University of Colorado **Boulder**
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This issue of Prime Bits is edited by Professor David Grant, working in concert with designer Rémy Jambor. It is available in electronic format at math.colorado.edu/alumni. If you would prefer to receive only the online version in the future, please just drop us an email at mathalumni@colorado.edu

In any format, we will endeavor to keep our loyal alumni and friends abreast of what's going on at their alma mater, and express our gratitude for what their continuing support has meant for the Department and its continuing generations of students.

Please follow CU Boulder Department of Mathematics on LinkedIn.

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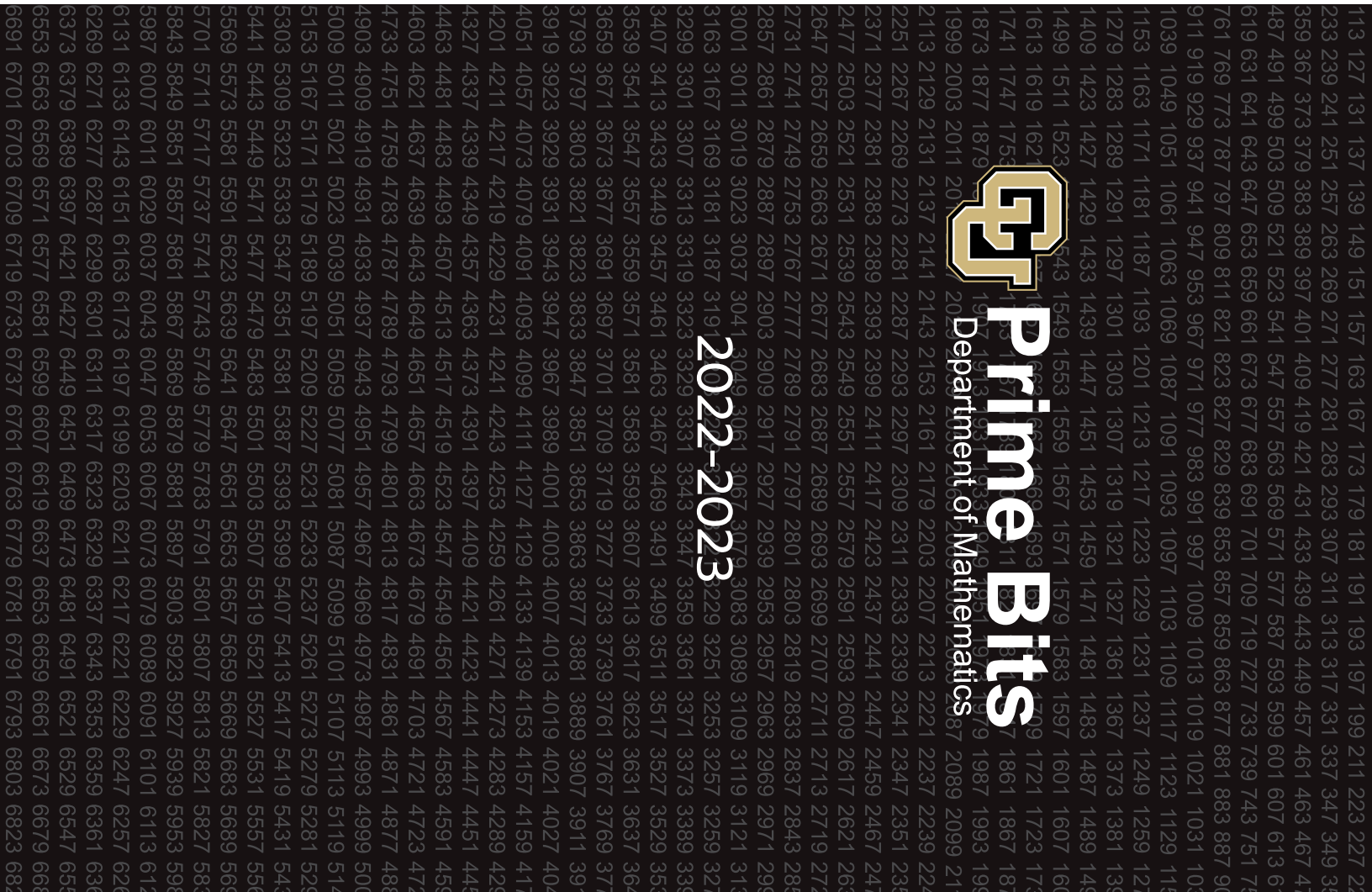
University of Colorado **Boulder**



Prime Bits

Department of Mathematics

Chair's Communiqué

Alexander (Sasha) Gorokhovsky

Dear Friends and Alumni,

For the past six years I have had the privilege and honor to address you as Chair of your math department.

