TEXAS A&M UNIVERSITY KINGSVILLE JAVELINAS

Physics Program

Physics Newsletter

Volume 3, Issue 1
Fall 2014

New Physics Degree Program at TAMUK

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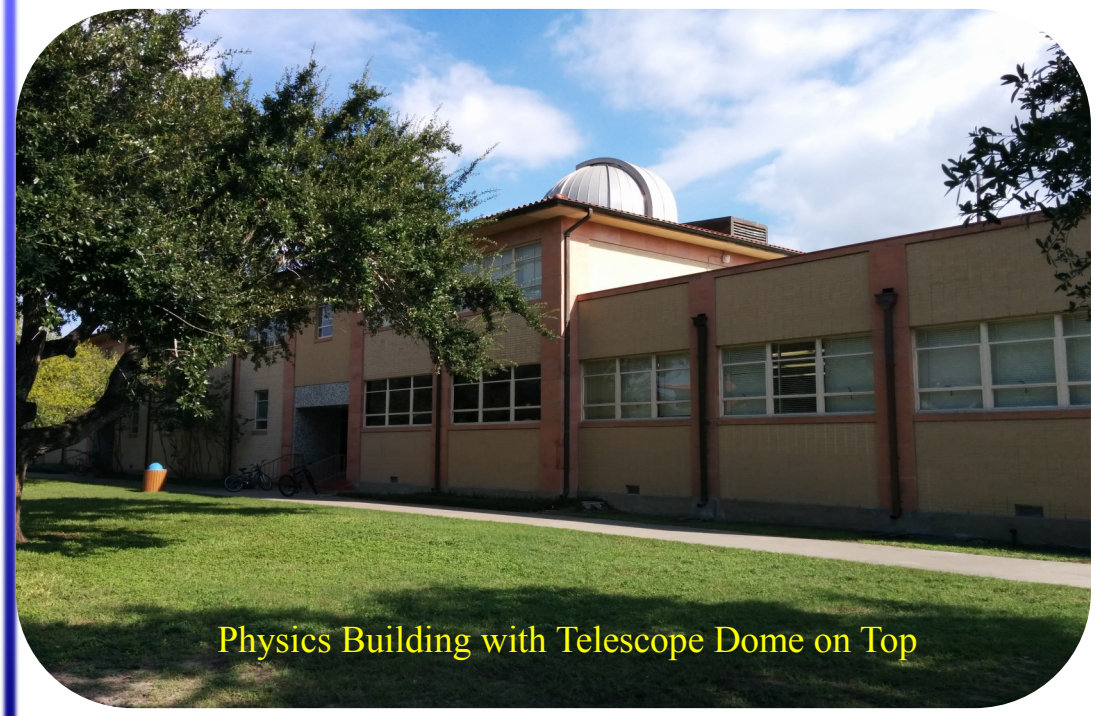
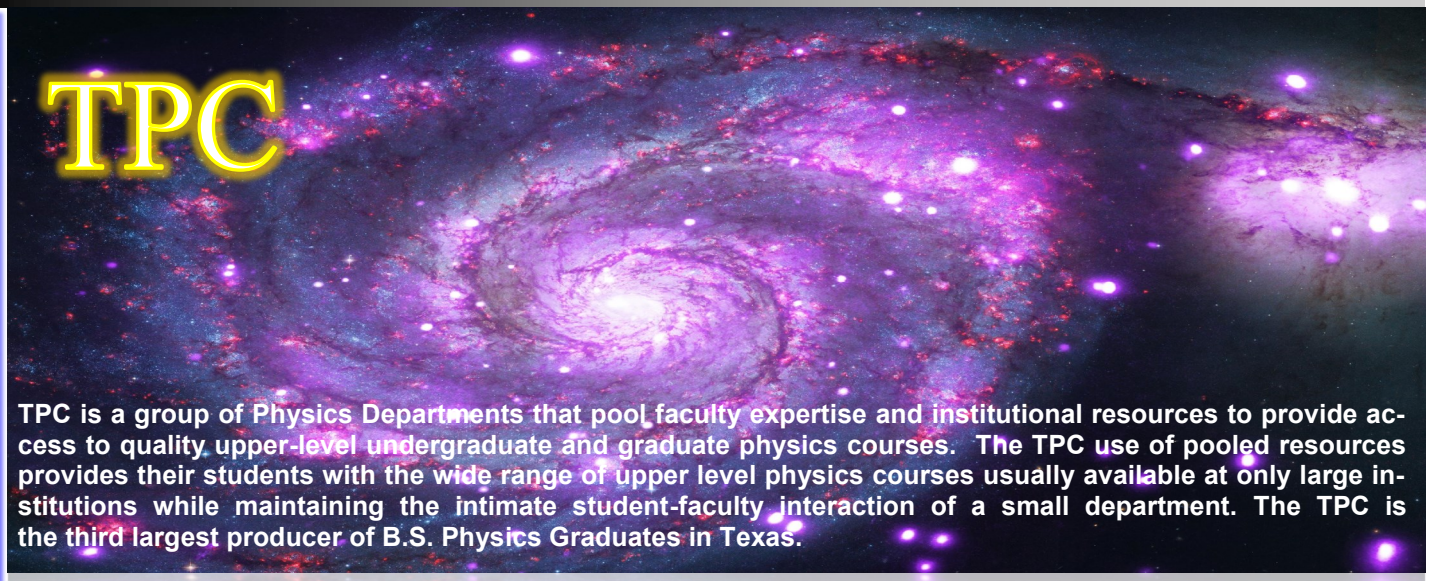
During the academic year 2010-2011, the physics degree programs at Texas A&M University Kingsville (TAMUK) along with all of the other small physics degree programs in the State, were discontinued by the Texas Higher Education Coordinating Board (THECB). Each program was allowed five years to finish graduating the students currently enrolled in the programs but no new majors were allowed to enter the program. At the time of discontinuation we had 28 physics majors. Today we have only three physics students remaining in the old program. But a new physics program has now been established.

