

California State University Long Beach

Physics and Astronomy 2012-2013 Newsletter #31

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**Physics & Astronomy
Professor and Department
Chair Chuhee Kwon with
Her 2013 CNSM Faculty
Award for Excellence**

Observing the Night Sky!



Photo by Matt Caswell, Hillside College RA



Inside This Issue:

**Department Updates, The Society of Physics Students, PhysTEC Demo
Sharing, Research Achievements, Graduation, Scholarships, Online
Social Homework, Viewing The Stars, and more!**



The Society of Physics Students -2013

In Memoriam



Slobodan Bob Stankovic

It is with great sadness that we mourn the loss of our colleague and friend, Slobodan Bob Stankovic. He unexpectedly passed away of a heart attack Friday, May 31, 2013, while visiting his hometown of Sarajevo in Bosnia-Herzegovina. Bob was born in Skopje, Macedonia, but he spent his youth and early life in Sarajevo. It is also in his Sarajevo high school that Bob met his wife and our colleague, Jasmina Stankovic. Bob earned his Bachelor (BS), then his Master's of Science (MS), in Electrical Engineering at the University of Sarajevo in 1973 and 1978, respectively. He started to work on his PhD, but never finished because of the Bosnian war. First they settled in Germany, but later they had to leave, and they came to the US where they had some family ties. He worked at ITT Technical Institute in Torrance, CSU Dominguez Hills, and CSU Long Beach. He taught Physics 152 classes and Physics 380 classes at CSULB. Bob is survived by his wife, Jasmina, and his two daughters, Selma and Alma. He will be remembered as a man full of energy who was kind and helpful to others. Despite the hardship of war and being a refugee for several years, he was known for his good spirit. He and his family have a heart for people, and they welcomed and hosted so many over the years, not the least among them our students and faculty. We mourn Bob's passing with heavy heart and cherish his jovial spirit in our memory.

Jasmina Stankovic Retires



38 YEARS OF SERVICE - A NOTE FROM SAN PEDRO By Former Lecturer Jasmina Stankovic

I worked more than 38 years all together in my life, about 30 years of which were spent teaching Physics in different countries, and the last 14 ½ years at our Physics and Astronomy Department. I am 63 years old and now retired. Retiring at what many people would consider a young age was not an easy decision. I never planned to retire this early, but I have come to understand that

life is full of unintended events, good and bad, and it often makes decisions for us, rather than the other way around.

I joined the Physics & Astronomy Department at CSULB in the Fall 1999 semester as a lecturer teaching the Physics 151 lab. My family and I had just moved as immigrants from Germany earlier that year, after having spent seven years as refugees from the Bosnian war of the 1990's living in Germany. During those seven years, I had not had the opportunity to work in my profession due to my immigration status, so when I was able to join the Department, I was very excited to be working in my field and with students again. Under the supervision of Dr. Hlousek, I spent the early semesters at CSULB learning generally about the system of teaching in the USA, how to perform the specifics of the 151 lab, and how to use all of the new instruments that were now in common use worldwide. Physics is the same everywhere in world.

A few years later, in collaboration with Dr. Papp and Dr. Pickett, I carried out the largest improvement of the Physics 151 lab. All three of us teach physics because we love it - we love the concept, we love the sense of discovery, we love the challenges of passing on that passion and knowledge to young minds. But those can be a large obstacle to young students, who wish to enter the field - it is not easy learning how to teach. So, in our collaboration, we brought physics majors into the lab to observe how to teach physics in a school setting and to learn skills on how to solve problems in physics. We also introduced and put into practice a new approach in lab work (social group work), which serves to prepare students for team work in their career, a key element to success in the field. In addition, with the help of Dr. Papp, I was able to add computational physics to the lab curricula, and this process continues to improve every semester. During all those years working as the lab coordinator, I followed and supervised the work of TAs (our graduate students), helping them to perform the experiments and teaching them the easiest ways to conduct problem solving sessions. Mark McLaughlin in the Physics Issue Room helped me a lot.

For now, I am preparing a big move back to Europe, to my roots, to be closer to my family and my children. Once I am settled in over there, in an old country, but a new place, who knows? Maybe I will again start to think about how to improve the Physics 151 Lab. After all, we all know that the concept of "If it isn't broke, don't fix it" does not apply to physicists - we always like to "play" with things!

Dr. George Kuck Retires

After teaching in the Physics and Astronomy Department for fifteen years, Dr. George Kuck decided to explore some new paths in life. He is helping a group of home schooled high school students. He said that the internal rewards are great. He said that if he gets enough students, he will be teaching a course out of Dr. Patrick Kenealy's new electronic text. He said that the electronic version is less than \$20.00, which is great news for the students and their parents. Apart from loving teaching, Dr. Kuck has had a very adventure-filled life. He served in the US Air Force for twenty years, worked at McDonnell Douglas for thirteen years, and he is also a special assistant to Congressman Rohrbacher.

His wife, Sally Kuck, is a talented quilter, and she made the beautiful quilt hanging on the wall in the picture shown here. She donated this quilt to our Department.

We wish Dr. Kuck well with all of his future endeavors.



THE YEAR IN REVIEW

Dr. Chuhee Kwon, Chair: Highlights of the Year



The last department newsletter was published in the Fall of 2012. I am excited for the opportunity to share with you the status of the department.

This is the first year the department and the university didn't need to worry about the budget cuts since I became the Chair. State support to the California State University system decreased over 30% between 2007-08 and 2011-12, and it has been extremely difficult to maintain our high standard of excellence. However, I am happy to report that the department is stronger and more successful coming out of the difficult budget time and you will find the evidence in this newsletter.

