Jessica Orvis (far right), of the Department of Chemistry and Biochemistry received the 2016 Georgia Southern University Excellence award for Instruction.
COSM Awards of Excellence

Ji Wu

Dr. Ji Wu, of the Department of Chemistry and Biochemistry, won the COSM Award of Excellence in Research.

Checo Colón-Gaud

Dr. Checo Colón-Gaud, of the Department of Biology, received the COSM Award of Excellence in Teaching.

Christine Whitlock

Dr. Christine Whitlock, of the Department of Chemistry and Biochemistry, received the COSM Award of Excellence in Service.

Thomas Anderson
Thomas Anderson, of the Department of Chemistry and Biochemistry, received the COSM Staff Award of Excellence.

Eagles in Training for STEM Careers

The i²STEMe Experience Summer 2016 camp programs focused on hands-on projects to inspire campers to work collaboratively to investigate potential solutions to problems in their immediate environment through the process of design engineering.

A residential camp held on Skidaway Island, Eagle Expedition was designed and supported by Bob Williams, the camp leader, Clark Alexander, the Director of Georgia Southern’s Applied Coastal Research Lab, and Marc Frischer, Skidaway Institute scientist, and executed in collaboration with the staff at the UGA Marine Extension Center and Aquarium. Eagle Expedition is a unique STEM Experience Camp for students interested in oceanography, marine science and coastal ecology. Students were part of the research team collecting data on coastal ecosystems from land and boat surveys, mapping shorelines with GPS, sampling the coastal ocean for environmental data and monitoring weather patterns.

The camp was designed to engage students and encourage exploration and investigation by teaching campers how to evaluate problems and design potential solutions in real-world scenarios, and then apply the engineering design process which combines practical knowledge and natural creativity to devise potential solutions to some of today’s issues. Students were encouraged to imagine, plan, create, improve, and inquire in collaboration with their instructors and their peers. Campers learned how to apply science, technology, engineering and mathematics, along with the necessary ‘soft skills’ to create, collaborate, and communicate to a variety of audiences – all while having a blast

Department of Biology

The Department of Biology Welcomes New Faculty

The Department of Biology is one of the largest departments on campus. For the academic year 2016-17, the department has 43 faculty, 8 support staff, a collections manager, 53 graduate students and 1209 undergraduate majors. The department operates in 3 different buildings on
campus, including the relatively new LEED-certified Gold building. The department welcomes the new president Dr. Jaime Hebert and are looking forward to the new academic year!

The Department of Biology welcomes 3 new permanent faculty members and 1 new visiting faculty member for this academic year. Dr. Kerrie Sendall, plant ecologist, received her Ph.D. from the University of Minnesota and completed a postdoctoral appointment at the University of Minnesota. Kerrie recently co-authored an article on boreal forest warming in Nature titled “Boreal and temperate trees show strong acclimation of respiration to warming.” Dr. Stephen Greiman, parasitologist, received his Ph.D. from the University of North Dakota and is currently a NSF postdoctoral associate at the University of New Mexico. Stephen will join our department in January 2017 and is currently conducting research in Mongolia. He is the recent recipient of the Ashton Cuckler New Investigator Award from the American Society of Parasitologists. Dr. Emily Kane, functional morphologist, received her Ph.D. from the University of California at Riverside. She is currently an NSF postdoctoral fellow at Colorado State University and will also join the department in January of 2017. Dr. Lauren Stefaniak has been a postdoctoral associate in the Institute for Coastal Plain Science the past two years and is now a Visiting Assistant Professor in Biology. She is a marine biologist and received her PhD from the University of Connecticut.

**Biology Faculty Distinguished in Research, Teaching and Service**

Faculty in the department continue to distinguish themselves in research, teaching and service. Dr. Denise Carroll was selected to be a Governor’s Teaching Fellow, the 4th in the Department of Biology. Dr. Christian Cox co-authored an important paper in Nature on the evolution of mimicry. Dr. Checo Colon-Gaud received the Ogeechee Riverkeeper Educational Partnership of the Year Award at their Annual Meeting. Dr. Colon-Gaud also received the COSM Award of Excellence in Teaching for 2016. Dr. Lance Durden published a paper describing a new genus and five new flea species discovered in Indonesia in the Journal of Medical Entomology. Dr. Durden has now published over 260 peer-reviewed articles. Dr. Laura Regassa began a stint as Program Director of the National Science Foundation Research Traineeship Program.

