The Quaternion

Volume 28: Number 1; Fall, 2013
The Newsletter of the Department of Mathematics and Statistics
USF UNIVERSITY OF SOUTH FLORIDA

IN THIS ISSUE

The Quaternion is an annual publication of the USF Department of Mathematics and Statistics, which can be visited on the web at <http://www.math.usf.edu/>. Our our snail-mail address is Department of Mathematics and Statistics, University of South Florida, 4202 E. Fowler Ave., CMC342, Tampa, FL 33620. Our phone number is (813) 974-2643, and our fax number is (813) 974-2700.

The AAAS Honors USF Professor Nataša Jonoska

Imagine that we could assemble a molecule with the same confidence that we could assemble a structure out of Legos or Tinkertoys. An architect could create a blueprint of a molecular structure and give it to an engineer, who would build it – and it would turn out to have the properties the architect intended.

This is a revolutionary way of doing chemistry: For over ten thousand years, people have been mixing substances together, heating them, cooling them, dissolving them, and keeping track of what happens. But over the last two centuries, scientists have recognized that if ordinary matter is made of atoms, then we can understand matter – and make what we want out of it – by looking at and controlling atoms and the molecules. During the last half century, that is what they have been doing.

A carbon atom is about seventy millionths of an inch wide, or one sixth of a billionth of a meter (a *meter* is just over a yard), and since a billionth of a meter is called a *nanometer*, people call this study and manipulation of atoms and molecules *nano-science* and *nano-engineering*. The nanoscale has become truly accessible to scientists and engineers during the last three decades, and USF (with a Nanomedicine Research Center in the USF College of Medicine and a Nanotechnology Research and Education Center in the USF College of Engineering) is very much in the game.

Three decades ago, Nadrian "Ned" Seeman's laboratory (first at SUNY Albany, later at New York University) started making *nano*-structures out of DNA. *Deoxyribonucleic acid* is the medium on which genes are recorded. A DNA molecule consists of two long strands of smaller molecules called *nucleotides*; each nucleotide has one of four *nucleobase* molecules sticking out: adenine, cytosine, guanine, or thymine. Adenine will tend to join with thymine and cytosine will tend to join with guanine, so if one strand is the *dual* of the other – it has thymine where the other has adenine and vice versa, and guanine where the other has cytosine and vice versa – then the two entire strands can join together and form the familiar double helix.

For cell biologists, the helix represents a string of characters from an alphabet of four letters (***A***denine, ***C***ytosine, ***G***uanine and ***T***hymine), and a gene can be regarded as a string of letters from A, C, G, and T. For DNA engineers, this ability to get strands to join if and only if they are duals means that they can assemble complex structures out of DNA – one of Seeman's first structures was a cube of DNA. In the early 1990s, University of Southern California Professor Len Adleman pointed out that many computing problems can be represented in the form, "Does there exist a structure *X* made out of little structures of the form *x*, *y*, *z*?" Many intractable problems could be represented in this way, and one of the hopes of "DNA computing" was that such an intractable problem could be solved by making a liquid with many pieces of DNA encoding *x*, *y*, and *z*, and then checking if any of these had fused to form a piece of DNA encoding *X*.

Professor Nataša Jonoska entered DNA computing in the 1990s. She had arrived at USF in 1993 from SUNY Binghampton, where she had completed a dissertation in automata theory and sofic systems (for example, imagine an infinite sequence of letters evolving through time in discrete steps). Her advisor, Tom Head, had done some early work in DNA computing and got her interested in biology. Jonoska said, "He also introduced me to people. I owe him my whole professional development."

