DEPARTMENT OF
MATHEMATICS
AT FLORIDA STATE UNIVERSITY

IN THIS ISSUE

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Feng Bao

Sanghyun Lee

Exploring Geothermal Energy, Carbon Sequestration climate solutions

by Amy Walden, Taken from news.fsu.edu

For decades, scientists have looked to the skies for ways to mitigate climate change – from solar panel farms to wind-driven turbines.

Now, Florida State University researchers are looking at the ground beneath us for new ways to address some of today's most complex global climate challenges. Two researchers from FSU's Department of Mathematics are taking part in the U.S. Department of Energy's Energy Earthshots, a nationwide initiative aimed at accelerating breakthroughs in clean energy solutions within this decade through eight key targets, with a specific focus on subsurface energy systems.

FSU associate professors Sanghyun Lee and Feng Bao are members of a multi-institutional team that will use a three-year, $4.9 million grant from the Department of Energy (DOE) to explore use of geothermal energy to generate electricity and to identify techniques for removing carbon dioxide from the atmosphere and storing it underground.Lee and Bao will build a computational model that provides a comprehensive understanding of the physical, geomechanical and geochemical processes that occur in subsurface energy storage and recovery systems.

Exploring Geothermal Energy, Carbon Sequestration climate solutions

A Message from the Chair

Washington Mio

Washington Mio

Each edition of the FSU Mathematics Newsletter presents a fresh, unique opportunity to reflect on and rejoice over the many achievements of our faculty, staff, postdocs, and students, and be thankful for the support from our alumni and Friends of the Mathematics Department. We have all reasons to take pride in what we accomplish year over year in so many different spheres of academic activity. Our graduate program continues to thrive and the number of doctoral degrees we confer yearly places us in a very select group nationwide. More than 300 undergraduate mathematics majors are working towards their bachelor's degree in mathematics or actuarial science, pursuing a variety of career goals. We teach basic mathematics to thousands of students every year and it is most rewarding to see the positive impact we make on their education thanks to a firm commitment to provide a rich and engaging learning experience to undergraduates across campus.

Our research is well and strong. Building on our strengths, embracing new trends, we move forward with an ambitious portfolio of research projects that span a wide range of mathematics, pure and applied, oftentimes crossing disciplinary boundaries. Research expenditures are at an all time high, enabling us to further strengthen our scientific and educational activities and provide new opportunities to our students. We have expanded our faculty, some featured in this newsletter so you get to know the new faces in the Department. We engage with the local community through outreach efforts geared towards K-12 students to spark and support their interest in mathematics. All these activities fuel and maintain a vibrant and diverse mathematical ecosystem in our department. I invite you to read this newsletter that highlights some of these activities and to learn more about the FSU Mathematics Department at www.math.fsu.edu/.

As always, my deepest appreciation goes to all members of the Department and to our alumni and donors for the support they provide. You shape the success of our department and of our students!

Best Wishes,

Washington Mio

Exploring Geothermal Energy, Carbon Sequestration climate solutions.
Continued from page 1

FSU associate professors Sanghyun Lee and Feng Bao are members of a multi-institutional team that will use a three-year, $4.9 million grant from the Department of Energy (DOE) to explore use of geothermal energy to generate electricity and to identify techniques for removing carbon dioxide from the atmosphere and storing it underground.

Lee and Bao will build a computational model that provides a comprehensive understanding of the physical, geomechanical and geochemical processes that occur in subsurface energy storage and recovery systems."This opportunity symbolizes the chance to create a substantial influence within the realm of computational mathematics in the field of subsurface energy systems," Lee said.

The interdisciplinary project is a collaboration with the University of Texas at El Paso, Sandia National Laboratories and the University of Utah and includes researchers across applied mathematics, data science, geochemistry, geoscience and engineering.The team will tackle two of the Earthshots initiatives: the Enhanced Geothermal Shot, which will unlock the "heat beneath our feet" to maximize use of Earth's nearly inexhaustible internal heat resources to reduce the cost of geothermal energy and feed new, clean electricity into the power grid; and the Carbon Negative Shot, through which carbon dioxide extracted from the atmosphere and oceans is stored in manmade and natural sinks to achieve negative CO_2 emissions.

"The primary aim of our team is to develop innovative machine learning approaches that integrate highly complex systems and leverage a novel data assimilation method while utilizing state-of-the-art laboratory test data and field data," Bao said. "This integration will enable us to construct a robust and efficient numerical simulator for subsurface energy storage and recovery systems."Lee and Bao will focus on the machine learning and data analytics aspects of the research, key components

to answering questions about how emerging clean energy technologies can be improved upon and expanded for more widespread use.

"My major contribution to this project is to develop appropriate machine learning methods for simulating multiphysics models, and my expertise in data assimilation would allow me to analyze laboratory test data and field data in this project," Bao said.

In recent years, the main challenges in subsurface energy systems — for example, enhanced geothermal systems and CO2 sequestration — have included issues arising from the multiphysical and multiscale nature of the problem and uncertainty quantification.

"Multiphysics means coupling solid mechanics, fluid mechanics, thermal energy and chemical reactions, while multiscale considers how to relate pore-scale problems to field-scale problems," Lee said. "These problems are complex and require interdisciplinary efforts to achieve meaningful outcomes within the research."