Dr. John Schenk, Curator of the Georgia Southern Herbarium, received a National Science Foundation Biological Research Collections Grant. This grant totaling almost $300,000 will allow Dr. Schenk and
his students to incorporate un-accessioned and orphaned specimens into the department’s herbarium. This is great news for the herbarium, department and university.

**Biology Undergrad News**

Many of our undergraduate students had a busy summer taking courses or conducting undergraduate research. **Bryant Brumbill** spent the summer participating in a NSF-REU program at the Long-term Ecological Research site in the Luquillo Mountains of Puerto Rico.

Eleven students participated in the department’s study abroad course to Ecuador taught by **Dr. Ed Mondor** and **Ms. Michelle Tremblay**. The group even got to meet the President of Ecuador Rafael Correa! **The Biological Field Experience: Ecuador study abroad opportunity will be offered again Summer 2017!**

**Anna Lee Whitaker** and **Alex Dye**, mentored by **Dr. Scott Harrison**, won the best undergraduate poster award at the Association for Southeastern Biologists Meeting held in North Carolina.

**Biology Grad Student News**

Graduate student **Theresa Gunn**, mentored by **Dr. Christine Bedore**, received the Donald R. Nelson Research Award from the American Elasmobranch Society. **Jackman Eschenroeder**, mentored by **Dr. Jamie Roberts**, won the best student paper award at the Virginia and North Carolina Chapters of the American Fisheries Society.

**Biology Alumni Move Onward and Upward**

Former students offer evidence that their training at Georgia Southern prepared them to move onward and upward. Recent graduate **Kaitlyn Hanley**, now a graduate student at Clemson University, was interviewed by PBS for a part of their upcoming documentary “The Great American Thaw.” Kaitlyn’s research involves pikas, small mammals whose alpine habitat is shrinking due to a warming climate.
Biology alumnus **G. David Williamson** who went on to earn a Ph.D. in biostatistics from Emory University was just elected to be Vice President of the American Statistical Association. **Dr. Louvenia Rainge**, B.S. Biology alumna, received The Dental College of Georgia’s 2016 Distinguished Alumna award. **Dr. Carrie Simmons**, Director of the Gulf of Mexico Fishery Management Council, was presented the Biology Organization of Graduate Students Distinguished Graduate Alumna award. Dr. Simmons gave a presentation and talked with students about careers in biology. Alumna **Gina Kent** was featured in a story about conserving the Swallow-tailed Kite, in Nature Conservancy magazine.

## The Department of Chemistry and Biochemistry

### Georgia Southern's Elite 8 for REU-2016

This summer’s CEMITURE (the Georgia Southern University Chemistry Dept.’s own REU program) welcomed eight undergraduate students from five different states for a 10 week intensive research experience on our campus. This is the second year of the program. The students were mentored by faculty from the Chemistry and Biochemistry, Biology, Environmental Health (in the College of Public Health) departments. The program, coordinated by **Dr. Karelle Aiken**, aims at providing research opportunities to undergraduate students from institutions that don’t offer the same capabilities as Georgia Southern University.

The participants were selected from a pool of 200 applicants and worked on research projects, including nanomaterials, chemical sensors, drug design, and food toxicology. Through an intensive research experience, CEMITURE seeks to equip its participants with the necessary skills and technical knowledge to forge impactful and fulfilling careers in science. The program is also designed so that the scholars will build a community of professionals with their peers and Georgia Southern faculty and students. The students gained a global perspective of how science can serve the worldwide community. The scholars’ research experiences are complemented by professional development workshops for enhancing their career outlook, scientific communication skills, leadership abilities, and their sense ethics as scientists.
Leah Bartel of Warren Wilson College says that she “gained perspective into the life of a researcher, was helped tremendously on my scientific writing skills, and built relationships with academic professionals that helped me understand my career options.” She also says, “The most challenging part of the program was accepting all of the roadblocks that arise while doing research and having the patience to meet each additional challenge with unwavering persistence.”