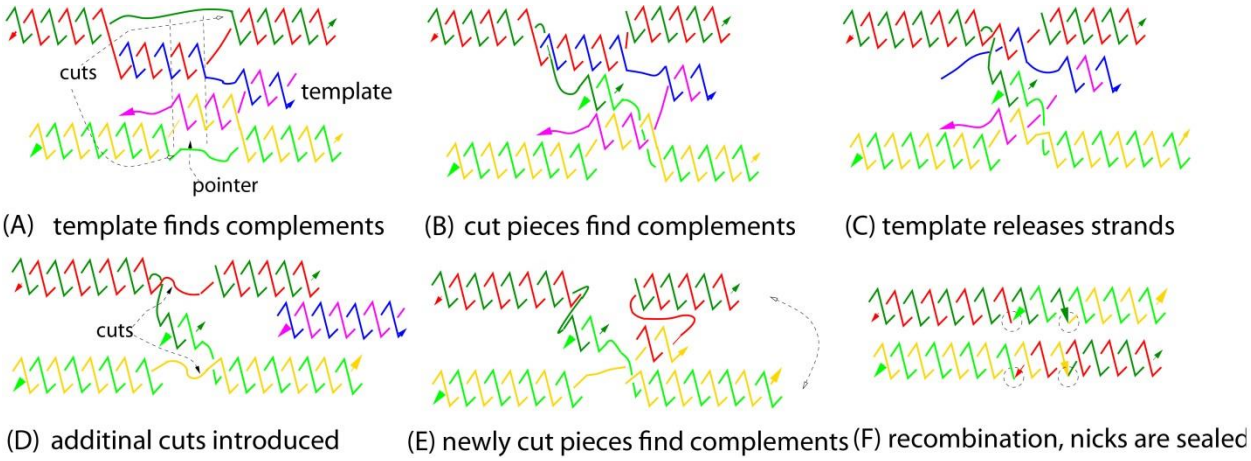
In 1995, Jonoska started attending classes taught by chemistry and biology professors Stephen Karl, Bruce Cochrane, Jim Garey, and others. She met Seeman at a DNA Computing conference where she and Karl gave a joint talk, and in 2001, she went to Seeman's lab for six months. That was the beginning of a collaboration that has produced three grants and eleven papers. Her primary collaborators have been Karl, Seeman and USF mathematics Professor Masahico Saito. Her work in DNA computing was recognized in 2007 when the International Society for Nanoscale Science Computing and Engineering (ISNSCE) awarded her the Tulip Award in DNA Computing and Molecular Programming. And this fall, she is Pascal Professor at Leiden University in the Netherlands.

A lot of her work has involved the details of assembling complex structures out of DNA. For example, here is a description of how to use a blue & lavender DNA *template* to take a green & red double helix and a lime & yellow double helix and cross-splice them (see below).

Any non-trivial structure is assembled using hundreds or thousands such little steps, and designing the process for getting each step right is critical for obtaining the desired product.

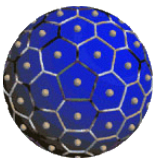
In 2007, Angela Angeleska – a joint student of Jonoska and Saito – together with Jonoska, Saito, and then Associate Professor Laura Landweber of Princeton proposed a model for DNA recombination in ciliates, a class of about 30,000 species of protozoans covered with hair-like "cilia" used to swim around. A typical ciliate has a "somatic" *macronucleus* in which DNA is used to direct bodily functions, and a "germline" *micronucleus*, where the DNA used to generate successive generations is stored. The four authors proposed a model of how the micronuclear DNA is unpacked to obtain the macronuclear DNA. This model was subsequently confirmed in Landweber's lab. "You start with tiny little things and it gets larger and larger," said Jonoska. This led to more work, three grants – including the current $ 2 million grant from the National

Institutes of Health. And now Associate Professor Angeleska is a tenured faculty member at the University of Tampa.



The American Association for the Advancement of Science honors members "whose efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished" to become AAAS Fellows. There are now about 8,000 fellows, and last year, Professor Jonoska was designated an AAAS fellow because of her research. The joint statement of the AAAS and USF noted "her distinguished contributions to theoretical analysis and experimental verifications in nanoscience, particularly for advancements in understanding information processing in molecular self-assembly." She is one of 26 current AAAS fellows at USF.

But she is notable also for her service to the university and the community. A co-founder of the ISNSCE, she was a co-organizer (with Professor Saito) of the *Knotting Mathematics and Art International Conference on Low Dimensional Topology and Mathematical Art* at USF in 2007. She has supervised eight doctoral dissertations and sits on four editorial boards.



Faculty News

Transitions

Jean-François Biasse Joins the Faculty

We welcome assistant professor Jean-François Biasse to the department this fall. Biasse is no stranger to the Tampa Bay area, having attended summer tennis camp in Sarasota while in high school. He is looking forward to the many outdoor activities available here; alas, we cannot offer downhill skiing, another of his passions. He is also looking forward to fruitful collaboration within the department.