The department majors have been growing significantly. Many initiatives started under Prof. Kenealy's leadership have been the foundation of the success. The figures below show the number of bachelor and master degrees awarded by the department since 2001/2002, and we expect 22 physics bachelor and 12 master students to graduate this year (AY 2013-14). The annual average number of bachelor's and master's degrees conferred by the 63 Master's-granting departments in the USA are 6.3 and 4.1, respectively. We are among the top five departments in terms of the number of graduates in our peer group. In addition, the department contributes significantly in the diversity of the Physics community. 22% and 10% of bachelor's and master's degrees were awarded to under-represented minority students, that is double the national average.

Physics majors are accepted to pursue either a teaching credential, MS and PhD programs, and others have found employment after graduation. Last year's graduates are pursuing post-graduate degrees at Purdue U., Rice U., U. of Houston, UCLA, UCI, USC, Okinawa Institute of Science and Technology, and CSULB, are working at Boeing, NavAir, Google, Yamaha, etc., and are teaching at Occidental College and Pierce College.

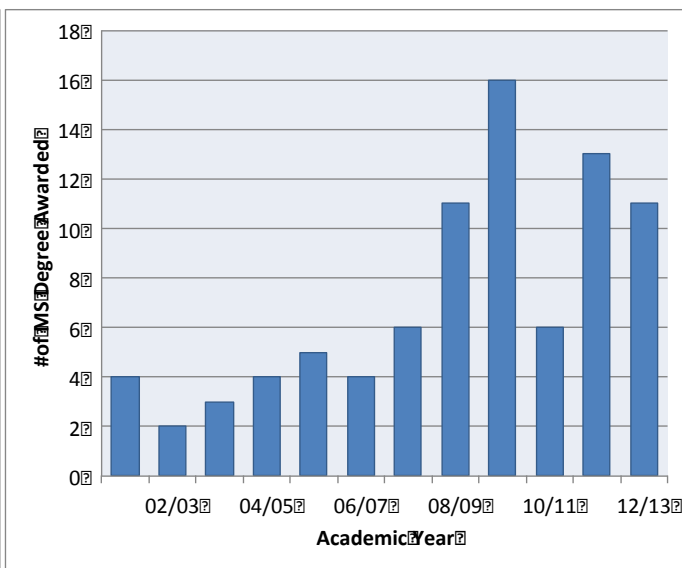
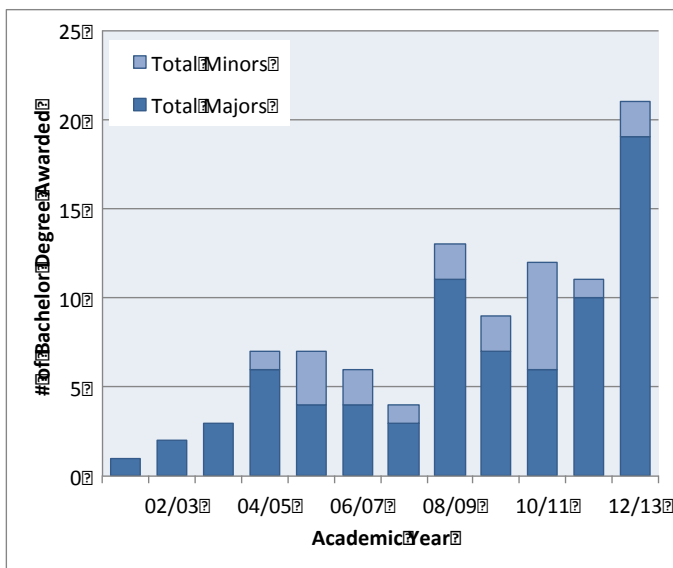
The department faculty and staff are working together to put student success as the top priority of the department; the faculty have raised external funding for research, education, and outreach; the faculty continue their research and publish papers with students; and the Society

of Physics Students (SPS) has done a lot of things to build a stronger community. The CSULB SPS is recognized as the 2013 Outstanding Chapter the second year in a row.

The department has been working with the American Physics Society (APS) and American Association of Physics Teachers (AAPT) to address the shortage of qualified physics teachers and reach out to the local high school physics teachers. We host the demo-sharing event on the second Thursday of the month and the bi-annual open house attended by local high school physics teachers, credential students, physics majors and faculty. We are recognized as a nurturing place for physics students by physics teachers, and more freshmen are applying and accepted into the department than ever before. In Fall 2014, 17 first-time freshmen were accepted as physics majors, and many came from the high school where physics teachers attended the demo-sharing and open house events.

This newsletter was put together by the department Office Coordinator, Irene Howard, and I thank her for her dedication and hard work.

The Number of Bachelor's and Master's Degrees Awarded by the Department Since 2001/2002



The above photo was taken at the Fall 2013 "Physics at The Beach – Physics Teacher Open House" at CSULB. The Hands-On Activity was "Building a Fancy Spectrograph".

Our New Staff Member: Amber Parker



The Department was finally able to hire a second office staff member. We feel very lucky to have our new Administrative Assistant, Amber Parker. Amber received her Bachelor of Arts degree in Journalism with a minor in English from CSULB and was on the President's List. She recently earned a Masters in Fine Arts in Creative Writing Non-Fiction from Saint Mary's College in Moraga, CA. She is bright, works hard, and has a kind and gentle personality. She is a great addition to our department!