The team's computational model will help scientists understand what is occurring at multiple scales in subsurface energy storage and recovery systems and facilitate more accurate predictions and the ability to optimize and manage enhanced geothermal and carbon sequestration systems.

"It is very exciting to see Sanghyun Lee and Feng Bao engaging in a multi-institutional partnership to help accelerate breakthroughs and advance the Energy Earthshot goals of delivering clean energy solutions in response to the climate crisis," said Department of Mathematics Chair Washington Mio. "This will place the FSU Mathematics Department at the frontier of energy research and provide our students and postdocs new opportunities for research of high environmental and societal impact."

New Faces in the
Graduate Faculty
by Rodney Campbell

Malbor Asllani

Malbor Asllani

When given the opportunity to move from Ireland to Tallahassee in 2021, **Malbor Asllani** quickly packed his bags. Recruited from University College in Dublin, Asllani was impressed with Florida State University, where he now serves as an assistant professor in the mathematics department. He connected with faculty during the interview process and was intrigued by what the university had to offer.

"I had the pleasure of chatting with (Professor) Richard Bertram, who was leading the recruiting team for the interdisciplinary math position," Asllani said. "Usually, I base a lot of my decisions on the impressions that people give me. The impact that Richard had in the short interview, together with the reputation of FSU as a flagship university of the state and Florida's weather, convinced me to be here today."

Asllani grew up in Albania and spent his career in Europe before coming to FSU. He sees many advantages to teaching and doing research in America.

"Working for a research university in Europe in some expensive city such as Dublin, for instance, might not be sufficient to sustain a minimal decent life," he said. "Academic freedom is also a big advantage of American universities, teaching-wise in particular. It can be more versatile here than in Europe, both in terms of choices of what to teach or teaching load. Research-wise, the difference can be huge if you can access the funding that the American system offers."

His research, which he estimates takes up 60 percent of his time, focuses on complex systems, network science, biomathematics, stochastic processes and data science. The rest of his days are spent preparing for his calculus classes, teaching those courses and being available for students during office hours. Over the long haul, he would prefer to focus more on research.

"FSU offers tracks for more research-devoted profiles, something I hope to pursue in the near future," Asllani said. Opportunities are just part of the reason why Asllani likes his new home. He sees FSU as an institution with unlimited potential. "It's an amazing campus, there are high standards and the weather is fantastic," he said. "FSU is at its best moment ever and has a bright future. I am confident it will be resilient and stand to the great universal values with which it was found independent of which direction the winds blow."

Asllani's journey has taken him to many interesting places, from earning his bachelor's, master's and doctorate in Italy to teaching and performing research in Belgium, England and Ireland. He became fluent in four languages along the way. Still, coming to America was in the back of his mind. Fortunately, FSU offered the opportunity and he's thankful that things worked out.

"I was always intrigued by the idea of living in a great country like the US," Asllani said. "Only by living in a place can you understand, appreciate and learn from the people of that country. I'm happy with my choice so far."

Qi Feng

Qi Feng

A native of China and new faculty member at Florida State University, **Qi Feng** is doing what he can to become part of the team.

He's even trying fishing. "Fishing is not my hobby," he said. "I just do it to join my colleagues. They are super fans of fishing. I like to play basketball and I used to run."

When angling for a position, Feng found a tenure track assistant professorship in FSU's Math Department. He came on board this past August after spending two years as an assistant research professor at the University of Michigan. Feng wanted a job that offered opportunities to perform research and he found it when he accepted the FSU position.

"I was looking for positions in financial math and machine learning," he said. "FSU has a strong program in financial math that drew my attention." Feng hasn't had many opportunities to discover much about campus in his short time there. Most of his free time has been spent either at the dining hall or the gym. As for Tallahassee, he's still trying to find good Chinese food options. With his busy schedule, he hasn't been able to explore much.
"The parks are really good," he said.

Feng earned his undergraduate degree in math at Tianjin University in China. Tianjin is the oldest university in the country and puts a premium on engineering studies. "I changed my research interest several times during my graduate study and postdocs," he said. "But once I got my first postdoc offer, it was almost certain that I would continue my career in math."

Feng came to the US in 2012 to start his master's work at Purdue University. After earning his degree in computational finance there, he transferred to the University of Connecticut for his PhD after his advisor left Purdue. He came to America because his career interests weren't largely available in his homeland.

"Research is the main reason why I came to the United States," he said. "I heard that the research here is diverse and strong so I just applied to give it a try." His first job after earning his PhD was as an assistant professor at the University of Southern California. His experiences at USC and Michigan enabled him to narrow his focus and choose a specific career direction.

"I started to work on mathematical finance and machine leaning at USC and Michigan, which were different from my PhD thesis," Feng said.
The combination of research opportunities and chances to focus on what he most enjoys made the FSU job attractive. Feng likes the direction his career is headed and intends to stick with and expand on what he likes.

"I will keep working in math finance and machine learning in the next few years," he said. "I have proposals and papers to write and new collaborations to be established."

Bhargav Karamched

Bhargav Karamched

More than three years into his time at Florida State University, **Bhargav Karamched** is just getting to know Tallahassee. Coming to a new city during a pandemic will do that.