Biasse specializes in the study of number fields and lattice ideals. The subject has garnered great interest from cryptographers recently. Many cryptographic schemes currently in use, particularly those used for secure internet communications, rely on the presumed difficulty of factoring large numbers. Quantum computers may someday be powerful enough to factor numbers large enough to break current encryption. Lattice ideals offer cryptographic schemes that may be resistant to attacks by quantum computers.

In addition to the presentation "Ideal lattices and tomorrow's challenges in cryptology" which he gave for his interview, Jean-François spoke to the department about "Using lattices for computational number theory" in May.

Biasse did his undergraduate studies at the Ecole Normale Supérieure and his graduate studies at the École Polytechnique, both in Paris. After completing his Ph.D., he spent six months with the Mathematics Department of the University of Sydney on the development team for the computational algebra software *Magma*. He was a PIMS postdoctoral fellow for two and a half years in Calgary. Last year he was a postdoctoral fellow at the Institute for Quantum Computing of the University of Waterloo.

Richard Stark Retires

Professor W. Richard Stark retired this year after 37 years at the University of South Florida. Originally a logician, he spent much of his career working on distributed computing, especially self-organized networks. In an "artificial tissue" model, individual cells communicate with each other, collectively generating a *global* computation reflecting the activity of the whole. He also started the computer theory group in the department and launched many of the computer programming courses.

Stark was led to "biological metaphors" via logic. As an undergraduate at the University of Kentucky at Lexington, he had read Stephen Kleene's classical *Introduction to Metamathematics* during his free time while running a computer for physics and astronomy Professor Wesley Krogdhal. He then went to Kleene's school, the University of Wisconsin at Madison, where he received a doctorate in 1975 for his work in set theory. Two years later, he met John McCarthy, the creator of the second oldest higher level computer language, LISP, which has particularly intimate connections to logic. In 1978, he became an associate professor at USF, which assigned him a computer programming course. "You could teach experimental courses then," and Stark started LISP as a sequence of two undergraduate courses (it is now a single graduate course) using a text he ultimately published as *LISP, Lore, and Logic: And Algebraic View of LISP Programming, Foundations, and Applications*.

But by the time he met McCarthy, Stark was already interested in distributed computing – having many computers participate in a single computation. The subject goes back to the late 1940s, when John von Neumann and Stanislaus Ulam developed *cellular automata*, in which a regular array of simple synchronized processors, each connected to a few neighbors, collectively carry out a computation. Stark became interested in irregular arrays of unsynchronized processors. He sought support for research in such models of computation, and in 1984 he went to Bell Labs.

At Bell Labs, a work group focused on U.S. Navy's Sound Surveillance System (SOSUS), a system of hydrophones scattered across the Pacific Ocean during the 1950s to use sound to triangulate and track Soviet submarines. Stark's variant arose from the American experience in Vietnam, when a major problem was detecting enemy movements beneath the jungle's tree canopy. Using Agent Orange to strip the canopy proved problematic in several ways, and the Army wanted a more practical method to track movements in jungles. Stark's solution was to scatter infrared sensors that could communicate with each other locally. The devices would develop a fault-tolerant network that could collect, distribute, and transmit intelligence.

It was a well-paying job, but "working in a classified environment was no fun" and he came back to USF in 1988. But he continued work on what is now called "amorphous processing" and ultimately developed a model of asynchronous computation. He employed abstract analysis to study the probable or almost certain

behavior of a network whose individual processors act randomly.

Stark was also departmental chair for one four-year term from 1994 to 1998. During his first year, he was his own associate chair: "I learned from the secretaries, who helped educate me." For the rest of his term, his associate chair was Marcus McWaters, who succeeded him. Stark was involved in creating the Nagle Lecture series – which memorialized R. Kent Nagle, Stark's first friend at USF.

Stark saw major changes in USF during his tenure here, and is optimistic about the future. "I think that USF has turned into a fine university. I think [President] Castor and [President] Genshaft have done more than anybody to bring USF up to the top." His associate chair and successor, Marcus McWaters, said Stark's "kindness and his staying power through adversity are among his most admirable characteristics. He will be sorely missed in the years to come."

