California State University Long Beach

Physics and Astronomy
2013-2014 Newsletter #32

Visit us at

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Physics & Astronomy Professor and Department Chair Chuhee Kwon

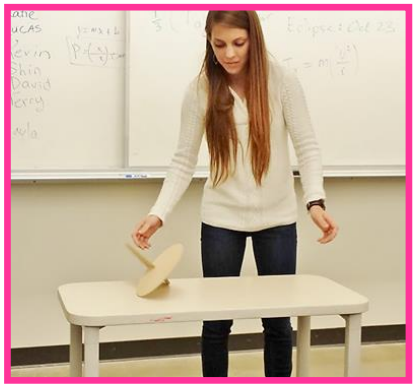
Graduation 2014!

Inside this Issue:

The Society of Physics Students, PhysTEC Updates,

Graduation and Scholarships, Course Redesign Projects, and More!

The Society of Physics Students - 2014



Kayla Bollinger exploring gyroscopic precession!

Kevin Dwyer
Teacher-in-Residence

Rachael Jordan proving angular momentum!

PhysTEC Rolls On!

From Demo Days to Open Houses, from Learning Assistants to classes designed to develop better Physics teachers, CSULB remains a PhysTEC (Physics Teacher Education Coalition) site. While the grant for PhysTEC ended two years ago, the programs and activities started through PhysTEC continue on (with help from the Miller Foundation).

Demo Days (held the 2nd Tuesday of every month at 4:30 in HSCI 280) bring together university professors, high school teachers and CSULB students to explore the best Physics demonstrations on topics in the high school physics curriculum. The Open House brings high school teachers and students to campus to see what is happening in the Physics department at CSULB and explore hands-on activities, talk with faculty and physics majors.

The two courses started through PhysTEC are also going strong. Exploring Physics Teaching (Phys 390) has students explore teaching physics as a possible career by being a learning assistant (LA) in secondary classrooms and for lower-level Physics classes at CSULB. The Physics Pedagogic Content Knowledge course (Phys 491) examines a high school physics content area in depth, providing current and prospective teachers with the resources and knowledge to effectively teach physics.

Additionally, the popular Social Mixer event brings together all the campus Physics community for fun activities, food and just have to time to talk with each other. In fact, one of the main products of the PhysTEC program has been the development of a Physics community – Physics undergraduates and graduate majors, CSULB Physics faculty, prospective Physics teachers and current Physics teachers that all supporting each other. The support for new teachers entering the field, the strength of the connections made through PhysTEC, and the growth of this supportive Physics community through PhysTEC is a testament to the great work done by those who started the program: Dr. Chuhee Kwon, Dr. Galen Pickett, Dr. Laura Henriques, Rod Ziolkowski and Katie Beck.