PHYSICS DEPARTMENT STAFF:

From left to right: Mark McLaughlin, Amber Parker, Irene Howard, Tony Torres

Society of Physics Students (SPS)

California State University

Long Beach Chapter

A Report from the SPS President, Daan Leiva

This past year our SPS (Society of Physics Students) chapter accomplished many wonderful things. Our members attended multiple conferences, among them: "The Undergraduate Women in Physics Conference" at California Institute of Technology, the SPS Zone 18 meeting at Sacramento State University, and even PhysCon (Physics Congress) 2012 held in Florida. Many of our members presented their research at "The Undergraduate Women in Physics" conference, PhysCon, and Cal State Long Beach Research Symposiums in topics ranging from super conductivity to nano-antenna behavior and organic solar cells. Our chapter held multiple General Body Meetings and hosted events last year such as an observatory trip with a neighborhood chapter, Cal Poly Pomona, and many others.



Daan Leiva

This year our chapter has grown in size, and thus our involvement has increased as well. We kicked off the year by participating in the "It Takes A Village" outreach event along with many other clubs from the College of Engineering. Our campus hosted a group of girls who at the time resided at a homeless shelter in Long Beach, with the purpose of sparking their enthusiasm in STEM fields and encouraging them to pursue higher education. We have also carried out a similar outreach event at Cypress High School while working together with our former Teacher-In-Residence, Mr. Dwyer. Many of our members have obtained internships at JPL through the SIRI program, as well as other companies such as Boeing and L3 Communications. We continue to participate in research competitions by presenting work in cutting edge topics such as optical filters, and novel meta-materials. We have also held events for our members to simply socialize such as Movie Nights, a "Let's Make A Deal" TV taping, Summer Bon Fire, and Ice Skate Night. Also, to increase our involvement with other parts of campus, we will be participating in the annual E-Week event hosted by the organizations in the College of Engineering. We have co-hosted such events with MSSA and MAES and will continue these partnerships for future events such as Game Night at the USU on Pi Day, and our annual observatory trip. Finally, our chapter will host the spring 2014 Zone 18 Meeting, which includes all of California, Nevada and Hawaii, during the weekend of March 21st. During this Zone meeting we will reinstate our dormant Sigma Pi Sigma Honors Society chapter and initiate the first members of this reinstated chapter.

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



Physics undergraduate student, Wendy Rivera-Chavez, sports the SPS t-shirt.

Dr. Yohannes Abate's Research Group



Front row: Sarah Grefe, Brandon Hessler, Stephanie Sodergren, Jill Pestana, Roxana Chavarria
Back row: Matthew Acosta, Dr. Yohannes Abate, Terry Dunlap, Raul Torrico, Daan Leiva

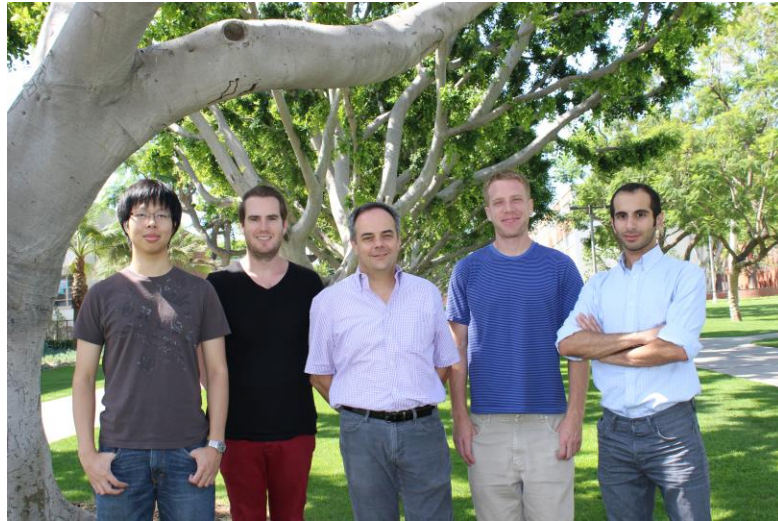
Nano-Optical Spectroscopy and Imaging of Quantum Confined Low Dimensional Systems

Quantum confined low dimensional systems exhibit some of the most strikingly rich spectra of electronic and optical phenomena and occupy a central stage in modern materials research. These phenomena include valley polarization, spin plasmons, tunable bandgaps, strong electronic correlations, spin-orbit interactions, and time-reversal symmetry. Direct nanoscale realspace visualization of the subtle interplay of these phenomena and detailed understanding of their interactions with photons and external fields remains an exciting challenge and opportunity in condensed matter physics.

My group's research focus has been subwavelength scale light-matter interactions in solid state physics, focused on novel physical phenomena emerging in quantum confined low dimensional systems. These include unique nanoscale near-field optical properties of topological phases in $\text{Bi}_{2-x}\text{Sb}_x\text{Te}_{3-y}\text{Se}_y$ compounds and to characterize and control their macroscopic quantum properties, Mott transition and charge dynamics on correlated states that are confined to low dimensions (nanoparticles and nanowires) of transition metal oxides (TMOs), real-space imaging and spectroscopy of polarization dependent valley excitation of the plasmon mode of charge carriers of monoatomic layer transition metal dichalcogenides (TMDC), and in hybrid TMDC-metamaterial designs.

We investigate the unique nature, spatial distribution and dynamics of charge carriers and spins using advanced high spatial resolution laser microscopy and spectroscopy techniques. These techniques include utilization and development of scattering type scanning near-field microscopy (s-SNOM) based on broadband light source and allows near-field spectroscopy at nanoscale spatial resolution from THz to visible frequencies, high spatial resolution Raman Force Microscopy (RFM), and far field absorption/transmission spectroscopy. An important goal of my research group is also to train and educate the future generation of researchers. Both graduate and undergraduate students are involved in a meaningful way in the research areas mentioned that allow them to gain both experimental and theoretical experiences required in nano-optics.