Kaiqi Xiong Joins the Faculty

Kaiqi Xiong joins the department as a tenured associate professor this Fall. In addition to working in the department, Xiong will be assisting the Florida Cybersecurity Center. The center was established last year at USF to make Florida a leader in cybersecurity with the support of many businesses and the state legislature.

Xiong's current research lies in the development of algorithms and tools for computer and network security, such as cryptography, trustworthiness, risk analysis, and secure computing resource allocation used in cloud computing, big data computing, smartphone computing, sensor networks, smart grid, and emergency response communications. We welcome the new directions in research and teaching that he brings to the department.

He received his Ph.D. degree in Computer Science from the Department of Computer Sciences and his M.S. degree in Computer Engineering from the Department of Electrical and Computer Engineering at North Carolina State University, respectively. He started his career at IBM after receiving his Ph.D. degree in Mathematics from Claremont Graduate University.

Xiong has published two books, over a hundred refereed papers in leading journals and conferences, and holds two U.S. patents. His teaching and papers have been recognized with various awards. He has co-organized several large conferences, and a series of Global Environment for Networking Innovations (GENI) events. He spent several summers as a visiting researcher at the Air Force Research Laboratory. He is a senior member of the IEEE. He has also received six National Science Foundation and NSF/BBN grants

since 2010. Recently he was recently awarded a grant to develop supplemental activities for undergraduate courses in cryptography.

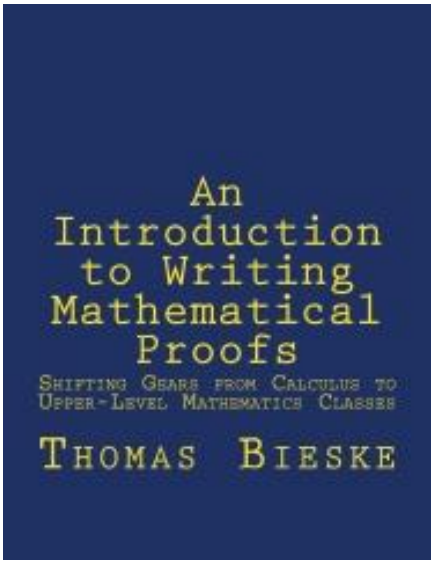
Alan Sola will be a visiting assistant professor. A graduate of the Royal Institute of Technology in Sweden, he works in analysis and probability.

Other Faculty News

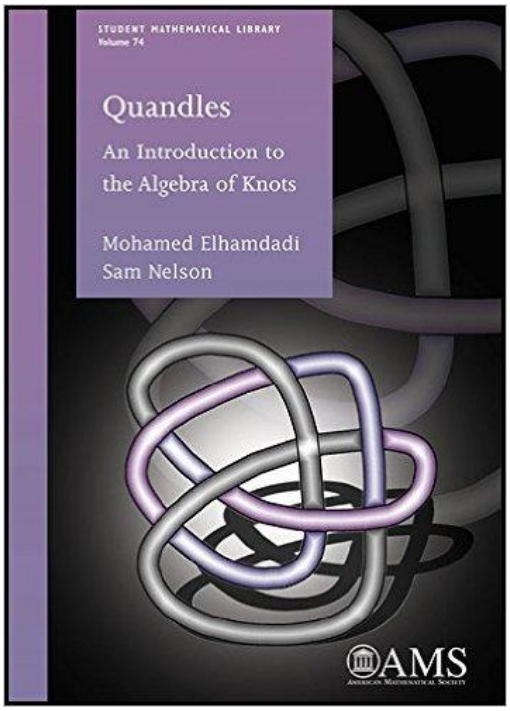
Catherine Bénéteau organized a workshop on *Advanced Techniques in the Implementation and Creation of* ***Process Oriented Guided Inquiry Learning*** (POGIL), which was held at USF in July. POGIL is a pedagogical system for teaching learning process skills (e.g. collaboration and communication) and content (using inquiry-based learning), and the POGIL project is supported by the National Science Foundation's Division of Undergraduate Education's National Dissemination Program via the Professional Enhancement Program (PREP) of the Mathematical Association of America.