The action of the THECB was a severe blow to the state's effort to increase number of majors in the Science, Technology, Engineering, and Mathematics (STEM) disciplines, especially at minority institutions. Because (1) the combined numbers of all the discontinued programs were comparable to the largest physics programs in the state, (2) physics is the foundation of all the STEM disciplines, and (3) all the minority universities in the state lost their physics programs, eight Texas state universities formed the Texas Physics Consortium (TPC). This union allows them to combine their classes, their faculty, their resources, and their numbers into a single large physics program distributed throughout the state while permitting the students at each university to attend classes at and receive their degrees from their respective local university.

The TPC proposal was finalized and approved by all parties during the Fall 2013 semester so that as of Spring 2014, TAMUK once again is allowed to recruit and enroll new majors into our new physics degree program. This new Bachelor of Science (BS) in Physics degree program is essentially the same as the old BS program except it requires a few more physics courses and is not as versatile. Still it retains flexibility to allow students interested in such diverse applications as astronomy, nuclear physics, cosmology, solid state, health physics, nanotechnology, petrophysics, teaching, and graduate school to obtain a solid foundation on which to build their chosen field of specialization. For further information, visit: http://www.tamuk.edu/physics_geosci/physics/index.html.



Physics Building with Telescope Dome on Top



TPC is a group of Physics Departments that pool faculty expertise and institutional resources to provide access to quality upper-level undergraduate and graduate physics courses. The TPC use of pooled resources provides their students with the wide range of upper level physics courses usually available at only large institutions while maintaining the intimate student-faculty interaction of a small department. The TPC is the third largest producer of B.S. Physics Graduates in Texas.

The Texas Physics Consortium (TPC)

In order for the citizens of the State of Texas to have maximum access to higher education, regional colleges were established throughout the state. Most of these colleges offered Bachelor of Science (BS), Bachelor of Arts (BA), and Masters of Science (MS) degrees in many important disciplines (including physics). Choices to discontinue these programs or to add new programs were requested by respective departments and approved or rejected up the chain of command through the Texas Higher Education Coordinating Board (THECB). Over time, the decision regarding program continuation was shifted up the bureaucratic ladder and many of these original programs were discontinued over the objections of the departments that were impacted.

Texas A&M University-Kingsville (TAMUK) lost its MS degree in 1981 and recognized the danger of losing its BS and BA degrees by 1994. Four other universities also recognized the danger and joined with TAMUK to form the Texas Electronic Coalition of Physics (TECP). This union allowed them to combine their numbers, resources, and faculty to form a distributed department located on their respective campuses. But the combined numbers still were not large enough to get them off the small program list. Therefore, TAMUK lost its physics degree programs in 2011 when the Texas Higher Education Coordinating Board (THECB) killed all the small programs in the State.