Dr. Andreas Bill's Research Group



George Wang, James Brugger, Dr. Andreas Bill, Adam Moke, Hamed Sadeghi

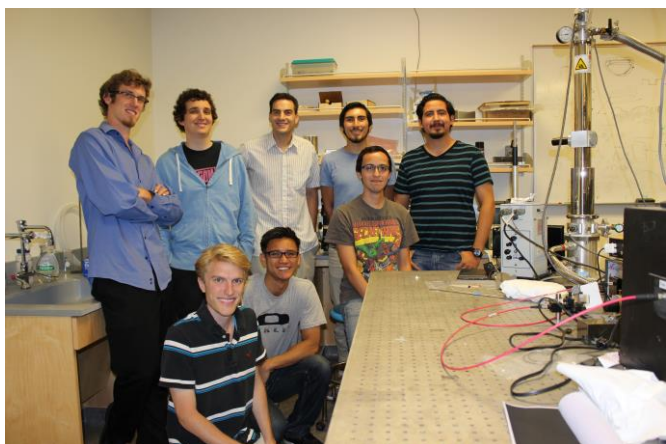
Coexistence of Phases in Solids

Our group works along three axes of research: 1) The study of coexisting superconducting and magnetic phases in heterogeneous systems and in particular in magnetic Josephson junctions, 2) The development of a theory for the non-equilibrium distribution of grains during the crystallization of solids, 3) The modification of electronic collective modes in a variety of combinations and stacking of single graphene sheets. The most exciting results of the past year have been obtained in the first topic where we demonstrated the existence of a new Josephson current reversal effect upon twisting a domain wall into the magnetic material (see arXiv: 1310.6580). This work reveals the intricate relation between superconductivity and magnetism at the nanoscale and points towards possible applications for spintronics. The picture shows the most recent students who worked on these topics: from left to right George Wang worked on the second topic, James Brugger and Adam Moke on the first subject, and Hamed Sadeghi on the third topic. The two latter have now started their PhD at UCLA and USC, respectively.

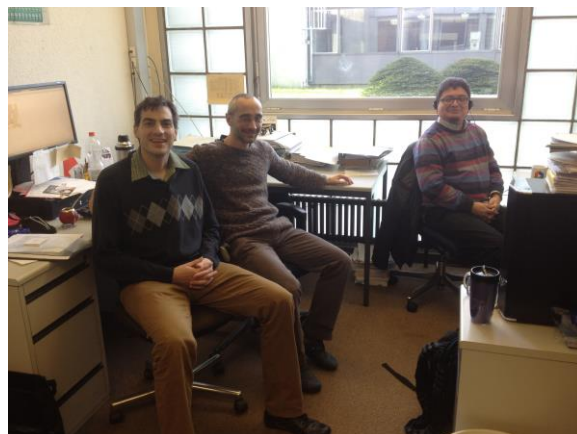
"We gratefully acknowledge the support of the National Science Foundation (DMR-0907242 and DMR-1309341)."



Dr. Thomas Gredig's Research Group



Back: Kyle Robinson, Matt Byrne, Dr. Thomas Gredig, Kevin Cano, Joshua Corona
Front: Paul Ekstrand, Brian Cacha, Carlos Garcia



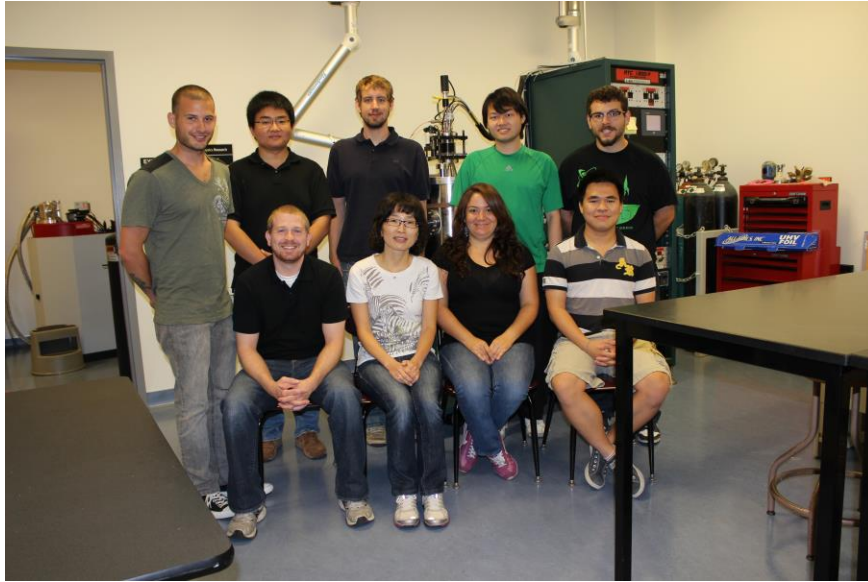
Dr. Thomas Gredig, Dr. Alessandro Vindigni, Hugo Cabrera

The Gredig research group focuses on understanding the charge transport and morphology of phthalocyanine thin films, which play an important role in photovoltaic devices. Kyle Robinson investigated the role of grain boundaries in the charge transport of organic thin films. He used a technique based on impedance spectroscopy to separate the grain boundary contribution from the bulk crystal contribution. Kyle has presented his research at several places, including at UCLA and CSU Sonoma. Brian Cacha is working on the introduction of nano-particles into organic-based photovoltaic thin film devices. The nano-particles can enhance the efficiency. Paul Ekstrand is involved in determining magnetic relaxation rates and dynamic process in magnetic thin films. Matt Byrne has created new nano structures based on phthalocyanine that include multilayers of isomorphous phthalocyanine molecules with different electronic properties. This type of work is important to engineering designed electronic and magnetic properties using structural building blocks. Joshua Corona and Carlos Garcia have worked on determining the structure of molecular alignment on different substrates using x-ray diffraction. Together with Kevin Cano, who imaged the samples with atomic force microscopy, they constructed a picture that tells us how surface roughness alters the molecular self-assembly process. Seniors Joshua and Carlos have been accepted to Ph.D. programs.