Catherine Bénéteau and **Dmitry Khavinson** were awarded a $30,000 grant from the National Science Foundation to organize and support U.S. participation in the international *Complex Analysis & Dynamical Systems VII* conference held in Nahariya, Israel, May 10-15, 2015.

Thomas Bieske has published the textbook "An Introduction to Writing Mathematical Proofs: Shifting Gears from Calculus to Upper-Level Mathematics Classes". Professor Bieske will be teaching Bridge to Abstract Mathematics from this text in the Fall.



Mohamed Elhamdadi and Sam Nelson of Claremont McKenna College in California wrote a senior level text on *Quandles: An Introduction to the Algebra of Knots*, which was published by the *American Mathematical Society* as part of its *Student Mathematical Library*.



Dmitry Khavinson was honored at the USF Faculty and Awards Reception last November for his promotion to Distinguished University Professor. The Distinguished University Professor award recognizes senior faculty members who have distinguished themselves among their peers both within and outside the University. For details on his work on gravitational lensing, see the 2014 Quaternion.

Dmitry Khavinson and **Razvan Teodorescu** received a $ 25,000 USF Proposal Enhancement Grant for the coming year.

Nataša Jonoska and Nadrian Seeman of New York University were awarded a $ 200,000 grant from the National Science Foundation for a collaborative research project on *Programmed Cyclic Molecular Dancing on 2D Origami Lattices*.

Gangaram S. Ladde was awarded a $424,000 three-year grant from the U.S. Army Research Office in Stochastic Modeling for a project on *Network-Centric Stochastic Hybrid Dynamic Time-Event Process Modeling, Methods And Analysis*. The grant includes a post-doctoral position and Research Experience for Undergraduates (REU) component.

Seung-Yeop Lee and **Dmytro Savchuk** each were awarded five-year $ 35,000 *Collaboration Grants for Mathematicians* from the Simons Foundation. The Foundation was cofounded 21 years ago by Jim and Marilyn Simons to support basic and discovery-driven research, particularly in mathematics and the physical sciences, in the life sciences, and in autism, as well as education and outreach.

Manoug Manougian received the USF 2013-2014 Outstanding Undergraduate Teaching Award last fall, at the Faculty Honors and Awards Reception held November 17. Eight other USF faculty members also received this award last year.

In 2012, Manougian received an Excellence in Teaching Award by The National Society of Leadership and Success. He received Outstanding Undergraduate Teaching

Awards from USF in 1997, 2002, and 2004, as well as Outstanding Teaching Award from the Teaching Incentive Program and USF in 1995 and 1999.

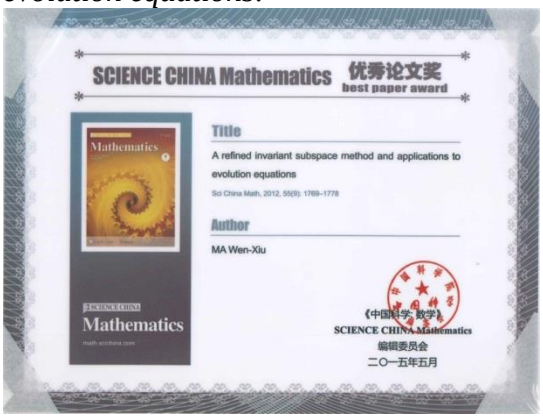
The goal of the Outstanding Undergraduate Teaching Award program is to encourage

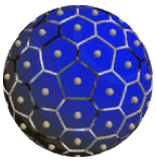
excellence in teaching at the undergraduate level. The University intends to ensure that the foundation courses of the undergraduate curriculum receive the proper emphasis in preparing students for work in the major, as well as providing the proper foundation in critical thinking and problem-solving skills. The Outstanding Undergraduate Teaching Award is administered by the Office of the Provost.

Professor Manougian is active on other fronts as well, and he received $34,000 from various sources to fund a project with USF's *Alliance for Integrated Spatial Technologies* to bring three dimensional visualizations of ancient monuments to the web.
One of **Dan Shen**'s articles was nominated for the annual Taylor & Francis Reader's Choice Award. He is the lead author of *Functional Data Analysis of Tree Data Objects*, one of ten articles chosen as finalists by Taylor and Francis for their inaugural Mathematics & Statistics Readers' Award. All papers published in 2014 in any of the 102 Taylor & Francis Mathematics and Statistics journals were eligible. The paper was based upon work that Dan did as a postdoctoral fellow at the University of North Carolina—Chapel Hill. Although his paper was not the winner, we congratulate Dan on this recognition. As lead author, Shen received a π-day t-shirt from Taylor and Francis.

