for the University public and one, more specialized for physicists and scientists. In addition, the lecturer meets with students and faculty members in smaller groups where they discuss the research conducted at CSU Long Beach.



In Spring 2018 we invited Dr. Craig Roberts from the Physics division of Argonne National Laboratory where he led the theory group for 7 years. Dr. Roberts published over 160 scientific papers, is a fellow of the American Physical Society and received several international distinctions. His specialized talk was titled “Cannibals in the Standard Model” and the general talk “Laying the God Particle to Rest”. While at the department, Dr. Klaehn and Dr. Papp engaged in a possible scientific collaboration.

In Spring 2019 Dr. Sophie Guéron from the Laboratoire de Physique des Solides of the Université d’Orsay, Paris France, visited us for a week. During that time, she presented a general talk on “How do Quantum Conductors Conduct?” and the specialized talk on “Probing Topological Protection of Bismuth Nanowire Hinge States”. During her visit she spent time working with Dr. Claudia Ojeda-Aristizábal and her students and met with students and faculty in smaller groups.



The visit of these outstanding scientists had a positive, empowering impact on our students and our faculty alike, though for different reasons. Students could interact with prominent scientists and talk one on one with them, as scientists and human beings, motivating them to pursue a career in physics. Faculty could find renewed energy and joy in centering their time on discussing science and collaborative projects. The department hopes very much that we will continue this meaningful and productive partnership with our donor for new fascinating Distinguished Lectures.

Visiting Faculty, Dr. Lee Loveridge

Professor Lee Loveridge from Los Angeles Pierce College spent the spring semester here at our department. It was an excellent time to let aside the teaching and focus on science. Together with Professor Thomas Klaehn he studied non-perturbative aspects of quantum chromodynamics, the theory that governs how quarks bind together into protons and neutrons. They found that a simple toy model of the gluon propagator could be used to demonstrate de-confinement, a property where quarks cannot exist as individual particles in isolation but can at high densities and temperatures. It has been a great experience having Dr. Loveridge on campus, and we look forward to working with him and other visitors in the future.



Dr. Thomas Klaehn and Dr. Lee Loveridge

Dr. Prashanth Jaikumar Awarded His Second NSF Grant



Dr. Prashanth Jaikumar was awarded a new grant from the National Science Foundation (NSF) titled "Neutron Star Oscillations as Probes of Dense Matter Properties and Phases", for 2019-2022. The grant will support Astrophysics research with students of the Department, as well as some outreach activities to high school teachers.

Since his appointment as Assistant Professor at CSULB in 2009, Dr. Jaikumar has been prolific in his research writing, publishing a total of 29 papers and conference proceedings in leading peer-reviewed journals in Physics and Astronomy. This year, three papers were published from his research group, and students Angel Benjamin Diaz, Michael Lanoye and Nina Miller graduated after completing their MS thesis. In academic year 2016-2017 Dr. Jaikumar was awarded the CSULB Distinguished Faculty Scholarly and Creative Achievement Award (see Newsletter 2017-18).

His students have exemplary achievements in their budding research careers. Five of Dr. Jaikumar's MS students have gone on to pursue/receive their doctorate in Physics.

The new NSF grant comes on the heel of a previous NSF award in 2016, from the Research Corporation for Science Advancement (PI), NASA Graduate Student Fellowship (PI) and the U.S. Army High-performance Computing and Research Center (Co-PI).

Congratulations to Dr. Jaikumar on receiving this new NSF grant!

What's Next After Department Chair?

Dr. Chuhee Kwon



The role of a chair includes many responsibilities, activities and services that are rather different from those of tenured and tenure-track faculty. Returning to teaching and research is not an easy step! For that reason, a sabbatical is important and provides the necessary time and freedom to define new goals and new projects. Chuhee Kwon came back recharged from her difference-in-pay leave in AY 2016-17. She has initiated a couple of new research projects and is developing initiatives with colleagues from other departments to improve success paths for students from groups of the population that did not receive much attention in the sciences and mathematics.