Besides an intensive research program, the students participated in a series of professional development workshops, as well as visits to the Georgia Cancer Center at Augusta University and an afternoon of outdoor activities at the nearby George L. Smith State Park. The program concluded on July 22nd, and the participating students have all submitted abstracts to attend the National Organization of Black Chemists and Chemical Engineers Conference in November in Raleigh, NC. More info about the CEMITURE program can be found here: https://cosm.georgiasouthern.edu/reu/cemiture-projects/.

The Department of Geology and Geography

Geologists Investigate Salt Water Intrusion on a Georgia Barrier Island

A research team consisting of Drs. Kelly Vance, Jim Reichard, Jacque Kelly and Fred Rich from the Georgia Southern Department of Geology and Geography are working with Dr. Brian Meyer (Georgia Southern alumnus, Georgia State faculty) to determine the pathways by which salt water is entering shallow aquifers on St. Catherines Island, and the potential for interaction with the deep Floridan aquifer system. Results of this work will be communicated to the public and regional water resource managers through the outreach efforts of additional team members Shana Jones and Leigh Elkins from the Carl Vincent Institute of Government at UGA. This research is supported by an $83,000 award from Georgia Sea Grant for operations in 2016 and 2017.

The project is a logical continuation of geophysical and vibracore investigations of the stratigraphy and structure of St. Catherines Island and their influence on island hydrology (Vance et al., 2011). Hydrologic investigations based on the sampling and analyses of deep Floridan aquifer well samples (Reichard et al., 2014) indicate salt water intrusion into the Upper Floridan aquifer from the underlying saline aquifers of the Lower Floridan. The top of the upper Floridan aquifer is ~ 400 ft deep below the surface of St. Catherines Island. This form of salt water intrusion requires structural pathways, such as faults and joints, to flow upwards across the relatively impermeable strata that separate the porous and permeable strata of the Lower and Upper Floridan aquifers. Sampling of six
shallow wells (< 30 ft depth) installed into the surficial aquifer by Reichard, with the assistance of students and colleagues, revealed periodic salinity spikes that may be linked to tidal peaks. However, the wells exhibiting the salinity spikes are not situated closest to the shore as would be expected for simple lateral movement from the sea. This feature suggests that structures and/or lateral and vertical variations in strata may be focusing salt water intrusion in the surficial aquifer. Are the same structural channels that are responsible for salt water intrusion in the deeper strata of the Upper Floridan aquifer also influencing groundwater flow through the poorly consolidated sediments that host the surficial aquifer? How will the surficial aquifer system respond to sea level rise? Will salt water move between the shallow and deep (Floridan) aquifers as sea level rises? These are important questions to resolve as the Floridan aquifer system is the most important groundwater resource for the Georgia Coastal Plain as well as parts of South Carolina, Florida, and Alabama.

Resolution of the questions posed above and the development of a more accurate conceptual model of this coastal groundwater system is important to predict the behavior of the hydrologic system as sea level rises. This will inform the best practice for groundwater resource management. To get a better handle on the shallow hydrologic system, additional shallow wells were needed. During the 2016 Georgia Southern University Spring Break, 13 new wells were drilled (Fig. 1.) using the Geology and Geography Department’s tractor-mounted Geoprobe system. The Geoprobe allows collection of core samples followed by installation of a monitoring well. Completion of these wells established an 18 well grid.

The wells are monitored for head fluctuation and sampled to determine pH and dissolved oxygen (Fig. 2) Jim Reichard uses ion chromatography to analyze the samples for additional constituents including K+, Na+, Mg++, Ca++, F-, Cl-, NO3-, PO4-3, SO4-2 to classify the water type and constrain aquifer characteristics. Jacque Kelly is conducting radon and radium, and oxygen and hydrogen isotopic analyses of the water samples to evaluate the presence and distribution of sea water in the well grid. Initial analyses show substantial variation in water chemistry among wells indicating the shallow aquifer system is not a simple system.