Society of Physics Students (SPS)
California State University
Long Beach Chapter

A Report from the SPS President, Kayla Bollinger

Kevin Cano and Katie Wimberly

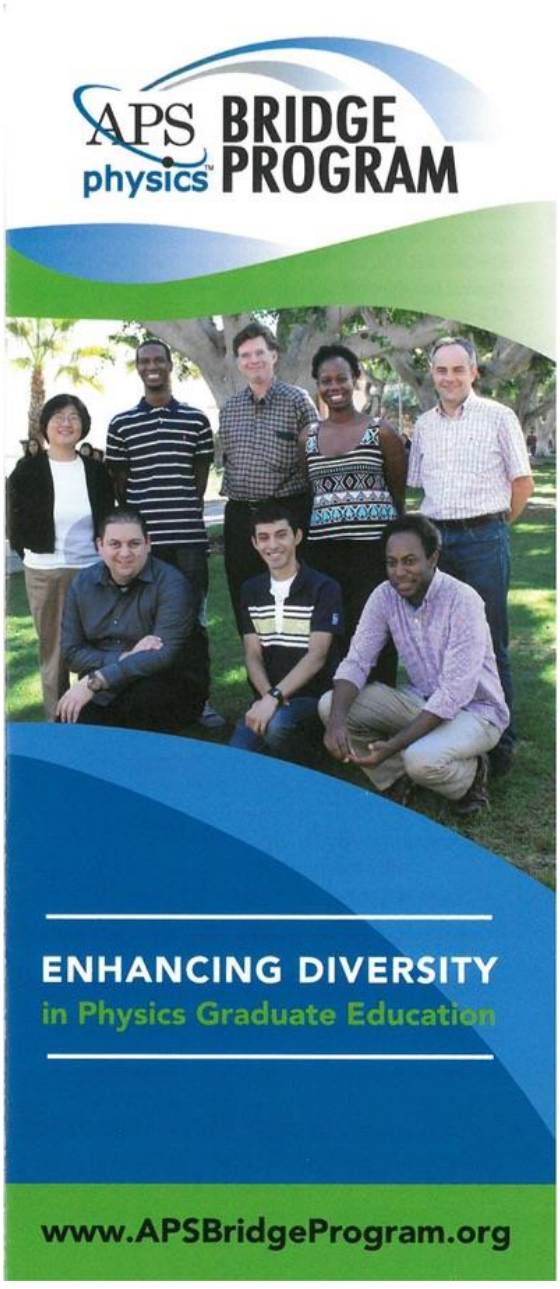
Kayla Bollinger, President

The Society of Physics Students (SPS), in addition to being the official physics club on campus, is a professional association explicitly designed for students. The SPS exists to help students transform themselves into active, contributing members of the professional community. Course work develops only a limited range of skills. Other skills needed to flourish professionally include effective communication and personal interactions, leadership experience, establishing a personal network of contacts, presenting scholarly work in professional meetings and journals, and outreach services to the campus and local communities. Locally, regionally, nationally, and internationally, the SPS offers the opportunity for these important enrichments to the students' academic experience. Within SPS is housed Sigma Pi Sigma, the national physics honor society, which elects members on the basis of outstanding academic achievement. This unique two-in-one society operates within the American Institute of Physics, an umbrella organization for ten other professional science societies. SPS CSU, Long Beach chapter focuses on academic achievement, community service and social science events. We focus our community outreach on local middle and high school students to spread the joys of science and pique interest in physics as a college major. We plan regular social events that include trips to the Griffith Observatory in LA, movie nights and even ice-skating events! Membership is open to anyone interested in physics. The only requirement for membership is that you're interested in physics! Besides physics majors, our members include majors in chemistry, computer science, engineering, geology, mathematics, medicine, and other fields. Our physics department has grown a lot in the last couple years, but even with the growth our club maintains the feeling of a tight knit family. Studies have shown that what keeps students in the STEM field isn't good grades or accomplishments, it's a sense of belonging. In addition to sharing a love for physics, SPS strives to create an environment where students can form friendships and always have a place where they are welcomed. Our members work together, often daily, to tutor and mentor each other in course work, grad school preparation, research projects, internships, scholarship opportunities and industry skills.

If you have any questions, or are interested in taking part in SPS activities, contact our President Kayla Bollinger at CNSM-SPSPresident@csulb.edu or visit our website at http://www.csulb.edu/org/college/sps/.

The SPS Enjoying Their Ice Skating Trip

The SPS Having A Fun Time At "The Crooked Duck"



Bridge from a Master's or undergraduate degree to a PhD program in Physics

The department is proud to be the fourth institution in the country and the first and only Master's granting program of all the United States Universities to receive this prestigious award. The purpose of the program is to welcome, train and send out students whose dream is to do a PhD in Physics, have a strong potential to succeed, but were not given the right opportunities to prepare for entry into a PhD program.

Although the program is open to all students, we mainly focus on students that belong to minority groups of the population that are underrepresented in Physics. The Bridge Program of the American Physical Society identifies underrepresented minorities in physics as citizens of the United States that are Hispanic/Latino, African American or Native American.