"Once I arrived in Tallahassee, I mostly stayed put in my apartment and ordered food in," he said. "It gave me a chance to sample restaurants from around but didn't let me get acquainted with the city." Karamched came to FSU from the University of Houston in August 2020 as COVID-19 and all its impacts had settled it. An assistant professor of biomathematics, he enjoys working at FSU, even though remote teaching kept him from meeting many of his colleagues for a while.

"I didn't see my offices for a full year," Karamched said. "When the University opened, I remember other faculty members seeing me and saying, 'Oh wow! Your first year is starting,' to which I would simply smile." Karamched's job involves partnering with faculty across disciplines for research. He describes it as "working at the interface of mathematics and biology."

"In most universities, walking to a biological lab and asking to start a collaboration is challenging because of the distinct vernacular affiliated with each field: mathematicians don't speak biology and biologists don't speak math," he said. "However, FSU already has a rich interdisciplinary history and culture, making it an ideal location for a mathematician like me. I am also part of the molecular biophysics and neuroscience programs, which greatly expand my proximity to interesting experimental work."

He started college at the University of Oklahoma as a chemistry major. While he enjoyed math, at the time, he didn't want it to be his career focus. Eventually, he changed his mind and earned bachelor's degrees in math and biochemistry at Oklahoma, putting up 4.0 GPAs in both disciplines.

"As I studied more physical and quantum chemistry, I realized how abstract it could be, and how such abstraction is probably better understood with a mathematical framework," said Karamched, who earned his PhD in math at the University of Utah.

He uses his own experience in the classroom when teaching. His perfect GPAs came through dogged determination and hard work to understand subjects.
"Students are in such a rush to

understand everything that they often get frustrated when things don't click instantly," he said. "I tell stories of how I struggled with materials and encourage them to be patient and have faith that diligently reading the book and working through problems will lead to robust understanding."

Karamched and his wife, Hajra, are happy be in Tallahassee. They recently had their first child, a boy named Surya. They are pleased to be members of the community and look forward to putting down roots.

"The city is wonderful," he said. "I love hiking, and there are plenty of places to hike around Tallahassee. I love arts and music, and First Friday is a great show of local art. My wife and I bought a house on the east end about a year ago, and we have lots of parks and lakes around our neighborhood that make for fantastic evening walks."
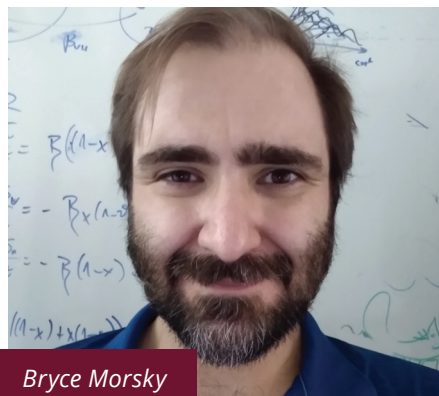
Bryce Morsky

Bryce Morsky

Born and raised in Western Canada, **Bryce Morsky**, PhD, was the first in his family to pursue higher education. His journey from the University of Regina in Saskatchewan, where he obtained bachelor's degrees in economics and mathematics, reflects his versatile academic interests. During his undergraduate years, Morsky explored various fields, including physics, biology and literature. Despite this time, his dedication to mathematics became evident, particularly during his

final year while pursuing his economics degree. It was then that he discovered his passion for mathematically driven research, leading him to the burgeoning field of mathematical biology.

"At the time I knew very little about such a career," said Morsky, an assistant math professor at Florida State University. "Certainly, I always enjoyed math, but I was unaware of the breadth of research possibilities." Under the guidance of his microeconomics professor, Morsky delved into evolutionary game theory, culminating in a research project that introduced him to mathematical biology. This experience redirected his academic pursuits toward graduate programs specializing in this interdisciplinary field. He completed his master's and doctorate under the tutelage of Chris Bauch at the University of Guelph in Ontario, Canada, delving into game theoretical analyses of vaccination decision-making, the study of group identity emergence and modeling natural selection.

"I had a great time there. I learned a lot," Morsky said. "My undergraduate research project was similar to his research on vaccination games where individuals weigh perceived costs and benefits in deciding whether to become vaccinated. Cooperation in vaccine games is to choose to be vaccinated. My research wandered some while in grad school to understanding other problems in mathematical biology." Subsequently, he held postdoctoral positions at the University of Notre Dame's Department of Physics, the University of Pennsylvania's Department of Biology, and Queen's University's Department of Mathematics & Statistics before joining FSU in February 2022. At these institutions, Morsky engaged in diverse research collaborations, applying game theory to microbial interactions, investigating the emergence and impact of social norms and exploring topics in theoretical ecology. "I've sustained

collaborations with colleagues from Penn and Queen's, spanning a broad range of subjects," Morsky said. "One such endeavor involves understanding the impact of the COVID pandemic on unemployment, particularly within the gig economy."