On the research side, Chuhee Kwon is interested in understanding the development of nano-magnetism in curved structures, collaborating with Dr. Jiyeong Gu. Terence Baker finished his MS thesis entitled “Magnetic Force Microscopy of Permalloy Thin Films on Nanosphere Templates” (Winter 2019), and Adriana Rincon and Mohammad Ashas are continuing the project.

The other research emphasis is a collaboration with Dr. Fangyuan Tian in the Department of Chemistry and Biochemistry. Her work deals with characterizing the topography to understand the growth process using Atomic Force Microscopy (AFM). Recently, her efforts contributed to shed light on an additional mechanism beyond the initial nanoparticle growth in a Metal Organic Framework material. This collaboration resulted in the submission of a scientific publication to the Journal of Physical Chemistry Letters and is

under review at the time this letter is written. Dr. Tian, Dr. Tapavicza from Chemistry applied with Dr. Kwon to the 2018 ORSP Internal Grant Multidisciplinary Research Grant entitled “Experimental and Computational Studies of Surface Supportive Metal-Organic Framework Thin Films for Gas Sensing”.

Dr. Kwon is also a co-principal investigator of the new NSF S-STEM grant (2019 – 2024) entitled “Mentored Excellence Towards Research & Industry Careers (METRIC)” with Profs. Chang (PI) in Mathematics, Buonora in Chemistry, and Stevens in Geology (co-PIs). This is the second S-STEM grant awarded to the interdisciplinary team. The first grant was named “Physical Sciences and Mathematics Scholarship” (2010 – 2015). As many as 44 students benefited from the latter program, and 80% of them pursued graduate degrees in their discipline, while the others obtained positions in STEM-related industries. Since leaving her chair role Chuhee Kwon also served as an executive committee member of the American Physical Society Forum on Education (2017 – 2020). She continues to be involved in the PhysTEC and the APS Bridge Programs.

On the teaching side, Chuhee Kwon redesigned the Modern Physics class and laboratory (PHYS 254, 255), renewed the curriculum and teaching of Electronics (PHYS-380) and took over the upper division quantum mechanics II class. The moto of her work in teaching these classes is to increase the personal involvement of students in their learning. For example, the laboratories are less cookbook like and more investigation based. This is in line with the department’s effort to update its teaching methods and emphases. Clearly, the difference-in-pay leave time has been an excellent investment of the University to promote new teaching, scholarly and service activities that benefit our students, department and institution.

Undergraduate Program

Dr. Jiyeong Gu



In the 2018-2019 academic year we have reached 151 majors in Physics. 44 students graduated with B.S. and B.A. degrees and were welcomed as new members of our distinguished alumni group. In the years since we introduced the B.A. pathway about 20 students completed the degree each year; hence a majority of our graduates finish with the B.S.

The growth of our undergraduate program is significant and visible in the number of students enrolled in our upper division classes. PHYS 310 (Analytical Mechanics) has now up over 50 students each year; this led us to offer a section of the class *each* semester. The classes PHYS 320 (Thermodynamics) and PHYS 340A (Electricity & Magnetism) also typically have enrollments of 35-45 students.

Since we added the new Materials Science Option to the B.S. in Physics, 3-5 physics students who graduate with this option each academic year. The number is increasing, and our bottleneck is in the number of our faculty members who can teach classes for the option. Finally, some of our students are double majors. Though each year only 1-2 complete two degrees (physics and another field), these students have performed exceptionally well.

The undergraduate program has also seen a substantial overhaul of almost all its lower division laboratories. Astronomy ASTR 100L was the first laboratory to be completely changed (the book, the software, the experiments). Jessica Asbell has been instrumental in this effort. This overhaul was followed by PHYS 152; a laboratory redesigned from ground up by Dr. Gredig. Then, Dr. Gu piloted the changes in PHYS 100A. At this time, only PHYS 151, PHYS 100B and need to be rethought and we hope to achieve this in the next few years.

Graduate Program

Dr. Prashanth Jaikumar

Our Graduate Program, already one of the top Master's programs in the Nation, continues to set new milestones. With a record 19 students graduating with the MS Physics degree, the Department demonstrated its continued commitment to student success at all levels. We celebrate the first cohort of graduates in the Master's in Professional Physics program. Anastasia Woo did her MS project at JPL and was subsequently hired by JPL. Wesley Burkhard did his MS project at Carl Zeiss Meditec AG and is now working as an Optical Engineer at the Physical Optics Corporation. Their pioneering work as students of the new degree allows us to refine the process and the offering and we expect the number of students choosing that path to steadily increase in the years to come.