Five Bridge Students have joined our Master's program in 2014: Gilbert Arias, Leslie Davis, Daniel Diaz, Zack Hall, and Yonas Getachew (see the picture on the flyer). The two first were awarded a fellowship for two years each. Two more Bridge Fellows will be chosen to start in the Fall 2015, and we hope that more Bridge Students will join our Master's program.

The Master's program of the Department has become very strong and provides a solid foundation in graduate physics together with a strong practical training component into techniques and tools to solve challenging problems. We have successfully sent our students to industry, doctoral schools, and teaching jobs.

Picture: The flyer promoting the APS Bridge Program features the five Bridge Students and the three co-PIs of the program at CSU Long Beach. – Dr. Andreas Bill

Zvonimir Hlousek, Thomas Gredig, and Galen Pickett

Koondis.com By Zvonimir Hlousek

Figuring out how to keep STEM (Science, Technology, Engineering, and Mathematics) students in their disciplines has long stumped higher education institutions. Just 43 percent of students who enter a STEM major in a four-year public college or university end up graduating with a STEM degree, according to a 2013 White House report. And the success rate is worse for students in community colleges.

The culprit may be freshman science courses, suggests research out of Harvard. Students' experiences in their first-year science courses are the "most influential" in their decisions to stick with a major or not, yet most students aren't happy with those courses. They cite a lack of "faculty-student interaction, 'coldness' of the classroom, lack of preparation and organization, and dullness of presentations" as proof that they're receiving "poor teaching."

These kinds of problems drove three physics professors at CSULB, Thomas Gredig, Zvonko Hlousek and Galen Pickett to develop a web-based application for their own classes, which they are now marketing more broadly through a start-up company EduDotOnLine, Inc. The learning platform, Koondis, as it's called, works in traditional large introductory lecture classrooms, blended classes, and fully online courses that are often filled with students enrolled from various disciplines who are required to be there for their majors.

Described as a "social homework system," a "discussion forum that puts students in small groups" and even a replacement for the campus learning management system, Koondis is showing great promise as a pill for student satisfaction.

Koondis (named for an Estonian word that means "select team") allows instructors to group students, assign each student a role in the group and map that role to specific tasks that lead to more effective problem solving. Roles encompass project director, investigator, executive and skeptics (held by two members), the same parts a science team might include in doing research. The software rotates students' roles from one assignment to another so that eventually every student participates multiple times in every role.

An instructor can use Koondis in many different ways. To date, Koondis. is used by several universities and high schools around the country. http://learn.koondis.com

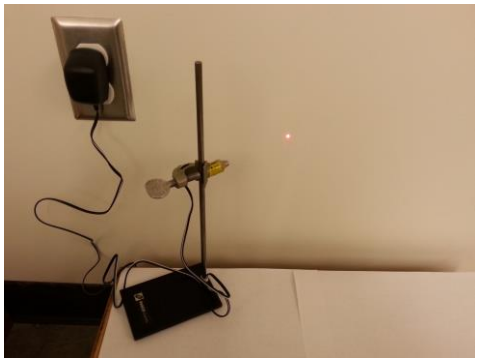
A New Smart Board For Computational Physics

Dr. Prashanth Jaikumar is shown teaching his students to learn to use the Mathematica software in our computational lab, which blends education and technology by hosting multi-level courses in programming and numerical methods for Physics. The new smart board is interactive technology that promotes student excellence in the classroom, modern pedagogical tools, and built-in collaborative resources.

Physics Lab Improvements

The work to improve the instructional labs is always ongoing. This year, the room where the Electronics and LabView labs are taught was reorganized. Kevin Bullock, from the CNSM Shop, made custom shelves to reduce the clutter of equipment and tangled mess of wires. Mark McLaughlin reorganized the equipment. This effort made these classes run much smoother this spring.