Throughout his academic trajectory, Morsky's passion for innovative research in mathematical biology has been a driving force, allowing him to contribute meaningfully to understanding complex problems within this interdisciplinary realm. "There is a great deal of creativity involved in math research," he said.
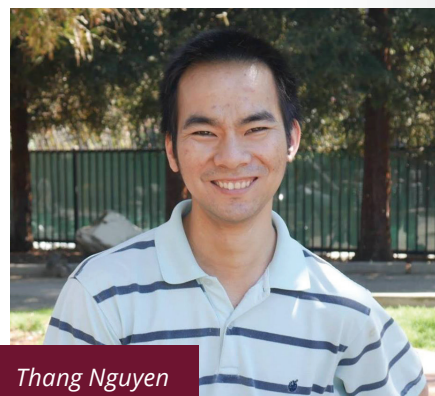
Thang Nguyen

Thang Nguyen

Growing up in the Vietnam countryside requires a long journey to reach a faculty position in the United States. Fourteen years after earning his bachelor's in math at Ho Chi Minh City University of Science, **Thang Nguyen** landed a position at Florida State University as an assistant professor of mathematics. Nguyen's journey to Tallahassee took him across the world, with visiting positions in France and Germany along with a postdoctoral assistant professorship at the University of Michigan and New York University. His first time studying in America came when he earned his PhD in math at Indiana University.

"I went to the US for my PhD because of advice I got from my undergraduate advisor, to whom I owe a lot for my

mathematics career," Nguyen said. "He encouraged his students, to study for a PhD abroad if we like math and want to do research. At that time, graduate programs in Vietnam weren't as up to date as they are now." Nguyen, who said he's been a math fan since the fifth grade, had to narrow his focus when he enrolled at Indiana.

"I entered my PhD study without specific interest in what type of math that I wanted to do," Nguyen said. "I looked around at the research of all faculty. Since I like most topics in math, I looked for faculty that were working more broadly and using knowledge from many fields and their connections. I started to talk to them and eventually I picked the topics that I liked most." He started at FSU last fall and is enjoying his work and life in the capital city. Nguyen's job involves studying geometric objects and their symmetry.

"Generally, each object, for example a bike, has very few symmetries," he said. "The class of objects, examples include a doughnut, with lots of symmetries, is very special. For those objects, there are strong connections between the geometry, that is how the objects look, and the symmetries, that is how many symmetries and how symmetries are combined. My research focuses on establishing those connections."

Nguyen is enjoying life in Tallahassee. He finds the climate much more to his liking than his experiences in the Midwest and his co-workers have been welcoming to the new guy on campus.

"I like FSU so far," Nguyen said. "Except summer, the weather is good, not as cold as places where I got my PhD and postdocs. The department is very friendly."

Nguyen's journey gives him a valuable perspective that he's passing along to his students. Learning a subject requires active participation. It's advice that works in the classroom and in a career.

"I would like to help students with critical thinking and the skill to ask questions," Nguyen said. "Math is useful not only in the knowledge we gain but also the ways we think, ask questions and tackle questions. The latter ones may even have a broader impact in our life."

Wojciech Ożański

Wojciech Ożański

Like many of his colleagues at the Florida State University Department of Mathematics, **Wojciech Ożański** grew up overseas. Raised in Poland, the assistant professor spent most of his childhood in a small town surrounded by lakes, hills and forests.

"I have very good memories of growing up in Poland," he said. "I had lots of friends, lots of fun and lots of good teachers." After earning bachelors, master's and doctorate degrees in math from universities in Europe, including Warsaw and Oxford, and getting a research fellow position at the University of Warwick in England, Ożański made his way to the United States.

Getting here has been an adventure and an important step in his career.

"My goal was always to find opportunities for myself to be able to do professionally what I am passionate about, which would also be, at least a little bit, compatible with my private life," Ożański said. His first American experience came as an assistant professor at the University of Southern California and as a member of the Institute for Advanced Studies

at Princeton. He worked at USC until summer 2022, when he moved to FSU. Ożański is pleased to be in Tallahassee, where he was offered an opportunity to conduct research in mathematical fluid mechanics on a tenure track basis.

"I like FSU a lot," he said. "Everybody in the department is very supportive, and I have made many friends. I also feel like I am treated fairly, and the university and the department are generous in their support of my research activities."

Much of his work takes place outside of the classroom, collaborating with colleagues across the globe. "My job involves collaborations with researchers all around the world, lots of travel, giving talks at conferences and workshops, developing new mathematical theorems, and applying the results to real-life problems," Ożański said. He's grown accustomed to the American way of life, which he finds more homogenous than his native Europe.

"The interesting thing is that every place seems quite similar in terms of culture," Ożański said. "The main language is English, which makes it easy to collaborate and make friends and generally feel comfortable in different states. Even sidewalks, street signs and fonts on various forms are the same. In Europe, there different languages everywhere, different customs and very different food and architecture."

Just like back home in Poland, Ożański enjoys being outdoors, whether at work or riding his bike through the community in his free time.

"The campus is beautiful," he said. "I enjoy strolling across campus and cycling around. I often enjoy longer bike trips around the city or near the coast, as well as running in nearby parks."

While the warm and humid climate of North Florida has been a change of pace, Ożański is getting accustomed to his new home.

"I enjoy the summer thunderstorms" he said. "Overall, Tallahassee feels a lot like my hometown, but it is a little bit warmer. Also, the surrounding nature is very impressive, particularly the canopy trees, the birds and the alligators."