Dan's research interest include Neuroimaging Data Analysis; High-dimensional Inference and Sparse Regularization; and Sample Paths of Stable Processes. Dan joined the department last year.

Wen-Xiu Ma co-chaired the Organizing Committee for the Third International Workshop on Nonlinear and Modern Mathematical Physics at the African Institute for Mathematical Sciences in Cape Town, South Africa, last April. Professor Ma also was awarded the Best Paper Award from Science China Mathematics last May for his paper on *A refined invariant subspace method and applications to evolution equations*.





Department News

USF to Collaborate with North-West University of Africa

USF and the Mafikeng campus of North-West University in Mmabalho, South Africa, have signed a collaboration agreement to "facilitate academic and research cooperation" between the USF Department of Mathematics and Statistics and the NWU Mafikeng Department of Mathematics. Mafikeng campus, with 9,000 students, is the former University of Bophuthatswana and now one of the three campuses of NWU. The agreement comes into effect in January.

The American Statistical Association Visits USF

The Department hosted the 2015 Annual Meeting of the Florida Chapter of the American Statistical Association on February 6 &7. The theme was *The Art of Statistics in Business, Environment and Health*. The three keynote speakers were Professor Ganapati P. Patil, Distinguished Professor of Statistics at Penn State University, Ms. Jone Burr, Director of Measurement Science Methodological Research at The Nielsen Company, and Dr. Henry Roberts, Statistician at the Centers for Disease Control and Prevention (CDC).

USF graduate student Ryan Thurman received one of two 2015 Brumback awards. It is awarded to the best student speaker at the annual meeting of the Florida Chapter of the ASA. In addition to scholarly recognition, the award includes a cash prize of $100. The award was established by in 2014 by Professor Babette Brumback of the Department of Biostatistics at the University of Florida, and current president of the Florida chapter of the ASA.

The Chapter thanked **Chris Tsokos** and his student Taysseer Sharaf for organizing the conference.

A New Program for Postdoctoral Faculty

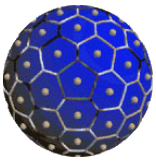
Unlike a generation ago, new academic researchers tend to spend a few years as postdoctoral faculty before seeking permanent positions. And research departments are increasingly hiring "postdocs" to help future researchers and to build connections to other universities.

This fall, the Department launched a new postdoctoral program. Our postdocs have faculty mentors to provide guidance in launching their research programs, and the Department's cutting edge STEM education programs offer postdocs the opportunity to hone their teaching skills. "This program attracts future leaders to help them jumpstart their careers," said Department Chair Les Skrzypek. "They will build skills in all aspects of research, from building interdisciplinary connections to applying for grants."

The Department hired two Postdoctoral Scholars for two-year terms. **Mustafa Hajij** has just received a Ph.D. from Louisiana State University, where he worked in mathematics and computer science; his research ranges from quantum invariants to computational topology, and his faculty mentor is **Mohamed Elhamdadi**.

Youngsoo Seol received a Ph.D. from Iowa State University in 2013, where he worked on random processes, especially random walks; he spent the last two years as a Lecturer at Texas State University - San Marcos, and his faculty mentor is **Gangaram Ladde**.

The Department anticipates hiring at least one postdoc a year, and hopes to build up the program so that we can hire two a year. And every postdoc will become a faculty member at another institution who has had the USF experience.



The R. Kent Nagle Lecture Series

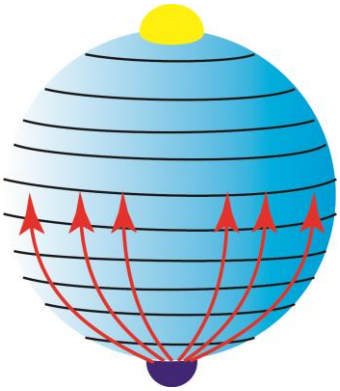
The Mathematics of Holes

From left, Mathematics chair Les Skrzypek, Sandy Nagle, Jeffrey Nagle, and Robert Ghrist.