The research is supported by the National Science Foundation (DMR-0847552).

Dr. Thomas Gredig with Dr. Alessandro Vindigni collaborated on a model to explain tunable magnetic properties of variable-length single magnetic chains. The CSULB initiated collaboration occurred during Dr. Thomas Gredig's sabbatical in Prof. Dr. Danilo Pescia's group at the Swiss Federal Institute of Technology (ETHZ) in Zürich, Switzerland.

Dr. Jiyeong Gu's Research Group



**Back Row: Daniel Kuljis, Hanming Yuan, Samuel Hedges, Xiaoyu Zou, Joshua Mendez,
Front Row: Russell Gleason, Dr. Jiyeong Gu, Sandra Milena Diez Pinzon, Kevin Ngo,
Absent: Brian Flores, Mikhael Semaan, Katy Rodriguez**

This group picture was taken after cleaning the laboratory in August 2013. Hanming and Russell graduated in summer 2013. Hanming is doing his Ph.D. studies at the University of Houston, and Russell is now a faculty member at Occidental College. Congratulations to both of them and good luck with their future career!

Sam and Mikhael have been working on "Triplet superconductivity in ferromagnet-superconductor Josephson junction". They made thin film samples using the sputtering system and characterized them using the x-ray diffractometer and physical property measurement system. To make a junction device they also designed a lithography mask. Recently they started to learn the photolithography method.

Xiaoyu has been working on "Magnetic thin films on monodispersed nanosphere template". He deposited a magnetic layer on nanosphere templates and looked for the magnetic property. Kevin and Josh successfully upgraded the magneto optical Kerr effect (MOKE) measurement system with both hardware and LabView software. They recently started to learn how to deposit nanosphere templates. The monodispersed nanosphere template has many applications, for example it can be used as a template providing different curvatures to the thin films layers and also work as a mask to define various nanostructures. Danny wants to study "Incidence angle dependence of MOKE in exchange spring magnet", so he is trying to add optical components with which incident angle can be varied.

Brian is currently working on the "Micromagnetic simulation of Permalloy thin films deposited on a nanosphere template". Katy uses the Atomic Force Microscope to study morphology of thin films deposited on a nanosphere template.

Sandra has been working on "Anomalous Hall effect in magnetic multilayers". She optimized thin film fabrication conditions and did some preliminary measurement of Hall resistance.

It has been such a great time with all of these great students working together and helping each other. Hopefully, everyone gets good results!

Dr. Paul Hintzen and Michael Frey Conduct Rooftop Telescope Observations



Photo by Matt Caswell, Hillside College RA

The rooftop observatory has been a boon to our observing program provided to our Astronomy lecture and lab students. We have observed planets such as Jupiter and Saturn, to Uranus, Neptune, and Mars. We have looked at nurseries of baby stars in the Great Nebula of Orion. Clusters of stars have attracted the students' attention and so have large galaxies.

Surveys have been taken of our students. Heads and shoulders above all else, the students have stated that the observing was the highlight of the semester for the Astronomy program. To them, the observing was the capstone of the semester for their sojourn into the life of the Physics and Astronomy Department at CSULB.

In addition, faculty and staff have enjoyed our semester open house for observing. We have many faculty members from our department, alongside those from other departments, who have come out to enjoy the observing and this great facility on top of the new science building. This open house allows us to showcase the work done in our department and makes faculty members aware of the education efforts and resources that we provide.

Lastly, we had a great time in November 2013 when we took a few of our new telescopic tools out to Joshua Tree for overnight observing. The students toughed out very cold weather to observe every planet in our solar system, galaxies, nebulousity, comets, and clusters of stars, under a very dark sky. Not much sleep was accomplished that night, but new views of the universe were engendered for our students. They all were amazed at the wonders of the universe.

We plan to hold two open houses for faculty, staff, and students this spring semester. We will announce them when the weather looks assured for good viewing. Please come out and join us to see Jupiter, the moon, galaxies, nebulousity, and clusters of stars. You all are very welcome to join us!

-- Michael Frey and Dr. Paul Hintzen

Physics Faculty Take an Educational Technology Project and Start a Business



Dr. Zvonimir Hlousek



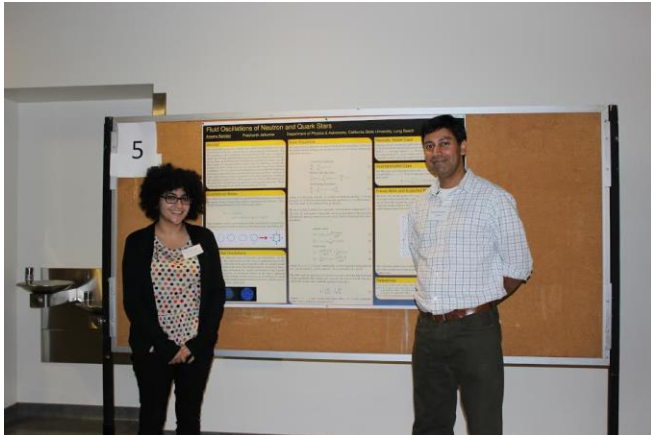
Dr. Thomas Gredig

The Social Homework Learning System (<http://socialhwk.com>) is a tool developed by Drs. Gredig and Hlousek over the past few years. The tool is subject agnostic and was successfully piloted in Physics, Geology, Math, and Engineering courses at CSULB. Over 3,500 students, and more than a dozen instructors, have used the system. The focus of the tool is to enable students to learn in small, managed collaborative groups, and to focus on critical thinking, writing, information exchange, and subject fundamentals. In addition to being a learning platform, the Social Homework is also a “data machine” that records student progress over time. This data provides valuable insight into the learning and the development of critical thinking. It allows an instructor to recognize students who have early difficulties with the course and provide timely remediation.