Jeremy Usatine

Jeremy Usatine

Maybe the key to having a successful math career is to not even think about the field until college. That approach has worked for **Jeremy Usatine**, who started as an assistant professor in the Florida State University Math Department this fall semester.

"Before college, I never thought about becoming a mathematician," he said. "At that time, I don't think I was even aware of what a mathematician does. When I started as an undergraduate, I thought I wanted to be a physicist, and I was taking math courses with this in mind. But these courses ended up making a rather strong impression on me, as they involved a lot more creativity than any of the mathematics I had seen before. I ended up switching majors to mathematics – another factor was that I have no affinity or talent for lab work – and I've been on this trajectory ever since." Once he decided math was his calling, Usatine earned his bachelor's degree from Harvey Mudd College in California and his PhD from Yale.He's put his education and experience into teaching Calculus

3 and performing research at FSU. His research centers around algebraic geometry and combinatorics, motivic integration and tropical geometry. That mix of professional activities can make describing his job a little challenging.

"There are aspects of my job that are easier to convey, such as the teaching parts," Usatine said. "But the process of mathematics research is harder to describe. Part of the issue is that when I'm hardest at work, on the outside it just looks like I'm staring into space (or I'm pacing around the room, for whatever reason, I pace a lot when I'm thinking). I suppose I could say I am inventing/discovering/solving puzzles. That's at least part of it, but it probably doesn't quite do it justice."

One thing is for sure: he has found the right fit. Even just a few months into his job, he feels comfortable in the department after coming to Tallahassee from a post-doc position at Brown University. "The first draw was that FSU's math department is a good research fit for my interests," Usatine said. "Then when I interviewed for the position, I got the impression that this is a rather friendly department, and I think that can make a big difference in how pleasant it is to work somewhere."

Early in his career, he believes he's found an excellent opportunity to do what he most enjoys." Fortunately for me, I have my dream job, which is to be a research mathematician," he said. Things are going well off campus, as well. Still new to the capital city, Usatine and his wife, Sydney, have made a quick adjustment to their new locale.

Zecheng Zhang

Two years after earning his PhD in mathematics from Texas A&M, Zecheng Zhang is an assistant professor in the math department at Florida State University. Still early in his career, he

believes he has found the right place to fit in and grow. "This is a great institute and the department environment is so good," he said. "Faculty here enjoy working with each other. We have a very good relationship; we also have dinner together quite often. The senior faculty helps me edit my research proposals and gives me suggestions on teaching and research. My colleagues here are very nice and provide many opportunities for young professors like me." Zhang studied in Hong Kong surrounded by students who were raised on mainland China or Taiwan. The programs, including the one he graduated from at Hong Kong Baptist University, were also much smaller than what he has found in Canada and the United States and are filled with young people from across the globe.

"There so many different universities in the USA and they are very different," Zhang said. "However, the key difference is the size of the school. We had less than 20 students one year in the math program when I was an undergraduate, and we knew each other very well. The professors also knew us very well. Students here are from different cultures and have very diverse backgrounds."

He came to North America when he was supported to earn his master's in math at the University of Alberta in Canada. Afterward, he moved on to Texas A&M for his PhD. After Texas A&M, he joined the math department at Purdue as a visiting assistant professor. From there, he transitioned to a postdoc research associate position in the department of math at Carnegie Mellon.

In his former roles, he worked with students who were majoring in some form of math. One of his duties at FSU is teaching calculus to students who aren't pursuing degrees in math or engineering.

"My students here are different from my previous ones," Zhang said. "Most of them do not major in a science or an engineering-related major, so I need to introduce more mathematical backgrounds."

He's proud to be part of the FSU math department and excited by his career possibilities. Along with teaching, he performs research in multiscale modeling and simulation, mathematics of machine learning and scientific machine learning.

He's only been on the job for a few months, but he already knows what he likes about his career direction.

"Being faculty means I can study and do what I want," he said. "I work for my interests and my research every minute, but also need to work hard. I really enjoy the life of being a researcher: discovering new challenges and figuring out solutions, talking with my collaborators discussing and discovering the solutions to challenging problems, going to conferences and workshops, meeting new people in the area and studying other researchers' work."

RETIREMENTS
AND PROMOTIONS

We wish the best of luck to **Mohammed Hussaini** and **Diane Maltby**, who have retired, and to **Ibrahim Ekren**, who is continuing his career at the University of Michigan. You will all be missed!

Congratulations go out to **Aleksandr Reznikov**, **Feng Bao**, and **Sanghyun Lee** for their promotions to Associate Professor, **Yaineli Valdes** for her promotion to Teaching Faculty II, and to **Kris Bowers** for her promotion to Teaching Faculty III.

Department News

The twenty-fourth **Quant Symposium** at Florida State University was funded by the College of Arts and Sciences and the Department of Mathematics, aimed toward career enhancement of graduates in financial mathematics. It was held on December 2-3, 2022. A distinguished non-FSU guest, Yuan Cheng, who is SVP at Market Risk Analytics, Citigroup (Ex.) gave a talk about LIBOR transition for market risk. The talk was delivered over Zoom due to family constraints. Two PhD alumni from FSU, Zailei Cheng and Zhiqiu Li, both of whom are former students of Lingjiong Zhu, attended the Quant Symposium in-person.