As Graduate Advisor, I try to advise each student as best as I can based on his/her career ambitions, life situations and personality, all of which can evolve during his/her time here! Ultimately, my goal is to see students properly utilize their time here, and step out of the University as confident and skilled physicists. I especially appreciate the diversity of thought, being, and experience that our students bring to the Department. In addition to their academic pursuits, we expect that all our students set a good example in society by treating others with equal respect and dignity.

I am also especially grateful to our outstanding administrative staff, Korin Coombs and Lisa Dignadice, whose care and concern for the well-being of our graduate students is an invaluable asset to the Department and to the graduate program in particular. Finally, I am excited that we have a biophysicist joining our faculty this Fall, expanding the scope of research for students. To all well-wishers of the Department, I welcome your thoughts and feedback.



APS Bridge Program

Drs. Andreas Bill, Chuhee Kwon and Galen Pickett

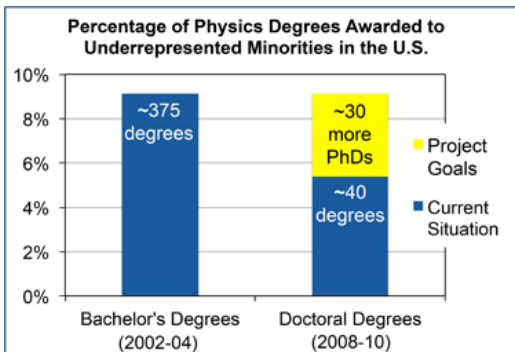


The Bridge Program of the American Physical Society (APS) at CSU Long Beach welcomed this year its sixth Bridge fellow cohort. Tommie Day, Andrew Konz and Everardo Molina joined a CSULB APS Bridge student community of 15 students over the past 5 years. 11 of them obtained their MS, one dropped out. Seven of those who got their MS degree joined a PhD program across the nation (the last two joined the Univ. of Illinois at Urbana Champaign and UC Berkeley).

The APS Bridge Program is led by Ted Hodapp and funded by the National Science Foundation. The APS chose six *sites* nationwide to develop the program. The department of Physics & Astronomy at CSU Long Beach is one of the six sites, the only non-PhD granting institution. In the past three years over 20 other institutions were added as *partner* institutions after a vetting process (see www.apsbridgeprogram.org for a complete list and description of the program).



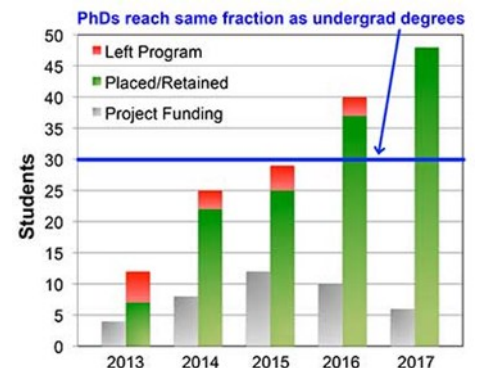
Tommie Day, Andrew Konz, Johnae Eleby, Dion Blackshire, Kevin Cano, Marc Salinas, Terence Baker