Core logs from the shallow well installation will be supplemented with additional deeper cores to identify the depth of important interfaces between permeable sands and relatively impermeable clay layers. Fred Rich will provide palynological analyses of selected organic sediments from the core for
paleoenvironmental analyses. The cores are being described and logged in detail by Vance. Brian Meyer will use the complete core log data set to assemble the shallow and deep core log data into cross-sections and block models illustrating island structure and stratigraphy. The core log data provides “ground truth” for geophysical surveys (ground penetrating radar and resistivity) that supply additional subsurface stratigraphic, structural and hydrologic information. Those surveys will be conducted by Vance and Kelly with the assistance of students.

This project is also providing valuable practical experience for our geology majors. Undergraduates **Doug Madrid, Amber Degon, Daniel Gray, and Jake Lindsay** participated in the core drilling, initial field logging and well installation (Figs. 3, 4). Albert Killingsworth (Georgia Southern geology degree, COSM Advisement Center) also supported the fieldwork and assisted Vance and St. Catherines staff with transporting the Geoprobe and the coring/well supplies to the barrier island work site (Fig. 5). Geology majors **Anne Delua** and **Ryan Diederich** will conduct, process and interpret geophysical surveys for their senior thesis projects. These students will also be making a valuable contribution to a better understanding of barrier island hydrogeology on the Georgia coast.

**Log and Prep**

Fig. 4. Geology majors Amber Degon and Daniel Gray log core and prep it for transport.

**Coring Work**

Fig. 3. (L to R): Jim Reichard, Doug Madrid (geology major) and Kelly Vance adding a section of drill pipe during coring work.

**Equipment Transport**

Fig. 5. The first step was getting the equipment to St. Catherines Island (SCI). Thanks to Albert Killingsworth (shown) and SCI staff Spyder Crews and Richard Bew for assistance in moving essential gear to the island. The Geoprobe unit is sitting on the deck of the Laura Leigh, a former shrimp boat converted to a small freighter to support SCI.
The Georgia Southern Sea Turtle Program at St. Catherines Island: The 2016 Sea Turtle Nesting Season

The Georgia Southern University Sea Turtle Program at St. Catherines Island (GSUSTP@SCI) is completing another successful season of operation as the Fall 2016 Semester begins at Georgia Southern. Located between Ossabaw Island to the north, and the Blackbeard-Sapelo island couplet to the south (See Fig. 1), St. Catherines Island is undeveloped, privately owned, administered through the St. Catherines Island Foundation, and devoted to conservation, research and outdoor education. The sea turtle conservation work during the 2016 nesting season marks 27 years of sea turtle conservation, nesting habitat research, geologic research and field-based science education on St. Catherines Island (SCI). The program is currently administered by Co-directors Kelly Vance and Gale Bishop, and Executive Coordinator Jaynie Gaskin. Vance and Gaskin are members of the Dept. of Geology & Geography, and Bishop is Prof. Emeritus from the same Department. Highlights from the summer of 2016 include documentation of a record breaking nesting season on SCI (321 nests) and more significantly, contributing to a record breaking year for sea turtle nesting on the Georgia coast, exceeding the 2800 nest recovery target of the Georgia Department of Natural Resources for the first time with 3284 nests as of August 30, 2016.

The conservation component of the program requires daily monitoring, documentation, and reporting of all sea turtle activity (Figs. 2a, 2b) on ~ 19 kms of beach starting on May 1 and extending through August. Monitoring of beaches on SCI is a challenging process due to the presence of four inlets that divide the beach into segments. The process is further complicated by shoreline erosion that averages 3 meters per year, with local rates of 6 to 8 meters per year, resulting in some beaches that are covered with “boneyards” of oak and palm trunks where the shoreline has eroded into maritime forests (Fig. 3). The 2016 daily monitoring work on SCI has been...
conducted by Gale Bishop, Jaynie Gaskin and Kelly Vance with the assistance of three sea turtle interns (Anne Delua, Mattie Whitesell, and Brooklyn Walsh). Nesting activity usually ceases in August, but incubating nests must be monitored and inventoried (Fig. 4) after hatchlings emerge to collect statistics on hatchling production and hatching success. This work continues into October as the incubation period may range from 50 to 65 days. Nesting and hatching data are provided to the Georgia DNR through daily data entry on the seaturtle.org web site.