In addition, Mark McLaughlin is always tinkering and making improvements to the labs. In one of the pictures below, there is a laser diode mounted inside a clamp. This makes it much easier for students to align a laser in their experiments. In another picture, there are custom brackets for the 'Simple Harmonic Motion' experiments. These brackets allow for easier angle readings on the pendulum setup, and easier amplitude readings for the oscillating mass-spring system. There is also a picture showing the upgraded equipment for the LabView class.



A Laser Diode Inside A Clamp

Simple Harmonic Motion

The LabView Lab Upgraded

UNDERGRADUATE COMPUTATIONAL PHYSICS (VPYTHON)

By Robert Woodhouse and Zoltan Papp

Computation in physics has become a fundamental tool in learning and understanding physics, as well as a critical competence for physics students entering the workplace. The pedagogical advantages of computational methods include development of analytical skills, providing system visualizations of phenomena unavailable to teaching laboratories and adds a flexible, multifaceted capability, unavailable a generation ago, to the instructional repertoire of physics teaching. California State University, Long Beach offers a computational option in physics at the graduate level. At the undergraduate level, ongoing efforts continue to explore the best way to incorporate computational laboratories into introductory classes.

Computational labs are not computer based labs that simulate a complete physics experiment on a computer that a student can then manipulate parameters to see different outcomes. Computational labs involve the student directly in developing the code that models the physics under consideration. This insures that the student has a grasp of the physics principles being studied and can produce code that properly visualizes the physics. Studies show that conventional hands-on experiments are useful to teach simple concepts like force but they have problems in teaching more involved concepts like work, energy, field, etc., where computer simulations do a much better job.

The computer language of choice is Python. Why Python? It is free, available across many platforms, simple for beginners but rich in capability for advanced work and it is easy to read and figure out what a program is doing. It is also the language used by the textbook authors of "Matter and Interactions" which is used in our introductory majors classes. VPython, a 3-d version of Python has been used to create computational labs in PHYS 151 and 152.

In PHYS 151 lab a number of problems from spring oscillatory motion, kicked ball and planetary motion are developed and topics like energy, work and angular momentum are added through the semester. Planetary motion is a good example of modeling phenomena that students do not have access to in the typical physics lab. The motion itself (Figure 1) requires calculation of the sun-earth vector, force, the momentum principle, updates to position and velocity. Graphs for the kinetic and potential energy, angular momentum and other parameters are output. Other output is to print and the "screen shots" for observing the motion itself.

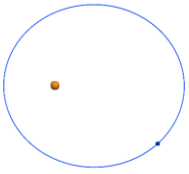


Fig 1: Planetary motion.

In PHYS 152 lab students model the motion of charged particle motion in electric and magnetic fields, solve RC circuit and visualize induction and the impact of electromagnetic fields on charged particles.

Preliminary feedback on student experience for the computational labs has been quite positive. Student experience is continuing to be collected and the Vpython examples refined. It is anticipated that computational experiences in the undergraduate curriculum will continue to expand and be productive to student outcome.

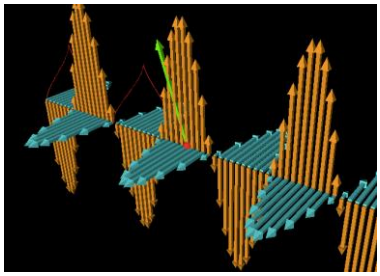


Fig. 2: Electromagnetic wave.

We Continue To Observe Our Heavens

Each semester, students taking classes in the department and students living on campus are invited to the Hall of Sciences rooftop platform for astronomical observations. On observing nights, students use telescopes and binoculars to study the Moon, planets, and star clusters, while faculty and graduate students give impromptu explanations of the objects in the telescopes and the constellations in which they reside. Many students are surprised to learn that it's possible to use their cell phones to take photographs through the telescope eyepieces. The first photograph below shows students and telescopes on the rooftop. The second shows a typical photograph of the Moon, where the heavily-cratered lunar uplands are clearly distinguished from the plains, which are actually lava flows resulting from large meteors punching through the surface long ago when the core was still liquid. The third image shows the stripes on Jupiter, parallel to, and on each side of, the planet's equator. These stripes are actually cloud layers stretched out by Jupiter's rapid 10 hour rotation period. The fourth photo also depicts Jupiter, with a field wide enough to include its four largest moons. These four satellites, Io, Europa, Ganymede, and Callisto, formed with Jupiter and, due to conservation of angular momentum, have orbits are in the same plane as Jupiter's equator. – Paul Hintzen




The photographs above were taken by our Physics Master's student, David Saroka.