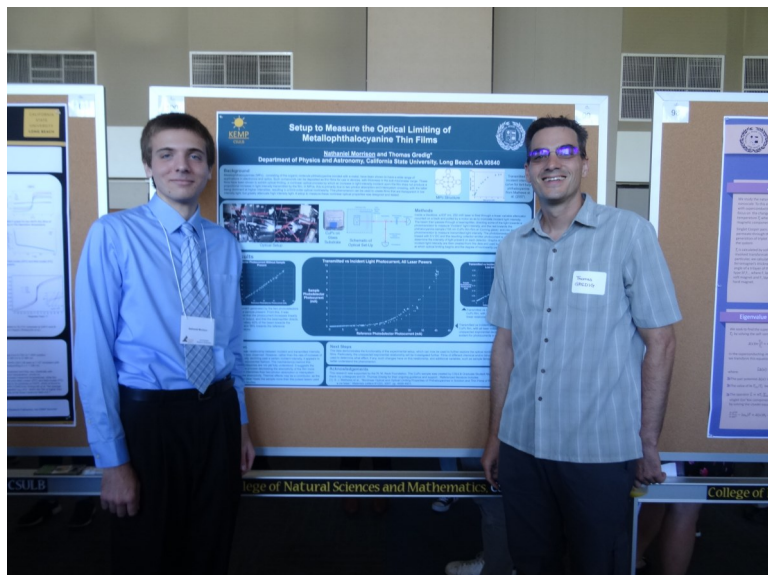
The goal and the achievements of the APS Bridge Program are summarized in the two charts (from the APS Bridge Program website). The first shows that there is a significant drop in number of graduating students from underrepresented minorities (URM) in physics who pursue a PhD in physics. The program aims at improving that transition, for example through our Master's program. The program as a whole has been very successful, as shown by the main green bars of the second chart representing the number of students who were placed and retained in PhD programs. The six bridge sites have initiated a steep upward gain of URM's who joined PhD programs, with a very modest concomitant project funding as seen by the grey bars.

Four years after its implementation, and with the significant help of the partner institutions the program has already outpassed its original goals. The main task is to sustain and continue improving this gain to have a physics PhD population that is truly representative of the population, which we are still far from achieving. The APS is also in the process of expanding the initiative to other physical sciences through the IGEN initiative (Inclusive Graduate Education Network).

As part of the bridge site status we received funds from the APS / NSF to support two new fellows each year for the first three years and some additional partial support for a fourth year. This year for the first time the department had to fund its fellows without APS support. Instead, the department agreed to use the scholarship money from an endowment provided by emeritus faculty Anfinson. In addition, CNSM Richard D. Green dean Dr. Curt Bennett and the CNSM development officer Maryanne Horton complemented the funding from College resources. The leaders of the externally funded HOGAR project also helped out during the past 4 years by providing scholarships that partially fund the tuition of our bridge fellows. We are grateful to all who provided support!



Keck Energy Materials Research and Education Program (KEMP) Dr. Thomas Gredig and Michael Peterson



Nathanial Morrison and Dr. Thomas Gredig, KEMP Co-PI



Dr. Michael Peterson, KEMP Co-PI

The Keck Energy Material Science and Education Program (KEMP) is an interdisciplinary program led by by Dr. Young-Seok Shon (Chemistry) and includes Dr. Michael Peterson (Physics), Dr. Thomas Gredig (Physics), Dr. Shahab Derakhshan (Chemistry), and Dr. Xianhui Bu (Chemistry). The purpose of the KEMP program is to provide CSULB undergraduate students an interdisciplinary educational opportunity in materials science; a major field nowadays that bridges physics and chemistry.

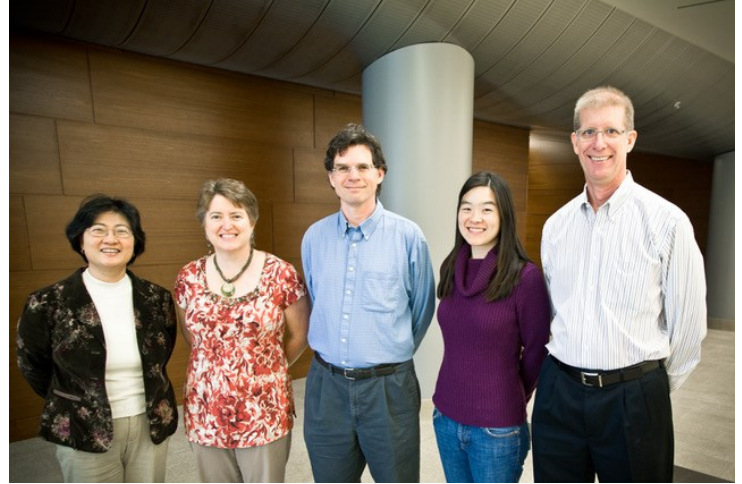
The program explicitly integrates involvement in energy-related materials research and a set of new courses in Materials Science. The program offers 300-level Materials Science courses followed by a laboratory and colloquium in Materials Science. At present, classes are well filled but only some of the students pursue the option in materials science; about 3 students complete the option each academic year. In addition, many CSULB undergraduate students work in research labs of faculty members affiliated with the KEMP program and disseminated their findings through poster presentations at the KEMP Symposium and at the annual CNSM Students Research Symposium. It is expected that the number of students choosing the Materials Science Option will grow in the years to come.