Zailei Cheng, now a VP at Citi, Tampa, gave an introductory lecture on market risk. Zhiqiu Li, now a Quantitative Analyst at Wells Fargo, talked about counterparty credit risk for risk participation swaps at the symposium. At the end of the event, a panel of professionals, including our guest speakers, answered students' questions about the job market for quants.

Sam Ballas, Tom Needham, and Martin Bauer were co-organizers of the **UF/FSU Topology and Geometry Meeting at FSU**, November 3–4, 2023, which has been a recurring meeting for several years and alternates back and forth between FSU and UF.

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Department News

Alumni News

Soheil Anbouhi (PhD 2022, Mio) is a visiting assistant professor at Haverford College.

Fan Bai (PhD 2023, Bertram and Karamched) is a principal product development engineer at The Timken Company, located in Ohio.

Hui (Alyssa) Duan (PhD 2023, Okten) is at Wells Fargo, Charlotte.

Mehran Fazli (PhD 2022, Bertram) is a Biomathematician at Austere Environments Consortium for Enhanced Sepsis (ACESO), located in Bethesda, MD.

Hubeyb Gurdogan (PhD 2021, Kercheval) is a Hedrick Assistant Professor of Mathematics at UCLA.

Julia Ream (PhD 2023, Sussman) is now a postdoc at Los Alamos National Laboratory.

Haixu Wang (PhD 2022, Zhu) is now working at Citi, Tampa.

Xiaoyu Wang (PhD 2020, Zhu) switched jobs to start working as a tenure-track assistant professor at Hong Kong University of Science and Technology (Guangzhou).

Graduate Student News

Jonathan Schillinger gave a talk at the Fall 2023 AMS Southeastern Sectional meeting in the special session on Dynamics & Equilibria of Energies, titled "Riesz Energy Asymptotics on Non-Spherical Sets".

Faculty Awards

Martin Bauer, Richard Bertram (lead), and Tom Needham, along with Roberto Vincis of the Department of Biological Science and Program in Neuroscience at FSU, were awarded a three-year grant from the National Science Foundation in 2023

Richard Bertram was elected as Fellow of the Society for Mathematical Biology in 2023. He was also awarded a 4-year grant as a co-investigator from the National Institutes of Health, with principal investigator Michael Roper, in 2022. He is also the principal investigator on a 2-year sub-award from Navy Medicine that began in 2023.

Kris Bowers and Yaineli Valdes were recipients of a 2021-22 University Teaching Award for Foundational Course Excellence at FSU.

Qi Feng was awarded an NSF grant titled "Hypoelliptic and Non-Markovian stochastic dynamical systems in machine learning and mathematical finance: from theory to application" for 2023-2026.

Washington Mio received the Distinguished Research Professor (DRP) award from FSU, which recognizes outstanding research and/or creative activity of eligible Florida State University faculty currently at the rank of full Professor. He was also selected as the inaugural Roger W. Roberts Professor of Mathematics. Mr. Roberts received an M.S. degree in Mathematics at FSU in 1969, and is currently the President and Chief Executive Officer or RhoSquared, Inc. He established the endowment to illustrate his commitment to mathematics education at FSU.

Giray Okten got the Oak Ridge Associated Universities Conference Grant for the Tenth International Conference on Sensitivity Analysis of Model Output (SAMO), 2022.

Lingjiong Zhu was awarded an NSF grant titled "The heavy-tailed methods in machine learning". He was awarded a Developing Scholar Award in 2022 and Graduate Faculty Mentor Award in 2023 from FSU. At 2023 INFORMS Annual Meeting, his paper "Operational Risk Management: A Stochastic Control Framework with Preventive and Corrective Controls" with Yuqian Xu (UNC) and Michael Pinedo (NYU) was the co-winner of the iFORM SIG Best Paper Award from MSOM society.

Faculty News

Qi Feng was invited to give a talk at the 7th eastern conference on Mathematical Finance.

Mark van Hoeij gave invited talks at the following conferences: Effective Aspects in Diophantine Approximation (March 2023 in Lyon, France), Modular curves and Galois representations (September 2023 in Zagreb, Croatia), Computer Algebra for Functional Equations in Combinatorics and Physics (December 2023 in Paris, France), 5th International Conference "Computer Algebra" (June 2023, online), Mathematical Summer in Paris (June 2023, online)

Giray Okten gave a talk at the Machine Learning and Monte Carlo Methods meet Economics and Finance Mini-Conference, University of California Santa Barbara, Nov 28, 2022.

CONGRATULATIONS
to all our students who passed actuarial exams!