**Document**

Fig. 2a. Alexandria Farris documents a non-nesting loggerhead sea turtle crawlway.

**Crawlways**

Fig. 2b. Students document and sketch a loggerhead sea turtle nest and crawlways. Entry crawlway on left, exit on right. The egg chamber lies hidden within the churned and covered sand between the tracks in the foreground.

**Boneyards**

Fig. 3. Boneyards of dead trees on the beach are a product of shoreline erosion responding to rising sea level and limited sand supply. They restrict beach monitoring to narrow time “windows” centered on low tide.
**Hatchlings**

Fig. 4. Nests are inventoried by exhuming nest contents six days after the first hatchling emergence. This one (Nest 16-192) contained 134 empty shells, 15 unhatched eggs and 2 hatchling corpses indicating 89% of the eggs produced hatchlings that emerged from the sand. After emergence at night, hatchlings run a deadly gauntlet of ghost crabs and roaming raccoons to reach the sea.

The 2016 season was also a record year for student participation. Georgia Southern student Anne Delua performed sea turtle conservation work beginning after final exams in May and monitored beaches into early July. Eighteen Georgia Southern students enrolled in the concurrent B-Term courses Sea Turtle Natural History and Barrier Island Environmental Geology and spent 10 days (July 12–21) on SCI monitoring beaches to document nesting activity after receiving formal training by GA DNR biologist Mark Dodd and the GSUSTP@SCI staff. The students consisted mostly of Biology and Geology majors but included two Interior Design students with a Sustainability Concentration, and an active science teacher earning graduate credit. During the ten days on SCI the students contributed to a record year for SCI sea turtle nesting, passing the 2015 record of 209 nests as they documented and conserved Nest 16-300 before the end of their stay. These students contributed to the conservation of a state record number of nests (3284) to support recovery of this threatened species (Caretta caretta). To complete course requirements, all students kept daily field journals with monitoring data and prepared papers on loggerhead sea turtles, addressing their nesting behavior, nesting habitat, emergent hatchling behavior, and threats to adults, nests, and hatchlings, documented and illustrated with their own images from their daily monitoring work on SCI. Students also collected field data, prepared reports and gave presentations as part of research projects for the Barrier Island Environmental Geology course.

Additional highlights and connections for the GSUSTP@SCI in 2016 include participation of our staff and some students in a horseshoe crab tagging program sponsored by Georgia Sea Grant and administered by Dr. Fred Rich. Mark Dodd (GA DNR) provided a superb sea turtle anatomy lesson for the class during the necropsy of a stranded loggerhead sea turtle on South Beach (Fig. 5). The program also hosted Camille Licate as she worked on production of sea turtle conservation videos for the “Kids for Positive Change Project”. The program is growing and evolving through strengthened ties with the Georgia Sea Turtle Center (GSTC) which provides special tours of the GSTC for our students, facilitated by wildlife DVM and GSTC Director Terry Norton. The GSUSTP@SCI also cooperates with Dr. Joe Butler (Univ. North Florida) to support his diamond back terrapin research and conservation efforts. Jaynie Gaskin is working with the staff of the Kashmir World Foundation conservation group to develop new monitoring and reporting software.
and to explore the use of drones to support beach monitoring. **Dr. Chris Mowry** (Berry College) is working with our program to monitor the appearance and activity of coyotes on SCI. Berry College also provides and supports one sea turtle intern each summer for our monitoring work. One of those interns (**Mattie Whitesell**) entered the graduate program in biology this fall at Georgia Southern. **Dr. Brian Meyer** (Georgia Southern alumni, Georgia State faculty) continues to monitor shoreline evolution and the impact on nesting habitat on SCI in the face of rising sea level. Dr. Meyer also works with Georgia Southern faculty on hydrogeology research.

![Field-based courses are unique and require much effort and support to succeed (Fig. 6).](image)

**Fig. 5.** Mark Dodd (GA DNR biologist) prepares to necropsy a loggerhead sea turtle stranded on South Beach. Mark provided an outstanding anatomy lesson for our students and staff.