The project was supported in part by CSU Chancellor's office through Dr. Gerry Hanley, also the executive director of the MERLOT project. Dr. Kwon, Chair of the Physics Department, and Dr. Kisiel of the Science Education Department, were important members of the team. The project includes a micro publishing component and has the potential for significantly reducing the cost of textbooks.

In September of 2013, Drs. Gredig and Hlousek created a start-up company, Edudotonline, Inc. (<http://edudotonline.com>), with the goal being to develop a commercial product beyond the Social Homework concept. They were later joined by Dr. Pickett, one of the pioneers in piloting the Social Homework. The company, Edudotonline, Inc. is attracting attention in the educational domain and has just recently received a first round of private funding.

Dr. Prashanth Jaikumar's Research Group



Graduate Student Anashe Bandari with Dr. Prashanth Jaikumar



Dr. Prashanth Jaikumar with Graduate Students Richard Patrick and Mark Lohmann

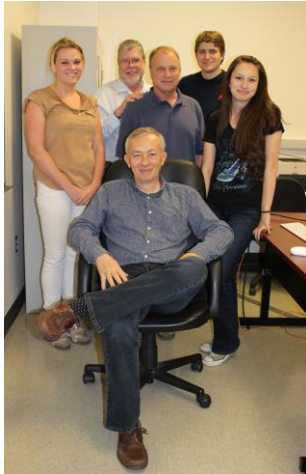
Dr. Jaikumar's research group on Astrophysics recently published a paper on r-mode damping and spin rates of quark stars with a crystalline crust. With help from Collaborator Gautam Rupak, his group investigated the implications of a rigid phase of superconducting quarks on spin periods of neutron stars. The paper has been published in the November 2013 issue of Physical Review C. Two more research papers on nucleosynthesis are expected to be published very soon.

Dr. Jaikumar receives continued support this year from the Research Corporation for Science Advancement. Undergraduate students Roy Ready, Marc Guest, and Shaina Rawal worked last summer on parts of a project related to the properties of Quark matter in neutron stars and gravitational waves. Dr. Jaikumar's group has also applied for the NSF CAREER award to further promote teaching and scholarly activities.

In addition, Dr. Jaikumar will be working on computer simulations of binary star mergers in order to explore the connection of such events with gamma-ray bursts. This work is being carried out in Spring 2014 with support from a reassigned time award from the College. He will also be teaching a course on Modern Astrophysics for advanced undergraduates and graduates this Spring.

Looking forward, 3 graduate students working in Dr. Jaikumar's group, Anashe Bandari, Mark Lohmann and Joshua Arenson will be defending their thesis work later in the Spring. Anashe and Joshua presented their work at the APS California-Nevada section meeting at Sonoma State University last Fall. Our group expects to have openings starting in Fall 2014 to take on new thesis students interested in Astrophysics research. Also, students interested in internships at NASA Jet Propulsion Lab to enhance their scientific research skills can reach out to Dr. Jaikumar for further information.

Dr. Zoltán Papp's Research Group



Front: Dr. Zoltan Papp
Back: Natalie Brown, Robert Woodhouse, Mark Linick, Josh Fernandez, Carolyn Ward, Absent: Khang Nguyen



Left to right: Dr. Zoltan Papp, Natalie Brown, Josh Fernandez, Carolyn Ward, Robert Woodhouse, Mark Linick, Absent: Khang Nguyen

The primary research interest in this group focuses on quantum mechanical few-body problems. As a theoretical physicist, a well-established part of our expertise is to perform accurate three-body calculations by solving the Faddeev integral equations used in describing three-particle quantum systems. Innovative methods for solving these equations have been developed and have been applied to various problems in atomic, nuclear and particle physics. The group has welcomed a number of new graduate students.

Khang Nguyen is working on determination of the optimal parameters of the Goldstone boson exchange quark-quark potential. Natalie Brown's work is on the approximation of the potential through the truncation of the inverse. She has also carried out work with Sarah Greife, a recent graduate from Yohannes Abate's group, that resulted in a publication in Phys Rev C.

Mark Linick is working on muon-catalyzed fusion. Caroline Ward has not decided on a topic for her thesis yet. Josh Fernandez is working on continued fractions for large matrix eigenvalue problems. Other developments in our group include managing the activities of a physics department volunteer, developing and implementing computational approaches in undergraduate laboratories, collaborating with colleagues and outreach to the community.

The volunteer, former student Dr. Bob Woodhouse (Ph.D. biology) is working on a solution method for the Feshbach-Villars equation and to calculate the energy levels of a quark-anti-quark system. He is helping implement computational approaches in undergraduate laboratories and provides the department with assistance to manage laboratory computer resources.

In August 2013, the group participated in a workshop sponsored by PICKUP, a national community that is deeply involved in examining, testing and promoting computational approaches to teaching undergraduate physics. The group is working on having a continued involvement with them.