Physics Teacher Education Coalition (PhyTEC)

Drs. Laura Henriques, Chuhee Kwon and Galen Pickett



Chuhee Kwon, Laura Henriques, Galen Pickett and Rod Ziolkowski



Blast from the past! Chuhee Kwon, Laura Henriques, Galen Pickett and Rod Ziolkowski with former staff member, Angela Tuan, from the Spring 2011 semester

Now in our 9th year, the program has been very successful at engaging students to think about teaching high school physics as a valuable, fulfilling and well-paid career. These PhyTEC activities continue to bring teachers and students together for a greater educational experience in Physics. They have opened the mind of both our students and the faculty and led to a culture shift and a better perception of the profession. Students who aimed at teaching or students who joined the Master's program while teaching in a high or middle school feel accepted, supported and encouraged to pursue their passion. Some students have discovered their career while taking the PHYS 390 and PHYS 490 classes or participating in the various activities. During the past nine years, 26 students who completed a BS or an MS in physics at the department were also physics credential recipients from the department of Science Education. A good number of these students became physics teachers following their degree.

The CSULB PhyTEC project is continuing the outreach with high school physics teachers via the monthly Demo Days (second Thursday of the month) and the annual open house (in the Fall). During these events, physics teachers from surrounding school districts come together to share new and interesting ways to teach and learn physics. The monthly Demo Days also bring together physics majors who might consider teaching, prospective teachers, practicing physics teachers, college faculty and more. Highlights of the Demo Days are the engineering challenge and the Make, Take & Teach events once each semester.

We had a special treat this year with our Teacher-in-Residence (TIR), Rod Ziolkowski. Rod was our very first TIR nine years ago and he came back to be this year's TIR. So much has changed and is running smoother and it has been a pleasure to have him lead the various tasks of the PhyTEC program. He co-taught PHYS 490D – Electricity & Magnetism – and PHYS 390 – Exploring Physics Teaching with L. Henriques and G. Pickett, respectively. In addition, Rod and Laura Henriques presented new E&M demos and lab activities that were introduced in PHYS490D at the 2019 California Science Education Conference in Pasadena.

Among the new initiatives taken this past year is the creation by Drs. C.Kwon and L.Henriques of a Southern California Regional PhyTEC network. This initiative has been supported financially by the American Physical Society and aims at expanding the reach of PhyTEC. The first meeting is scheduled for the Fall 2019. The goal is to bring together the 10 CSUs in our region to enhance physics teacher recruitment and support.

Society of Physics Students (SPS)

The Society of Physics Students (SPS) is *the* undergraduate organization for those who love physics. This club has proudly served a diverse community of students who want to be involved with the physics community; anyone with a passion for physics is welcome to be a member. There have been some changes as some of our club officers have graduated. I was handed the bâton from Naomi Maruffo and Peter Santiago, who were president and vice president, respectively.

We organized several activities during the 2018-19 academic year. Next to the game nights or movie nights we also have larger events. I highlight three of them here.

In October we had an Ice Cream Social in the SPS room (HSCI-285) where we had a club bonding event and discussed potential meetings for the upcoming semester. It was a great opportunity to network and catch up with old and new students.

In March we hosted a research panel with Peter Santiago, Naomi Maruffo and myself describing the research we do and the importance of doing research as an activity beyond the classroom. We discussed the different lab mentors and what opportunities were available for students to be part of the research community.

At the end of March we also organized a Q&A lunch with this year's distinguished speaker Dr. Sophie Guéron, a renowned physicist from the University of Paris, Orsay in France.

For the 2019-2020 year, the SPS will continue hosting such unique events to encourage and inspire students to pursue physics. We plan to make a trip to the Griffiths Observatory, JPL, and perhaps join with the Astronomy Club for a weekend to observe the sky. We are also interested in participating in community outreach. It is our hope to share our love of physics with people of all backgrounds and experiences.