Field-based courses are unique and require much effort and support to succeed (Fig. 6). The GSUSTP@SCI acknowledges and appreciates the support of the COSM, the Department of Geology and Geography and Department Chair Jeff Underwood, the COSM Advising Center and especially Lisa Vance and Kelly Gagel for course publicity and recruiting, and for cooking and shopping for the class during island residency. The GSUSTP@SCI is a member of the Georgia Sea Turtle Cooperative administered by Mark Dodd through the GA DNR. Our program is able to operate through their federal to state permitting process, training and guidance. This program would not be possible without the benefit of the unique and beautiful host site that is St. Catheines Island, and the generous logistical support and lodging provided by the St. Catheines Island Foundation. Special
thanks to SCI Manager Mike Halderson for supporting this program and making these courses possible for our students.

Fig. 6. Eighteen happy Georgia Southern students, two interns, Fred Rich and Kelly Gagel pose for a farewell photo on the Pope Mobile touring vehicle before departing St. Catherines Island.

The Department of Mathematical Sciences

The Department of Mathematical Sciences Welcomes New Faculty

The department welcomed Dr. Heidi Eisenreich in August. She completed her Ph.D. from the University of Central Florida in May. Dr. Eisenreich will teach mathematics education courses in the department.
Three faculty members changed from lecturer positions to assistant professor positions. **Dr. Jimmy Dillies**, **Dr. Emil Iacob**, and **Dr. Ha Nguyen** all made the transition to tenure-track positions in August.

We welcomed four former graduate students into temporary faculty roles. Hired as regular, limited term faculty are **Katelyn Coggins**, **Zachary Espe**, **Nathan Farmer**, and **Michael Fox**.

**Math Students Recognized**

We celebrated our Senior Math Major Award winner, **Keller Vandebogert** at Honors Day and the reception afterward. Also at the reception, we recognized **Matthew Just** as Outstanding Graduate Student and **Katelyn Coggins** as Outstanding Graduate Assistant. **Alan Budd**, **Nyla Basharat**, and **Nicolas Smoot** received Meritorious recognition.

Nine students graduated with their M.S. degree at the May graduate commencement ceremony. Three remained in the department to teach (see Coggins, Espe, and Fox below), **Jonathan Gregory** is teaching in Tennessee, and **Alan Budd** took a job with Texas Instruments in Dallas, Texas. **Matthew Just** accepted an assistantship to pursue his PhD at the University of Georgia while **Nicolas Smoot's** assistantship is to pursue his PhD at Johannes Kepler University in Linz, Austria.

**Mathematical Sciences Department News**

The department continued to host active colloquia and seminar series. We hosted 16 colloquia speakers in addition to the seminars in geometry, statistics, mathematical physics, computational science, and analysis. Our CLEC lecture attracted almost 300 students in March to hear **Dr. Randall Kamien** from the University of Pennsylvania.

In May, **Dr. Alina Iacob** hosted a two-day conference on the Homological Methods in Algebraic Structures. The conference was the continuation of an NSF sponsored project from the previous summer.

**The Department of Military Science**

**Eagles Win Third MacArthur Award**

The U.S. Army Cadet Command at Fort Knox, Kentucky announced yesterday the eight winners of the prestigious MacArthur Award for the 2014-2015 school year.
Cadet Command oversees eight Brigades comprised of 275 senior Army Reserve Officers’ Training Corps (ROTC) nationwide. The award recognizes the top program from each of the eight Brigades and is presented by Cadet Command and the Gen. Douglas MacArthur Foundation.

Awards are based on overall performance, National Order of Merit List standings, and Cadet retention rate.

Georgia Southern University was selected as the top program from 6th Brigade Army ROTC, which includes 39 programs from six states and Puerto Rico. This marks the Eagle Battalion’s third MacArthur Award since 2009.