Graduation 2014

Class of 2014
Master's Students, Bachelor's Students, Faculty Advisors, and Scholarship Winners!

BACHELOR'S DEGREES

Bachelor of Science:

Stephani Sodergren
Matthew Acosta
Boe Colabewala
Brian Flores
Carlos Garcia
Marc Guest
Brandon Kawata
Jung (Jason), Jung
Julia Meinen
Kevin Ngo
Amethyst Radcliffe
Roy Ready
Daniel Silva
Brandy Wilson

Bachelor of Art:

Harry Cadlaon
Joshua Corona
Shawn Kirby
Christina Martin
Bryant Mercado

Physics Minor:

Nehemias Ochoa
Naoki Oishi
Joshua Mendez
Armando Reimor
Joshua Schnitzer
Heriberto Ortiz

MASTER'S DEGREES

Name	Advisor	Thesis Title
Arenson, Joshua	Jaikumar	Nucleosynthesis and the r-process using R-Java a GUI based software
Bandari, Anashe	Jaikumar	Calculations of Non-Radial Oscillation Spectrum for Neutron Stars
Damatoʼr, Ralph P	Abate	Polarization Dependence of Subwavelength Resonance Behavior in the Near Field
Donovanʼr, John C	Kwon	In-Situ Impedance Measurement and Size Analysis of Multi-Layer Self-Assembled Gold Nano-Island Film
Dunlap, Terrence L	Abate	Nanoscale Near-Field Imaging of VO2 Phase Transition
Hashi, Ryan K	Peterson	Realistic Effects on the Electron Wigner Crystal Energy in the Quantum Hall Regime
Lohmann, Mark L	Jaikumar	Calculation of Neutral Weak Nucleon Form Factors with the ADS/QCD Correspondence
Patrick II, Richard	Jaikumar	The Search for Supersymmetry in Particle Physics
Robinson, Kyle P	Gredig	AC Impedance Spectroscopy on Copper Phthalocyanine Thin Films
Torrico Abasto, Raul	Abate	Near-field Investigation of Vanadium Dioxide-Plasmon Interaction
Tubbs, Marcus	Gu/Henriques	The Use of Hand-Constructed Graphs in Microcomputer-Based Laboratories for Kinematics
Zou, Xiaoyu	Gu	Magneto-optical properties of ferromagnetic nanostructures on modified nanosphere template

UNIVERSITY/CNSM AWARDS/ACHIEVEMENTS

GRADUATION AWARDS

Outstanding Baccalaureate Graduate of the College: The CSULB Alumni Association recognizes an undergraduate in each college as a CSULB Outstanding Graduate. **Stephanie Sodergren**, B.S. Physics

Most Valuable Professor nominated by the **Outstanding Baccalaureate Graduate of the College: Prof. Yohannes Abate**

Robert D. Rhodes Award for the Outstanding Department Baccalaureate Graduate (one per department): **Roy Ready**, B.S. Physics

Graduate Dean's List (Top 1% of CNSM graduate students, 4 persons were selected for this year): **Mark Lohmann**, M.S. Physics

Outstanding Thesis Award: Hanming Yuan, M.S. Applied Physics

Department Honors (noted on the transcript and printed in the College's Commencement Program)**: Carlos Garcia, Brandon Kawata, and Daniel Silva,** B.S. Physics

Department Graduate Student Honors (noted on the transcript and printed in the College's Commencement Program)**: Terrence Dunlap, Anashe Bandari,** M.S. Physics

AMERICAN ASSOCIATION OF PHYSICS TEACHERS (AAPT) Outstanding TA and LA

Outstanding TA: Natalie Brown
Outstanding LA: Brandon Kawata

"The American Association of Physics Teacher's is pleased to help you make this a meaningful award by providing a one year membership for your top two teaching assistants in recognition of outstanding performance as a physics educator."