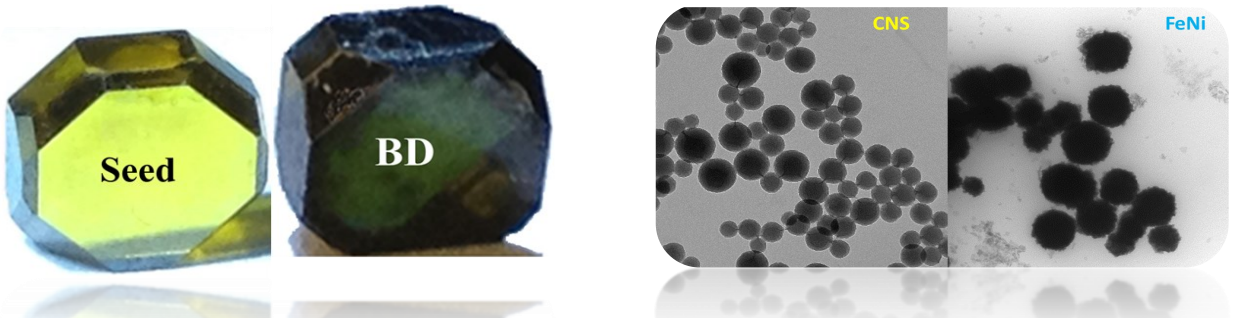
When this happened, there was a concerted effort to find some way to reinstate the physics degree programs throughout the State. This effort, led by Dr. Daniel Marble of Tarleton State University, eventually culminated in the formation of the Texas Physics Consortium (TPC). That consortium now consists of eight state universities: Midwestern State University, Prairie View A&M University, Tarleton State University, Texas A&M University-Commerce, Texas A&M University-Corpus Christi, Texas A&M University-Kingsville, Texas Southern University, and West Texas A&M University. A Memorandum of Understanding (MOU) for the TPC was signed by the participating universities' presidents during the summer of 2013, authorized by the THECB that same summer, and approved by the Southern Association of Colleges and Schools (SACS) during the fall semester 2013.

Today, because of the TPC effort, the same physics degree program is administered at all the participating universities; the advanced physics courses are taught through a combination of interactive television and the internet; the advanced laboratory experiments and senior research projects are performed locally or through remote control under the guidance of both a local advisor and a TPC coordinator; all the TPC facilities (telescopes, nuclear reactor, etc.) are available to students on all campuses; the faculty expertise on all campuses is accessible to all majors; and course availability is now on a one-year rotation instead of a two-year rotation. In other words, the new physics program has significant advantages over the old program and provides our new physics majors with increased opportunities. For further information visit: http://www.tarleton.edu/tecp/index.html.

Department welcomes new faculty members

Dr. Sunil Karna joined the Physics Program at TAMUK in fall 2013. He received his MS in Physics from University of Memphis, TN in 2009 and PhD in Physics from University of Alabama at Birmingham in 2013.

Prior to TAMUK, Dr. Karna taught Physics in Tribhuvan University, Kathmandu, Nepal. He has teaching experience in Electronics, Astronomy, Acoustics, Optics, Classical Mechanics, Heat & Thermodynamics, Modern Physics, and Mathematical Physics. He is an experimental material physicist with a focus on synthesis, characterization and understanding of nucleation, surface chemistry and growth mechanism of diamond thin films, nanomaterials and electrospun nanofibers. He has used a variety of characterization tools such as X-RD, TEM, SEM, FTIR, SQUID, UV-vis spectrometer, viscometer, and DSC/TGA to understand the properties of synthesized materials. In order to make the teaching and learning process easy and effective he is doing pedagogical research by introducing an online homework and feedback system in the College Physics course in fall 2014. Some of his previous work is illustrated below:



The first two from left are optical images of undoped (Seed) and boron-doped (BD) single crystal diamonds of dimension about ($3.5\times3.5\times1.5$ mm^3) and the two at right are TEM images of carbon nanospheres (CNS), and FeNi nanoparticles (FeNi) each with average size 100nm.

Dr. Hisham Albataineh joined the physics program in Fall 2014. He received his B.Sc. in Physics (with minor in mathematics) from Yarmouk University, Jordan. He received his first M.Sc. in particle physics from Aligarh Muslim University, India. He also received his M.Sc. and Ph.D. in Experimental Nuclear and Particle Physics from New Mexico State University, USA.