Other MacArthur Award winners for FY15 include:
- 1st Brigade — Virginia Military Institute, Lexington, VA
- 2nd Brigade — University of Vermont, Burlington, VT
- 3rd Brigade — University of Wisconsin–Stevens Point, Stevens Point, WI
- 4th Brigade — University of Virginia, Charlottesville, VA
- 5th Brigade — University of Houston, Houston, TX
- 7th Brigade — Austin Peay State University, Clarksville, TN
- 8th Brigade — University of Oregon, Eugene, OR

The Eagle Battalion was also recently recognized by 6th Brigade for having the Top Nursing Program for 2015, Highest GPA for Mission Set 17, and exceeded the contract goal for STEM Cadets for Mission Set 17.

Lieutenant Colonel Erik Kjonnerod, Professor of Military Science, praised the Battalion for its recent accolades.

“Congratulations to all of our Cadets, Cadre, and Staff on winning the coveted General Douglas MacArthur Award for 2015! Your commitment, dedication and determination is evident on a daily basis. I am proud to serve with all of you and thank you for consistently going above and beyond the call of duty! Strength and Honor!”

The Department of Physics

Faculty member awarded new Patent on “Engineered lumenized vascular networks and support matrix”

Dr. Dragos Amarie of the Department of Physics and former collaborators were awarded US Patent 9,267,099 on February 23, 2016 which implements a new design for blood capillary fabrication
using living cells within a support medium. Under controlled conditions, culture of specialized cells produces viable lumenized capillary networks with natural or pre-determined geometries by manipulating the extra-cellular medium and basement membrane associated with the capillary networks. Since the capillary networks and its substrate are detachable from the supporting substrate, this technique could be useful in tissue engineering applications. In the long run, both the capillary network and its associated extracellular medium have numerous scientific, industrial and medical applications. In vitro angiogenesis assays employing the forming capillary network play a crucial role in identifying factors involved in vascular development. Such assays are used in drug development as moderate-throughput screens for angiogenesis promoters and inhibitors related to wound healing, age-related macular degeneration, diabetes, cancer, and other diseases.

The Photonic Nanotechnology Computational Group

This past Spring, the Photonic Nanotechnology Computational Group graduated its first MS student in the Applied Physical Science (MS-APS) program at Georgia Southern with thesis “Modification of the Fundamental Properties of Light Through Interaction with Nanostructured Materials”. After graduation David Keene joined the PhD program in Material Science and Engineering at Norfolk State University.

In March, the group members Reed Hodges, Anne Delua, Matthew LePain, David Keene and Dr. Maxim Durach travelled to March APS meeting in Baltimore, MD to present several posters and talks. Later Dr. Durach presented and co-authored 2 talks at CLEO conference in San Jose, CA.

The group’s work has been published in Physical Review B as a Rapid Communication, and Annalen der Physik. Another paper has been accepted for publication in New Journal of Physics.

Edwards participates in NSF "Ideas Lab" to Measure "Big G"

Mark Edwards was chosen by the National Science Foundation (NSF) to participate in the "Ideas Lab: Measuring 'Big G' Challenge" held this past July 18-22, 2016 at the National Institute of Standards and Technology (NIST) in Gaithersburg, MD. The purpose of this event was to bring a group of scientists together to brainstorm new ideas for measuring Newton's Universal Gravitational Constant also known as
"Big G".
In the 1600s, Sir Isaac Newton discovered the "law of gravity" which states that the gravitational force between two objects is proportional to the product of their masses divided by the square of the distance between them. Big G is the constant of proportionality that relates these two quantities and is a fundamental constant of nature.
The first quantitative measurement of Big G was made in the late 1700s by Henry Cavendish and many more measurements of Big G have been made since then. Even after 200 years, Big G remains the mostly poorly measured fundamental constant of nature. Some of the measurement made in the last 10-15 years have actually made the uncertainty in the value of Big G increase. This situation has provided the motivation for the ideas lab.
At the ideas lab Edwards presented an idea for measuring Big G aboard the International Space Station (ISS). In 2017, the National Aeronautics and Space Administration (NASA) plans to deploy a new experiment to the ISS called the Cold Atom Laboratory (CAL).
This experiment will be capable of creating ultra-cold atomic gases that have been cooled into a state called a Bose-Einstein condensate (BEC). When the gas is in the BEC state, it can be split in two and separated in the microgravity environment of the ISS. When this is done with a large source mass present, the source mass pulls gravitationally on the two BEC pieces differently and this difference can be measured if the two pieces are put back together.
Edwards is working on refinements to the design of this proposed experiment. He is collaborating with Dr. Doga Murat Kurkcuoglu, a professor in the Physics Department at Georgia Southern and a physics major, Ms. Elizabeth Ashwood and with Dr. Charles W. Clark of the Joint Quantum Institute (JQI). The JQI is run jointly by NIST and the University of Maryland at College Park.