The SPS has a heart for young students from local schools and education centers to motivate them to join the scientific community and get excited about physics. Moreover, diversity in the community is crucial in promoting representation and inclusivity. Since physics is a collaborative endeavor, it is essential to include students from different backgrounds to stimulate diverse thought and further intellectual creativity.

Our club has a room located in the Hall of Science (HSCI-285). We aim at providing a safe environment where physics undergrads can study and hang out together. In addition, we sell food and drinks to raise club funds for our events. Our socials (game nights, movie nights etc.) also provide fundraising opportunities for future events. Our vision for the coming year is to have alumni and other physics clubs to participate in our meetings. We would like to help our members with their professional development and motivate students to pursue higher education in physics.

As always, everyone is welcome in our club room to discuss physics over a cup of coffee!



Mary Usufzy
Incoming 2019-20 SPS President

Astronomy Club and Observation Nights

Jessica Asbell and Johnae Eleby



Astronomy Club campers settle in for some amazing stargazing

Astronomy Club:

The Astronomy Club aims to foster an interest in Astronomy through community events, volunteering and club activities. In the 2018-19 academic year we have had the opportunity to travel to the Anza-Borrego State Park, the Palomar Observatory, and Joshua Tree for camping trips centered around sky observation. We have volunteered at CSULB Physics and Astronomy Department Events, such as our weekly Observatory Nights and CNSM Open House, and hosted Movie nights, showing movies like Apollo 13, The Martian, Arrival and Gravity.

We encourage active membership and participation for anyone who is interested in Astronomy. The club is not exclusive to Physics and Astronomy majors. All are welcome! For more information, please contact the new Astronomy Club President, Isaac Arriaga, through the Physics and Astronomy Department Office.

Night at the Observatory:

The department of Physics & Astronomy has for many semesters hosted observatory open-house events for the CSULB community. Spring 2019 was no exception. In addition to the now traditional “Night at the Observatory” observing sessions with Schmidt-Cassegrain style reflecting telescopes on clear weeknights, we also provided daytime solar observing with our collection of solar telescopes.

Spring 2019 was a busy semester. The department hosted hundreds of visitors to the HSCI-Rooftop observing platform. These consisted of students, faculty, campus personnel and their families. Our astronomy observing events have attracted a diverse cross-section of our campus community.

We introduced a new solar observing lab to the Astronomy laboratory ASTR 100L. We also hosted solar viewing for the CNSM Open House in July. These events have proven to be a very popular service to the CSU community. Join us during Fall 2019 for more “Nights at the Observatory.” Updates on the weekly observing are posted on Twitter. Check @CSULBPhysics.



The wonders of the universe await!