In *The First Circle*, one of Aleksandr Solzhenitsyn's characters reflects that "Topology belonged to the stratosphere of human thought. It might conceivably turn out to be of some use in the twenty-fourth century, but for the time being..." But on March 12, Robert Ghrist, the Andrea Mitchell Professor of Mathematics & Electrical Systems Engineering at the University of Pennsylvania, came to respond to that reflection by talking about *Applied Topology*.

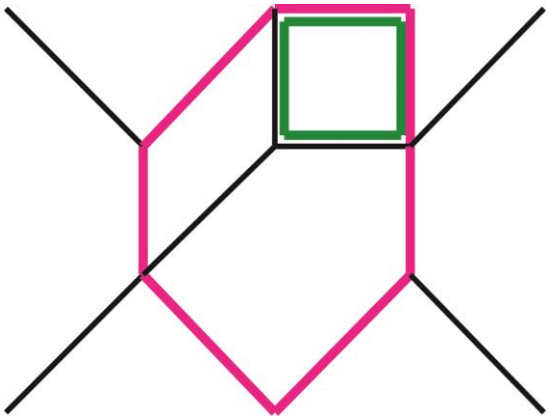
"Topology," Ghrist observed, is derived from the classical Greek τόπος, meaning "place," and topology is the abstract study of space. In his lecture, he started with Dante's cosmology in his *Paradiso*, in which the Earth and God are both at the centers of sequences of nested spheres, and arranged so that no matter where on Earth one was, if one looks directly up, one will be looking directly at God. Dante's geometry is a longstanding puzzle, but Ghrist explained it by proposing that Dante's universe is a three-dimensional sphere, i.e., the boundary of a four-dimensional solid ball.

Compare this to a two dimensional sphere, with a purple spot on the bottom and a yellow one on top...



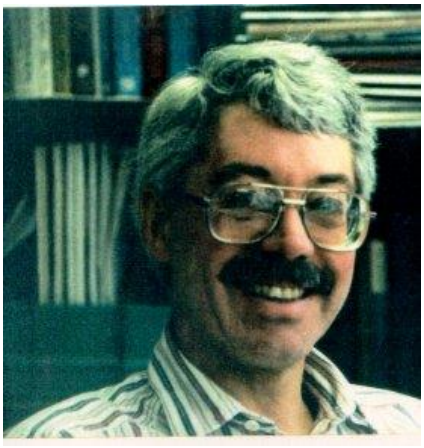
There are concentric circles around the purple and yellow spots, and from the bottom, no matter what direction one looks, following the (red) lines of sight, one sees the yellow spot on top.

Moving forward from the High Middle Ages, Ghrist turned to Silicon Valley, and said that there, the line was: "fast, cheap, reliable, choose two." He gave several examples in modern technology, including sensor networks.

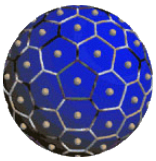


A sensor network can find holes in its coverage by looking for cycles and checking if they can be shrunk in the graph (much as the pink cycle below was contracted to a green cycle). An area is well-covered if a large cycle in that area can be incrementally contracted to a smaller cycle; but if a large cycle cannot be contracted, then there is a hole there.

In 1965, Gordon Moore proposed that the number of components per integrated circuit in computers would grow exponentially. Ghrist said that Moore's Law "conked out years ago," and that graph theory and combinatorics will take us only so far. He concluded by saying that we need new mathematical tools, such as those topology can provide.



The Nagle Lecture Series was established in honor of the late R. Kent Nagle, a mathematician deeply interested in mathematics in itself, in education and in society. In this spirit, the NLS invites world renowned scholars to speak on such matters in lectures designed for the general public.