Within the department, our group has provided JavaScript programs and general web development for work in Social Homework. Community outreach included a talk with a 4th grade LAUSD Emerson science magnet school class. Other collaborations involve work with Dr. Hu, a former CSU Long Beach physics department professor, who is working on theoretical aspects of muon-catalyzed fusion. It has been a busy and fun year, and the group is looking forward to yet another exciting and productive year.

Dr. Michael Peterson's Research Group



Students Matt Acosta, David Ronquillo, Dan Silva, Ryan Hashi, Michael Arciniaga, and Dr. Michael Peterson

Our research group is continuing to study strongly correlated quantum systems where quantum effects and strong interactions between the constituent particles combine to produce exotic and non-trivial phases of matter. Examples range from common crystals to topologically ordered quantum liquids with fractionally charged excitations with fractional statistics.

Lately, undergraduate students Dan Silva and Matt Acosta have been looking at the fractional quantum Hall effect in graphene and attempting to include various realistic effects that are difficult to include yet crucially important to consider. Both Dan and Matt are likely to graduate and move on to graduate school next fall.

Master's student David Ronquillo has been studying interesting quantum spin models in low-dimensions where he is searching for topologically ordered phases. The study of topologically ordered quantum phases is currently a hot topic in theoretical condensed matter physics and includes many new and fascinating concepts and ideas.

Master's student Mike Arciniaga has begun to investigate hyper-realistic effects on the fractional quantum Hall effect in semiconductor heterostructures and will hopefully provide a backbone for future calculations.

Lastly, Master's student Ryan Hashi is finishing his thesis on realistic effects on the ground state energy of two-dimensional electron Wigner crystals and will graduate in the summer.

The techniques we use are heavy numerical methods such as exact diagonalization and variational Monte Carlo, and we utilize many new theoretical concepts such as quantum entanglement and topological entanglement entropy.

Dr. Galen Pickett's Creative Origami



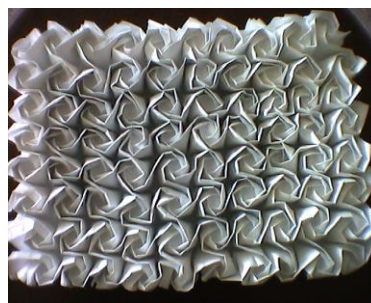
I am enthralled by geometry, the interlocking of shapes. In a very real sense, shapes coming together to make patterns are the source of all of the textures and complexities of life itself. What you see here are explorations, experiments, I have made in paper. There is no denying that I am the one who conceived of these compositions, and that I executed them with my hands. And yet, I am just as surprised by them as you might be. The physics of the medium here *is* the medium, and the ordinary tension between intent and what a medium will allow is instead a peaceful equilibrium. Once these shapes have been coaxed into life, they seem, to me, satisfied. I hope that you find some sense of symmetry, balance, and serenity in these pieces.

These are my websites:

<http://gallery.bridgesmathart.org/exhibitions/2014-joint-mathematics-meetings/galenpickett>

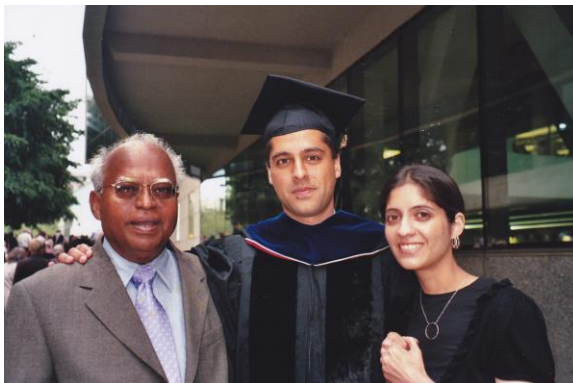
and

<http://gallery.bridgesmathart.org/exhibitions/2014-joint-mathematics-meetings/>



Faculty on FERP (Faculty Early Retirement Program)

Dr. Zahur Anwar



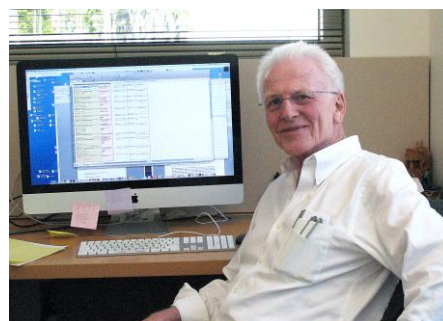
Dr. Zahur Anwar with Dr. Moshiur M. Anwar and Dr. Shamena Anwar

Dr. Zahur Anwar has recently been invited by the Physics Department of The University of Alexandria, a premier university of Egypt, to be one of their Ph.D. thesis evaluators in Condensed Matter Physics. Dr. Anwar's son, Moshiur M. Anwar, has joined the University of California, San Francisco (UCSF), as the head of the Gastro-Intestinal Department as a cancer specialist. He received his Ph.D. from M.I.T. and his M.D. from UCSF. Zahur Anwar's daughter, Shamena Anwar, teaches at Carnegie Mellon University in Economics after getting her Ph.D. in Economics from Yale University.