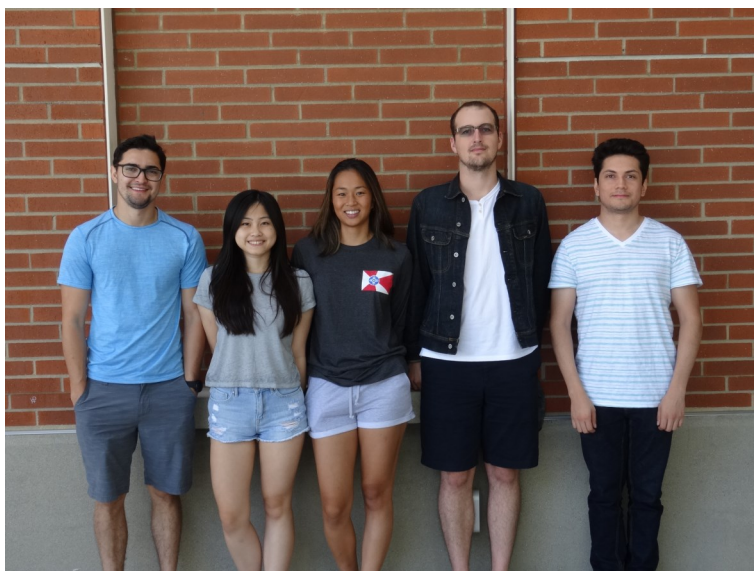
Learning Assistant Program

Dr. Galen Pickett



Dion Blackshire and Dr. Galen Pickett

The Learning Assistant Program enters its ninth year here at CSULB, with continuous support from a mixture of the American Physical Society (through the PhysTEC project) and the university (through the Highly Valued Degree Initiative). In the past year, we had 15 Learning Assistants assisting in primarily 100-level introductory courses (PHYS 151 and PHYS 152), but also in upper division courses (PHYS 310 primarily). In the Spring of 2019, Dion Blackshire oversaw the program while Dr. Pickett was on sabbatical. Dion is currently a Senior Graduate student and APS Bridge Program Fellow, and was a Learning Assistant as an undergraduate. She did an excellent job interacting with graduate TA's and LA's as they prepared for their weekly duties. The Learning Assistants provide a proven and powerful mechanism supporting the success of all physics students here at CSULB, so if you have an opportunity to support an LA in your charitable efforts, those dollars go 100% to supporting students as they support other students.



LA's: Jacob Fallon, Emily Chang, Roshel Lamug, Jean-Baptiste Faure, Isaac Arriaga

Where Are They Now?

CSULB Physics and Astronomy is committed to creating long lasting relationships with all of our undergraduate and graduate students. We are sincerely interested in staying abreast of a student's performance after receiving their degree, and the ways in which they end up applying the acquired knowledge and skills. The following are just some of the many highlights from former CSULB Physics students.



Enrique Hurtado- Grad. 2019

The thing I liked most about CSULB is how much I learned about physics and computation. While I didn't really go out much, I did enjoy the time I spent with the people at the department. Something else that was really nice was being able to work at the department and have enough free time for studying and recreation.

Currently I'm working at a defense company in San Diego as a Test Engineer. What I hope to do in the future is move on to computation or data science in industry. Maybe a few years down the road attempt a PhD in computer science.

Jean-Baptiste Faure– Undergrad. 2019

For me, the best part of the CSULB Physics experience was the approachability of the professors in the department and the invaluable mentorship and research experienced they kindly provided. I am starting my Masters of Science in Physics at CSU Fullerton this fall.



Walter Alvarado- Grad. 2017

People working together is often much more effective than that of an individual scientist working alone, which is why I believe the Physics Program at Cal State Long Beach was the ideal place for me to develop this foundational training. My experience in the program was instrumental in my development as an aspiring scientist and gave me the confidence to overcome the recurrent challenges of interdisciplinary research. I am currently a Biophysics PhD student at the University of Chicago.

Miguel Bugayong– Undergrad. 2019

My CSULB Physics experience was comforting; I never felt like I would fail no matter how hard the struggle was. I was surrounded by people that pushed me to keep on going and use my strengths to my advantage. I am now employed full-time as an engineer at Anton Paar USA.



Department Commencement 2019



The department had an impressive growth in the past eight years. In 2010 we had 50 undergraduates and 35 graduate students in the department. This academic year we had 151 undergraduates and 59 graduate students. The most impressive part though, is the graduation rate that places us number one among the CSUs and among the top Universities with a terminal MS degree in the nation (see this Newsletter). This year again, we had one of the largest graduating class ever for the department: 44 students completed their BS (over half) and BA, and 19 graduate students obtained their MS degree, all but one with a thesis.

Congratulations Class of 2019!

Congratulations to all students who obtained their degree and

best wishes of success for their future. Once in the CSULB Physics & Astronomy family, forever part of it! Keep in touch through LinkedIn CSULB Physics Group and twitter @CSULBPhysics and soon Instagram!

This year we had a few students who were honored for their achievements. Here are their names and the award they obtained.