Grace Alford	**Julia Lee**
Brooke Arnold	**Lorenzo Lindquist**
Giselle Burke	**Adam Lowinger**
Mason Deeley	**Katherine McKernin**
Sam Domsch	**Sam Mercier**
Andrew Dotterer	**Raeanna Michael**
Jacob Driggers	**Benny Pirrone**
Danielle Fonsing	**Vanessa Polidoro**
Grant Hays	**Dalton Raeckers**
Tadeusz Horomanski	**Roy Rodriguez**
Carson Hundley	**Yichan Shi**
Somya Joshi	**Bryson Thomas**
Joseph Kinnavy	**Paige Weinreich**
Spencer Laub	**Joshua Zuckerman**
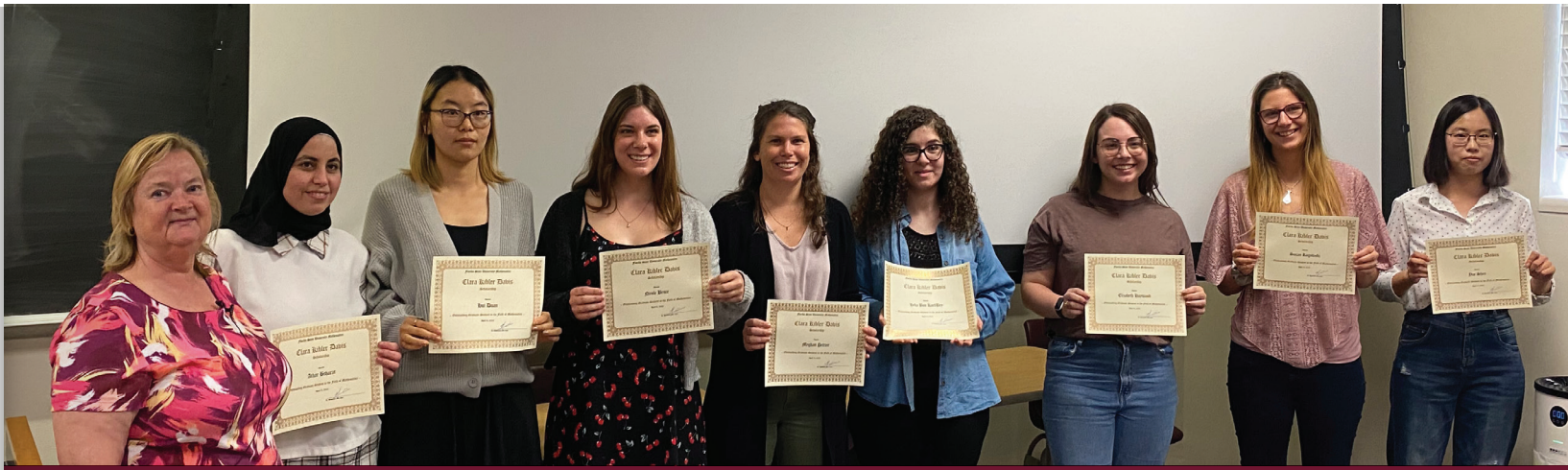
Mathematics Honors Day 2023

Every year in the spring, the Department of Mathematics recognizes graduate and undergraduate students for their teaching, academic, or service achievements. The following are the award winners from the Annual Honors Day event in Spring 2023:

Dwight B. Goodner Mathematics Fellowship

Millie and Dwight Goodner established this award to recognize teaching excellence in mathematics by graduate students.

Angelica Davenport

Anindya Chanda

Sathyanarayanan Chandramouli

Virginia Parkman

Edward White

Kenneth G. Boback Award

This award is presented to an outstanding senior undergraduate majoring in Mathematics.

Hayden, Seth

Bettye Anne Case Actuarial Science Award

This award is presented to an outstanding undergraduate student majoring in Actuarial Science. This award was established by Courtney and Shari White.

Wingfield, James

Bettina Zoeller Richmond Award

This award is presented to graduate students for outstanding service to the Department.

Julia Ream

Nicole Bruce

Clara Kibler Davis Scholarship

Shirin Provat

Alyssa Duan

Nicole Bruce

Yue Shen

Meghan Peltier

Susan Rogowski

Courtney Riggs

Elizabeth Haywood

Shreya Bose

Julia Ream

Angelica Davenport

Virginia Parkman

Charles and Anna Uhrhan Endowed Scholarship

Athar Bsharat

Kenneth G. Boback Award (undergrad)

Luke Baker

Connor Johnston

Bettye Anne Case Actuarial Science Award (undergrad)

Sam Domsch

Distinguished Teaching Assistants

This award is presented to graduate students for outstanding service to the Department.

Mehdi Abdi Anbouhi

Zhifeng Deng

Fan Bai

Jared Miller

Nicholas Ossi

Tam Family Award for Excellence in Graduate Student Teaching

Emmanuel Hartman

Mehran Fazli

Tam Family Award for Excellence in Graduate Student Research

Mehdi Abdi Anbouhi

Austin Anderson

Tam Family Poster Competition

Anindya Chanda (First)

Shreya Bose (Second)

Angelica Davenport (Third)

Bettye Anne Busbee Case Graduate Fellowship and Doctoral Mentor Recognition

Shirin Provat

Susan Rogowski

Meghan Peltier

Ethan Semrad

Nicole Bruce

Shaikh Obaidullah

De Witt Sumners Flash Talks Competition

Jon Schillinger (First)

Virginia Parkman (Second)

MATH PUZZLER

In this issue we present a Math Puzzler. The question comes from the FSU High School Math Contest. A prize* will be awarded for the best solution with the clearest explanation submitted by **May 1, 2024**. Solutions can be submitted to **newsletter@math.fsu.edu**. We hope you are challenged by this Puzzler!