Prior to joining Texas A&M University–Kingsville (TAMUK), Dr. Albataineh had been involved in different research groups. He did the first measurement of a transverse single spin asymmetry of open heavy flavor at the PHENIX experiment using polarized proton-proton collisions at center-of-mass energy 200 GeV at Brookhaven National Laboratory. As a member of the sub-atomic group at Los Alamos National Laboratory, he worked on designing and building pixel planes for the silicon vertex detector for the PHENIX experiment; this work took place at Fermi National Laboratory. For his post-doc, Dr. Albataineh worked for the Laboratoire de Physique Corpusculaire (Universite Blaise Pascal, France) and Thomas Jefferson Laboratory on the second generation of the Deep Virtual Compton Scattering experiment.

Dr. Albataineh joined TAMUK in June 2011 as director for research and graduate studies at the Frank H Dotterweich College of Engineering where he started teaching nuclear/mechanical engineering classes. Currently he holds a joint position between the Physics Department and the Mechanical Engineering Department.

Fighting the High Cost of Textbooks

Textbooks are a significant cost for college students, with a recent report finding that the average student pays about $1200 a year for books. In fact, a survey found that well over half of all students had decided not to buy at least one course text because of its price, and almost half reported they had made an enrollment choice affected by the cost of books.

However, there are some people concerned enough to do something about this problem, and the physics faculty recently took a step to join these. Using grant funding, an organization called OpenStax College, based at Rice University, has started producing e-textbooks and making them freely available. They are focusing on courses with high enrollment nationally and where usual text costs are high, and one of their first results was a text for College Physics, TAMUK's course PHYS 1301-1302. Members of the department learned about this option in 2013, and listed the OpenStax edition as an alternate text when PHYS 1301-1302 was offered in the summer of 2013, and as the primary text beginning that fall.

This new book is available in several forms. The entire book is available as a pdf file, readable online or free to download. It can also be accessed as a linked set of webpages. Print copies can be obtained at a fairly low cost, for those whose preference for that form is strong enough.

Physics Student Research

Two TAMUK physics majors are beginning their senior research projects this semester. Both projects are under the supervision of Dr. Lionel D. Hewett and are extensions of his theory of Time-Symmetric (TS) Cosmology. This theory uses the mathematics of the order of infinities to predict that the universe is spatially flat, in agreement with modern cosmological observations. Rodolfo Gonzalez is developing a rigorous formulation of the mathematics of the orders of infinities in order to justify that prediction. This new branch of mathematics sheds new insight as to the nature of various sizes of infinities and may well have important applications outside of the field of cosmology.


Rodolfo Gonzalez


Kevin Romans

TS Cosmology also predicts that cold dark matter, recently detected through its gravitational effects, should also emit soft x-rays at a specific wavelength of 10 nm. Kevin Romans is doing theoretical research to determine the intensity of that dark matter glow to see if it is bright enough to be detected with modern instrumentation. If this glow can be detected, it will allow astronomers to picture directly the distribution of cold dark matter in the universe and compare that distribution with the distribution determined through dark matter gravitational effects.

Recent Graduate Jesus M. Salas

In the spring of 2014, we graduated a very talented physics major, Jesus M. Salas. He has now moved on to graduate school at UCLA where he seeks to earn a PhD in astronomy. Jesus spent the last four years here at TAMU-K earning his Bachelor's degree in physics and participating in much of what our university has to offer. Jesus graduated Summa Cum Laude and received the College of Arts and Sciences' Distinguished Student Award. Throughout his time here, he was a member of the Honors College and participated in the Society of Physics Students local chapter, leaving as chapter president. Jesus was inducted into the physics honor society, Sigma Pi Sigma in 2013. In addition to his academic efforts, Jesus became a volunteer for operating the TAMU-K 16" telescope during public viewing nights. Jesus also mastered astronomical imaging and spent numerous evenings operating the telescope doing imaging. Jesus spent one summer working at UCLA on equipment for the upcoming 30 meter telescope planned for completion in about 8 years. Another summer, Jesus worked at MIT helping to develop diagnostic programming for the Murchison Wide Field Array radio telescope. For his senior project at TAMU-K, Jesus also worked on developing a model for mini-halos, objects that apparently exist at the far edge of our observable universe, in collaboration with researchers at MIT. While Jesus was doing all of this, he pursued his activities in music performance and composing as a hobby, creating numerous YouTube performances of both covers and original compositions.