<p><u>Graduate Dean's List</u></p> <p>Anh Nguyen</p> <p><u>College of Natural Sciences and Mathematics Awards</u></p> <p>Richard D. Green Dean's Award, Andrea Nelson Outstanding Thesis Award, Raphael Monroy</p>	
<p><u>Departmental Undergraduate Honors</u></p> <p>Calum Shelden Lizbeth Galvez Kyle Mosier</p> <p><u>Departmental Graduate Honors</u></p> <p>Josue Rodriguez Taylor Shannon Renyu Wang</p>	<p><u>Specialty & Department Awards</u></p> <p>AAPT Outstanding Teaching Assistant Award Nina Miller</p> <p>Department Outstanding Learning Assistant Award Denzel Belleza</p> <p>Department Outstanding Teaching Assistant Award Johnae Eleby</p>

Scholarships and Assistantships Recipients



Scholarship recipient, Sylvia Chow with Donor, Dr. Keung Luke and Irene Howard



Scholarship recipients, Christopher Burgess and Everardo Molina with Donor, Dr. Keung Luke, Kevin Kwok Chan, Dr. Andreas Bill, Irene Howard and Maryanne Horton

The generosity of several alumni and faculty has been instrumental in recent years to help and support our students through a scholarship or an assistantship.

In the 2017-2018 newsletter we presented three new scholarships endowed by faculty emeritus Dr. Keung Luke. Below we present the three very first recipients of the Luke scholarships (also pictured above). We are grateful to all who contributed this year again with scholarships and assistantships. The help provided to students cannot be overstated!

Here are then names of the proud recipients of the 2018-2019 assistantships and scholarships.

Department Scholarships – Undergraduate

John & Terry Milligan Scholarship in Physics— Norberto Gallegos

Richard & Florence Scalettar Scholarship— Rami Allaf

Richard & Florence Scalettar Scholarship— Joseph Soliz

Physics & Astronomy Scholarship— Leonel Rodriguez

Department Scholarships – Graduate

John E. Fredrickson Endowed Scholarship— Stuart Slavin

Keung Luke, Charles Roberts and Richard Whiteley Endowed Scholarship— Christopher Burgess

Irene Howard and Keung Luke Endowed Scholarship— Sylvia Chow

Scholarships and Assistantships Recipients

Kevin Kwok Chan, HK Alumni and Keung Luke Endowed Scholarship— Everardo Molina

Physics & Astronomy Scholarship— Sara Qubbaj

Department Assistantships – Undergraduate

Summer Research Assistantship of The Department— Isaac Arriaga

Summer Research Assistantship of The Department— Chloe Goings

Summer Research Assistantship of The Department— Michael Mancini

Department Assistantships– Graduate

ORSP Summer Student Research Assistantship— Nicholas Werner

Margaret Heeb Summer Research Assistantship in Honor of Wilman Jordan— Evan Phelan

Summer Research Assistantship of The Department— Mohammad Ashas

Summer Research Assistantship of The Department— Emran Karzai

Summer Research Assistantship of The Department— Megan Barry



**Assistantship recipient, Chloe Goings, with
Department Chair, Dr. Andreas Bill**



**Scholarship recipient, Leonel Rodriguez, with
Department Chair, Dr. Andreas Bill**

Donor and Alumni Giving

The Department relies exclusively on private contributions for these key enrichment activities and supports for students:

Faculty-mentored Research Experiences (Winter Session and Summer)

Weekly Colloquia by Visiting Scientists

Training on Cutting-edge Instrumentation

Learning Assistant Program (Tutoring)

Scholarships and Assistantships

Your gifts determine how rich an educational experience we can provide our students and ensure that hard-working students receive the financial support they need to keep on track, and graduate with minimal or no debt.

GIVE ONLINE at giveto.csulb.edu/?view=PSA

To establish a named scholarship, assistantship, create an endowment, or include the Department in your Will or Trust, call or email Maryanne Horton, Senior Director of Development, 562-985-1687 or maryanne.horton@csulb.edu.



Maryanne Horton

Sr. Director of Development

Our Current Scholarships

The Richard and Florence Scalettar Scholarship

The John and Terry Milligan Scholarship in Physics

The Margaret Heeb Summer Research Assistantship

The Scholarship Fund of the Department of Physics and Astronomy

The Olaf and Mary Jane Anfinson Endowed Scholarship

The John E. Fredrickson Endowed Scholarship

The Keung Luke, Charles Roberts, Richard Whitely Endowed Scholarship

The Irene Howard and Keung Luke Endowed Scholarship

The Kevin K. Chan, HK Alumni, Keung Luke Endowed Scholarship

Thank you for your continued support!