SPS RECOGNITION:

SPS OFFICERS		
	AY 13/14	AY 14/15
President	Daan Leiva	Kayla Bollinger
Vice President	Boe Colabewala	Mikhael Semaan
Secretary	Katy (Rodriguez) Wimberly	Katy Wimberly
Treasurer	Kevin Ngo	Diana Gonzalez
Webmaster	Jaylen Wimbish	Jaylen Wimbish
Social Chair	Kayla Bollinger	Elizabeth Briley
Director of Outreach	Kayla Bollinger	Wendy Rivera Chavez
CNSM Ambassador	Daniel Ta	Sara Limon
Vice CNSM Ambassador	Roy Ready	N/A
Faculty Advisor	Michael Peterson	Michael Peterson

STOP HERE FOR A MOMENT!

You can contribute ONLINE at https://giveto.csulb.edu/?view=PSA

Another way to discuss giving: talk to **Maryanne Horton**, Director of Development of the College of Natural Sciences & Mathematics, at **562-985-1687**.

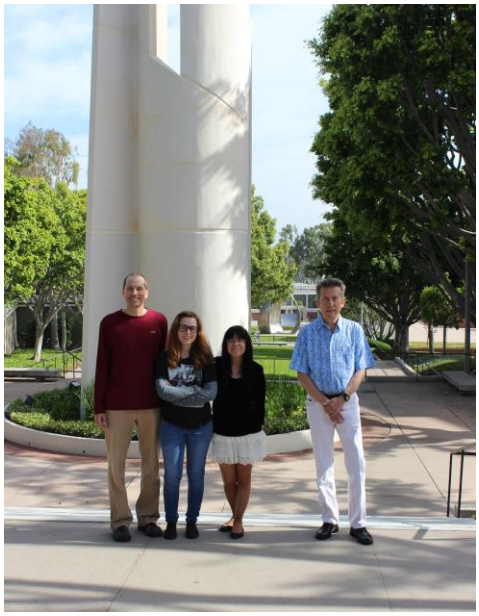
Thanks very much for any help you can give!
(Don't forget that many corporations will match donations of employees!)

Many students are supported by scholarships. All receive non-state funds that are contributed and are in accounts with the CSULB Foundation. No state funds are used for scholarships or department events.

- **Undergraduate Research Experiences (for Winter Session and Summer)**
- **Scholarships, Colloquia, and General Funds for Department Needs**

"Diving Pelican"
by Patrick Kenealy

Pelican seeking food in near free-fall dive from ~10 meters high. Adult pelicans can hit the ocean surface with speeds near 40 meters/sec (~30 mph) in near vertical dives.



Physics Department Staff

Mark McLaughlin, Amber Parker, Irene Howard, and Tony Torres (from left) are seen enjoying the beautiful Long Beach weather. The CSULB bell tower is in the background.

GO Beach!


COLLEGE OF NATURAL SCIENCES AND MATHEMATICS
PHYSICS
ASTRONOMY


MASTER'S CANDIDATES

For Our Alumni:
We would like to hear from you!

If you would like to share with us and let us know about your current employment and research, please fill out this survey and e-mail it to irene.howard@csulb.edu or amber.parker@csulb.edu and we will include this information in our next Department newsletter.

Name:

Year of Graduation:

Current Employment:

Areas of Research:

E-Mail Address (optional):

Sun images produced by small openings between overlapping leaves decorate this sidewalk. These *camera-obscura* images betray their origins by being circular, or nearly so, quite unlike the shapes of the openings between the leaves. – Photo by Professor Patrick Kenealy