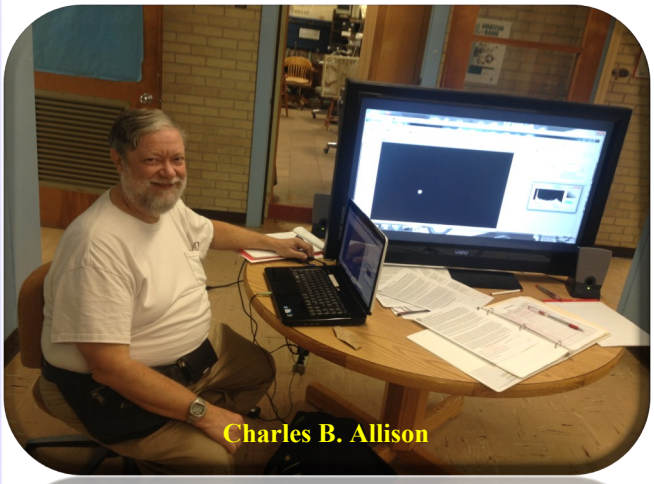
Performing original composition True Love at TAMU-K Spring 2013 Student Recital. This and other tunes may be found on YouTube at The Source 007.

M27, the Dumbbell Nebula, Taken by Jesus M. Salas using the TAMU-K 16 " Telescope.

M13 Globular Cluster, Taken by Jesus M. Salas using the TAMU-K 16" Telescope.

Public viewing nights Facilities & Technologies

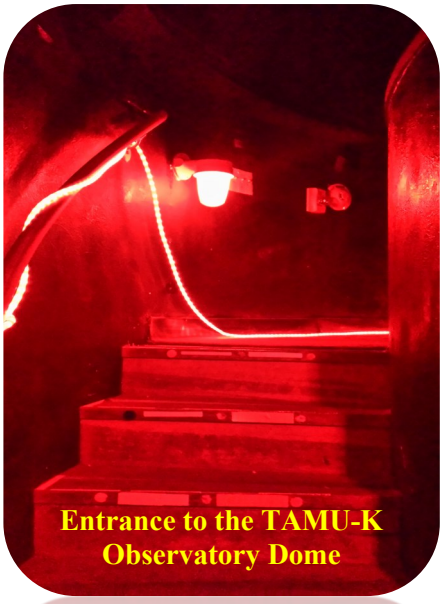
Several times during the year, the physics program hosts public viewing nights open to everyone. These start at dark, either 7pm or 8pm, depending on daylight savings time. Events take planning and preparation and numerous student volunteers to help make them successful. Events include attendees viewing objects through TAMU-K's 16" telescope and these events often attract over 100 people. An event needs several activities going on simultaneously since only one person may look through the telescope at one time.


Charles B. Allison

For visual observing, the 16" telescope is operated in the Newtonian configuration. It is available for use by TAMU-K students who have received training on its operation on nights when it is not being used for public viewings or for lab experiments. During public viewings, trained students operate the telescope and dome.


Public Viewing Night- Sept. 18, 2014

The telescope is computer controlled. This is referred to as a computer based go to telescope since one simply has to command the program to move the telescope to specified object. It can be used for viewing or imaging simply by mounting either an eyepiece or an astronomy camera into the eyepiece. It is a large telescope and requires the use of a roll around ladder for viewing.


Entrance to the TAMU-K Observatory Dome

On top of the 16" telescope is a 7.5" Maksutov-newtonian F/5.3 telescope designed for imaging. A camera is used with this telescope to allow other people to see the object being viewed by the 16" telescope. In the telescope dome, a second computer controls the camera imaging and provides an onscreen display of the images. That computer is networked on the local Wi-Fi system to a second computer located on the second floor of Hill Hall so people standing in line can see what is being observed on the 16". The second computer uses a flat screen TV for the display, allowing many people to view what is going on at the same time.


The TAMU-K 16" telescope with 7" imaging telescope riding piggyback

The second computer is also used to run a power point presentation with images, videos, and accompanying music to provide informative entertainment to the attendees waiting in line. Additionally, when there are good viewing conditions and enough volunteers, one or more 8" go to telescopes are set out on the astronomy viewing deck to allow attendees to view additional objects and spend more time viewing objects and less time simply waiting in line.