Dr. Patrick Kenealy



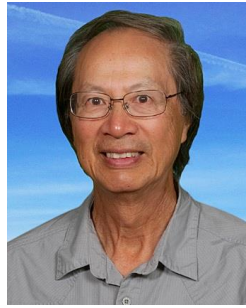
Dr. Patrick Kenealy with His Wife Julia



Dr. Patrick Kenealy in His Office 2013

Professor Patrick Kenealy is currently in his 3rd year in the FERP program, teaching a full-time load during the Spring semesters of the academic year. His work also includes upgrading and revising the textbook for PHSC 112, the only physical science course required for future prospective elementary and middle school teachers. The PHSC 112 laboratory manual is also being updated and revised. In addition, Dr. Kenealy has revised and rewritten majors parts of the PHYS 152 laboratory manual to bring it more in line with the current teaching and textbook in the course, and is working with Mark McLaughlin in bringing the equipment up to date.

Dr. Alfred Leung



He completed his third year of the Faculty Early Retirement Program. In his spare time he revised the PHYS 100B lab manual. He believed that the previous lab manual was hard to read and understand by students because it lacked photos of the equipment and sufficient illustrations related to the experiments. He published a lab manual for PHYS 255 which he had taught for the past several years. He hopes that this lab manual will be helpful for the next PHYS 255 instructor.



Graduation 2013



**Class of 2013
Master's Students, Bachelor's Students, Faculty Advisors, and Scholarship Winners!**

UNIVERSITY/CNSM AWARDS/ACHIEVEMENTS

GRADUATION AWARDS

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

Graduate Dean's List (Top 1% of CNSM graduate students, 3 persons were selected for this year): **Adam Moke**, M.S. Physics

Outstanding Thesis Award: **Eric Muckley**, M.S. Physics

Department Honors (noted on the transcript and printed in the College's Commencement Program): **Daniel Javier, Jill Pestana, and Brandon Hessler**, B.S. Physics

Department Graduate Student Honors (noted on the transcript and printed in the College's Commencement Program): **Hanming Yuan, Sarah Grefe, Eric Muckley**, M.S. Physics

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

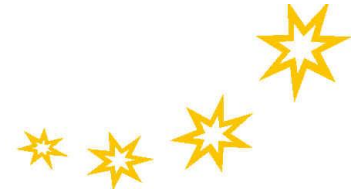
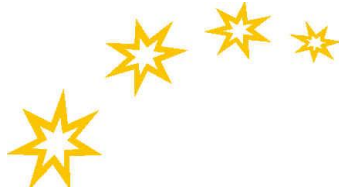
Outstanding TA: Anashe Bandari
Outstanding LA: Stephanie Sodergren

"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 12/13	AY 13/14
President	Julia Meinen	Daan Leiva
Vice President	Stephanie Sodergren	Boe Colabewala
Secretary	Melynda Jaramillo	Katy Rodriguez
Treasury	Matthew Acosta	Kevin Ngo
Webmaster	Alfredo Zanchez	Jaylen Wimbish
Social Outreach Advisor	n/a	Kayla Bollinger
CNSM Ambassador	Boe Colabewala	Daniel Ta
Vice CNSM Ambassador	Eric Muckley	Roy Ready
Faculty Advisor	Thomas Gredig	Michael Peterson





SPS President Julia Meinen shows her recognition plaque. She served the Society of Physics Students faithfully and with new, creative ideas.

ACHIEVEMENTS AND ACCOMPLISHMENTS

Advanced Degree Programs

Pak Too Chan: University of Okinawa, Japan, PhD in Physics

Sarah Grefe: Rice University, PhD in Physics

Adam Moke: UCLA, PhD in Physics

Eric Smith: Purdue, PhD in Physics

Hamed Sadeghi: University of Southern California, PhD in Physics

Hanming Yuan: University of Houston, PhD in Physics

Jill Pestana: UC-Irvine, PhD in Materials Science

Matthew Byrne: CSULB, MS in Physics

Melynda Jaramillo: CSULB, MS in Physics

Eric Muckley: CSULB, Single-Subject Credential (Physics)

Professional Careers

David Chon: Google

Ralph Damato: Kaiser Permanente, LA

Brandon Hessler: Naval Air Systems, Oxnard, CA

Ramsey Noah: HRL

Kyle Robinson: Cypress College, and Santa Ana College, Lecturer

Matthew Werber: Loyola Marymount, Lecturer

Summer Research/Internship

Daniel Silva, REU at University of California Davis

Julia Meinen, L3 Communications.

Brian Flores, Argonne National Laboratory

MARC by NIH

Brian Flores
Amethyst Radcliffe

Physical Science and Math Scholarship funded by NSF

Jaylen Wimbish
Wendy Rivera Chavez
Daan Leiva
Carlos Garcia

Learning Assistants

Brandon Hessler, Jason Jung, Brandon Kawata, Shawn Kirby,
Julia Meinen, Linh Nguyen, Stephanie Sodergren

CSULB Graduate Research Fellowship

Khang Nguyen (Advisor Zoltan Papp)

49er Textbook Scholarship

Christopher Kim

A final comment: Support for our students' scholarships can be life changing.

Thanks very much for your attention and your help! — *Chuhee Kwon*

Great programs need your help.

Your support for this work can be directed as you wish.



The CSULB Peach Blossoms
Photo by Professor Emeritus Keung Luke

STOP HERE FOR A MOMENT!

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

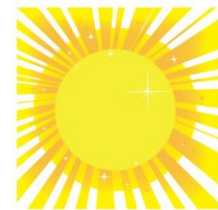
Another way to discuss giving: talk to **Maryanne Horton**, Director of Development of the College of Natural Sciences & Mathematics, at **562-985-1687**.



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**



Go Beach!



**2013 Commencement
Some Physics Bachelor's Degree Graduates**



**2013 Commencement
Some Physics Master's Degree Graduates**

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):

You may also attach a recent photo.



**The CSULB Japanese Garden
Photo by Professor Emeritus Keung Luke**