Student News

Pi Mu Epsilon in 2015

Student Clubs News

The USF Student Chapter of the Mathematical Association of America (MAA) leadership board during the academic year consisted of the following team of undergraduate math students: Andres Saez (President), Ayrton White (Vice-president), and Anjanet Loon (Treasurer). Faculty Advisors are Drs. Fernando Burgos and Ivan Rothstein
The USF Math Club met every other Friday at lunchtime during the academic year to play math games like Math Bingo and Math Jeopardy, hear invited speakers talk about interesting math topics, play math games, and socialize while munching on pizza and refreshments. Some presentation highlights included talks by math faculty **Razvan Teodorescu** on *Discrete Calculus vs Continuous Algebra* and **Vilmos Totik** on *The Cauchy Equation*, and math graduate student Junyi Tu on *A Random Walk through Stock Markets*.

A group of math club members that included students Jing Lin, Anthony Cruz, Rachael Dougherty, Anjanet Loon, Denys Kukushin, Andres Saez, Daniel Cruz, and Ayrton White traveled to the 2014 Suncoast Regional meeting of the MAA at USF-Sarasota in December, and the 2015 MAA Florida Section at Eckerd College in Pinellas County in January. Math undergraduate student Andres Saez gave a talk titled *On the Number of Zeros of harmonic Polynomials* at the Suncoast meeting, and math graduate student Daria Karpenko talked about *Dynamic Simulation of 1D Cellular Automata with DNA-based Tiles* at the Florida Regional meeting.

Math undergraduate students Jing Ling, Lukas Nabergall, and Andres Saez formed a USF team that placed in the top 30% in the prestigious 2015 Putnam Math Competition (a total of 4320 students from 577 colleges and universities in Canada and the United States participated in the Competition). The team was coached by our own **Xiang-dong Hou**.

During the 2014/2015 academic year our USF-based Florida Epsilon Chapter of Pi Mu Epsilon, the national math honor society, inducted the following new members: *Patrick Bagge, Maryam Bagherian, Sarah Branthoover, Jasper Braun, Kade Cicchella, Jamie Heath, Kara Heuer, Joseph Paul High, John Thomas Kennedy III, Joy Angel Lin, Faith Martin,*

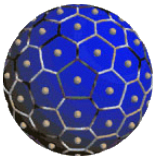
Wenjun Meng, *Lukas Nabergall*, *Xuzhengjun Song*, *Douglas Turner*, and *Richard B. Wallace IV*.

During the academic year 2014/2015 the Epsilon Chapter of PME has Denys Kukushkin as President, and Andres Saez as Vice-president. **Fernando Burgos** served as the faculty advisor, and **Mile Krajcevski** was the PME Permanent Correspondent.

The 2015 PME Induction Banquet took place on April 24, 2015 at the Top of the Palms restaurant in the Marshall Student Center. The sixteen new members received membership certificates, took the PME Oath, and signed the Florida Epsilon Chapter of PME Membership Book. Dr. Dmytro Savchuk of our Department of Mathematics and Statistics was the event's keynote speaker with the presentation *Algebra Around Us*.

Our Florida Epsilon Chapter of PME continued its long tradition of recognizing the best math students and scholars among USF graduating seniors by awarding the 2015 Outstanding Scholar Award to math students and PME members Denys Kukuskin and Jing Ling. They received scholarship awards from the Dan Samitas Scholarship in Mathematics fund, and commemorative plaques.

The Math & Stat Dept and the Florida Epsilon Chapter of PME hosted two Hillsborough County Math Bowls this year, as it has been traditional since the year 1980. About 400 of the best county high school students and their teachers converged to USF for a day of spirited individual and team competitions in algebra, geometry, pre-calculus, and calculus. The participating high school that ended up with the best combination of quantity and quality wins was King High School, which sent the strongest contingent to this popular event.



We'd Like to Hear from YOU!

The Department of Mathematics & Statistics would like to hear from alumni, friends, collaborators, members of the community, and fellow explorers of and guides to the world of mathematics and statistics. Contact us at: 974-2643, or fax 974-2700. We have a web-page at http://www.math.usf.edu/. Snail-mail address is Department of Mathematics & Statistics, University of South Florida, 4202 E. Fowler Ave., CMC342, Tampa, FL 33620.

Appeal for funds

We are a growing department, and we strive to develop new programs to meet the needs and provide opportunities for our students and our community to fulfill their aspirations. With all due respect to Benjamin Franklin, many of the best things in education and scholarship cost money. We would appreciate any assistance we can get from alumni and the community. Feel free to contact our chair, Marcus McWaters, at the above address for details.