For a positive integer M, there are many ways to write M as a sum of positive whole numbers. For which way is the product of the summands are large as possible? For example, 6 = 5+1 = 4+2 = 3+3 = 4+1+1 = 3+2+1 = 2+2+2 = 3+1+1+1 = 2+2+1+1 = 2+1+1+1+1 = 1+1+1+1+1+1. The largest possible product of the summands in such a partition is 3x3 = 9, just beating out 8 = 4x2 = 2x2x2.

Can you answer the same question when M is a positive real number, if we allow the summands to be positive real numbers as well?

*FSU Mathematics faculty and their families, and those affiliated with the FSU High School Math Contest (sponsors, participants, math club members, etc.) are not eligible for the prize. The newsletter editor and staff will determine prize eligibility.

FSU Mathematics PhD Recipients

Summer 2023

NAME	AREA	ADVISOR	THESIS TITLE
Abdullah Aurko	Applied and Computational Math	Justin Cole and Ziad Musslimani	Instabilities in nonlinear Schrodinger equations: classical and neural network approaches
Fan Bai	Biomath	Richard Bertram and Bhargav Karamched	Neuronal Development: From Polarization to Axonal Growth
Anindya Chanda	Pure Math	Sergio Fenley	Quasigeodesic Behavior of Anosov Flows: A Bridge Between Dynamics and Large Scale Geometry
Hui (Alyssa) Duan	Financial Math	Giray Okten	Computational methods for estimating global sensitivity indices and Shapley values
Hung Duong	Financial Math	Arash Fahim and Michael Mascagni	Solving High-Dimensional Fully Nonlinear Convex Partial Differential Equations Using Deep Learning
Yuxiu Lu	Pure Math	Martin Bauer	The Lp-Fisher-Rao metric and information geometry
Julia Ream	Applied and Computational Math	Marc Henry de Frahan and Mark Sussman	Large Eddy Simulations to Investigate the Fundamental Flow Physics of Supercritical Carbon Dioxide Turbulent Jets
Hui Sun	Financial Math	Feng Bao	Stochastic Optimal Control Through Gradient Projection Method and Backward Action Learning
Meng Wei	Applied and Computational Math	Kyle Gallivan and Wen Huang	Solving Clustering Problems Using Riemannian Optimization
Zezhong Zhang	Financial Math	Feng Bao	Mathematical Study on the Expressive Power of Machine Learning and Applications in Optimal Filtering Problems

Spring 2023

NAME	AREA	ADVISOR	THESIS TITLE
Austin Anderson	Pure Math	Alexander Reznikov	Asymptotics of Certain Short-Range Interactions on Rectifiable Sets and Beyond
Shreya Bose	Financial Math	Ibrahim Ekren	Risk aversion in Kyle-Back models
Sathyanarayanan Chandramouli	Applied and Computational Math	Ziad Musslimani	Nonlinear wave propagation in non-Hermitian media: theory and computation

FSU Mathematics PhD Recipients

Spring 2023

NAME	AREA	ADVISOR	THESIS TITLE
Angelica Davenport	Biomath	Nicholas Cogan	Mathematical Models of Triple-Negative Breast Cancer and HIV: Methods to Inform Treatment Regimens in Preclinical and Clinical Settings
Samuel Dent	Applied and Computational Math	Aseel Farhat	Analytical Study of Feedback Control Data Assimilation Algorithms for Ocean Models
Brad Mostowski	Financial Math	Ibrahim Ekren	Stochastic Liquidity in the Kyle-Back Model
Virginia Parkman	Biomath	Nicholas Cogan	Optimal Control Applied to a Canine Distemper Outbreak Modeled in an Animal Shelter
Edward (Alex) White	Pure Math	Alexander Reznikov	Polarization and Covering on Sets of Low Smoothness: Studying Short Range Repulsive Points by Asymptotic Behavior

Fall 2022

NAME	AREA	ADVISOR	THESIS TITLE
Mehran Fazli	Biomath	Richard Bertram	Modeling and Multi-Time Scale Analysis of Endocrine Cells: From Single Cell Excitability to Network Synchronization

Summer 2022

NAME	AREA	ADVISOR	THESIS TITLE
Mehdi (Soheil) Abdi Anbouhi	Pure Math	Washington Mio	Universal Mappings and the Metric Geometry of Functional Data
Jinglun Cai	Financial Math	Alec Kercheval and Xiuwen Liu	Two Topics in Deep Learning Based Dialogue Systems

FSU Mathematics PhD Recipients

Spring 2022

NAME	AREA	ADVISOR	THESIS TITLE
Yiran Chen	Applied & Computational Math	Giray Okten	Simulation and Goodness-of-Fit Tests of Copulas
Zishi Feng	Financial Math	Brian Ewald and Ziad Musslimani	A dynamic renormalization approach for solving stochastic differential equations
Haixu Wang	Applied & Computational Math	Ling Zhu	A Discrete-Time Self- and Mutual-exciting Models
Yi Zhou	Pure Math	Mark van Hoeij	Algorithms for Factoring Linear Recurrence Operators