**Faculty Member Participates in Scholarly Activities**

**Dr. Xiaojun Wang**, Professor of Physics, had a very busy summer with scholarly activities, including a feature invited talk (the thirteenth lecturer) on the Material Forum for Young Scientists, University of Science and Technology Beijing (USTB), May 24, 2016; an Invited speaker at The International Conference Rare Earths, June 5 - 10, 2016, Sapporo, Hokkaido, Japan; an invited talk at National Institute for Materials Science (NIMS), June 10, 2016, Tsukuba, Japan; and an invited plenary talk at Nature-Springer-CIOMP Light Conference, July 4 - 8, Changchun, China.
In addition, Dr. Wang will give an invited talk at Phosphor Safari 2016, the International Symposium on Luminescence, Spectroscopy and Applications, which will be held in Hong Kong, Nov 28 – Dec 1, 2016.

Dr. Wang has published 5 articles in prestigious journals so far in 2016, including one in a top undergraduate research journal (scholar.google.com). He continues to serve as an editor at Materials Research Bulletin and Light: Science & Applications (NPG/Springer).

He has been invited to attend the Editors’ Conference of Elsevier, held in Boston, MA, Nov 11-13, 2016 (the conference will cover all the costs). He was awarded as an Outstanding Editor by Light: Science & Applications in July, 2016.

**Dr. Wang** was awarded a certificate by the Dean of School of Materials Science and Engineering, University of Science and Technology Beijing (USTB), after his lecture in the Material Forum for Young Scientists, (May 24, 2016).
Professors study how stars form in ring galaxies

Galaxies - once considered to be isolated "Island Universes" - actually experience collisions and close passages with their neighbors. Such events can drastically change both a galaxy's appearance and rate at which it forms new stars.

One of the rarest and most dramatic examples of this are ring galaxies, created when a neighbor galaxy passes through the center of a larger "target" galaxy. The collision causes gas and stars in the target galaxy to accumulate into dense rings that travel outward at high speed. A prime example is the galaxy named AM0644-741, shown imaged in visible light by the Hubble Space Telescope in the displayed figure (below). The ring's blue color indicates that it is robustly forming stars. Georgia Southern Professors James & Sarah Higdon are studying how stars form out of the gas swept up in the rings, and if this is different from the way ordinary galaxies do it. Stars form in dense and cold clouds of molecular gas (mainly hydrogen), so to study star formation they must measure its quantity and distribution.

They were recently awarded observing time with the Atacama Large Millimeter Array (ALMA), a collection of 66 separate radio telescopes located on the high Atacama plains in Chile. These telescopes work together to produce sensitive high resolution images of light emitted by molecules
in distant galaxies. The panel at right shows that cold molecular gas is heavily concentrated in AM0644-741's ring. Together with other data James and Sarah hope to learn if stars form with greater efficiency or more rapidly in the rings of these objects. Their work shows that 130-million years ago, in the middle of the dinosaur's reign on Earth, a neighboring galaxy crashed through the center of a normal spiral galaxy, creating the ring we now observe moving outward at 340,000 mph and forming stars roughly 10-times faster than our own Milky Way galaxy.

About Us

The College of Science and Mathematics at Georgia Southern University prepares students in baccalaureate majors and the Master of Science programs.

- Biology
- Chemistry and Biochemistry
- Geology and Geography
- Mathematical Sciences
- Military Science/ROTC
- Physics

Georgia Southern University, Southern Drive, Statesboro, GA, United States

cosm@georgiasouthern.edu (912) 478-5111 cosm.georgiasouthern.edu