In this, my last communiqué, I would like to relate not just news of the past year, but enduring lessons I have learned during my time as Chair.

First of all, the future of the department is bright. It is in great hands with our new Chair, Sebastian (Yano) Casalaina-Martin, who has been serving as graduate chair. He is a very thoughtful and caring person with a deep commitment to make our department even better.

Second, I am delighted by the way our Department has evolved to become student-centered. Taking good care of our students requires constant commitment, and over the years, I have come to appreciate more and more the dedication of all our faculty. I have also learned how the continuing generosity of our alumni plays a major role in our ability to care for our students and provide for excellence in their education.

We can only hope that our current students grow into as faithful and supportive a group as our current alumni.

I am proud that our department survived and flourished during the difficult times of the pandemic. A lot of people stepped up to make that possible — the staff, the teaching faculty, and our generous alumni who stepped up with contributions. It was like a large family pulling together in a time of crisis.

We are thrilled that in recent years we were able to make some great faculty hires, bringing aboard Kyle Luh and Florencia Orosz Hunziker (profiled in this issue.)

I am saddened that one of our colleagues, Robert Tubbs, died this year while he was still teaching. Rob had great dedication to the department. One of his passions was undergraduate teaching, and his many educational innovations will stay with us despite his passing. The Department of Mathematics has set up a scholarship honoring his memory: The Robert Tubbs Award for Mathematics and the Humanities (see his obituary in this issue for more information.)

I am also proud that we have been able to expand our postdoctoral programs, both research postdocs, and our new innovative "teaching postdocs" (see the article in this issue.)

Alumni sometimes ask about what our departmental priorities are for fundraising. At the moment, we can use help getting the Tubbs award fully funded, and our hope is that some alumni will be interested in making our teaching postdoc program an endowed, permanent fixture.

I want to thank you all so much for your attention and dedication this year, and every year.

Department Welcomes New Chair

The Department is pleased to welcome its new Chair, Professor Sebastian (Yano) Casalaina-Martin. Yano earned his PhD in Mathematics at Columbia University in 2004 under Bob Friedman in the area of Algebraic Geometry, took a Simons Postdoctoral Fellowship at Stony Brook, and an NSF Postdoctoral Fellowship at Harvard before joining the CU Boulder Faculty in 2008.

A Berkeley, California native, Yano is married to Irene Lee, whom he met when she was a student at Harvard and he was a student at Brown. They have two sons. He reports that although he and his wife grew up on the coasts, his family is "fully integrated into Boulder culture — we ski, camp, hike, bike … and are amateurs at it all."

Mathematicians are lucky to count Casalaina-Martin among their ranks – his first career choice was the culinary arts. He spent a year between college and graduate school working at a restaurant in New York City under Chef Amanda Freitag. He also had a celebrity encounter with Anthony Bourdain. His explanation for his change of heart? "I always loved mathematics and cooking, but I found that cooking is everyday stress. Academics is long-term stress, and is more manageable," he retorts.

As Chair he wants to "continue the great work Sasha and previous chairs have done to strengthen the department, both in research and pedagogy."

"We have hired a spectacular group of young faculty and I hope I can continue to lead in this direction," he said.

"A lot of work has been done in our department in education and I'd like to continue that. Many of our department members have put a great deal of effort into calculus and lower division courses and I would like to keep that vision going. We have an important role on campus and we want to help people learn the math they need," he continued.

Casalaina-Martin also wants to strengthen our research postdoctoral program, and our new "teaching postdoc" program (see article in this issue).

Yano said he especially wants "to focus on our sense of community as a department, as faculty and graduate students and lecturers."

Calling all alumni

Our new Chair, Professor Sebastian Casalaina-Martin, has set the goal of getting our valued alumni and community members more involved in the day-to-day life of the Department. So in Spring 2024 the Department will be hosting its first-ever "Friends of Colorado Mathematics Event," an evening when alumni and members of the community will be invited to meet faculty and current students over food, with information on current trends in mathematics, and the goings-on of the Department and its students. Details will be on our dedicated alumni website, math.colorado.edu/alumni/

This will complement our annual fall Alumni Reception during Homecoming Weekend (November 3, in MATH 350, from 3-5 pm.)

Whether you can attend either event or not, alumni are always invited to contact our department at mathalumni@colorado.edu, to send news, express opinions, or ask questions. You can also write the Chair directly at sebastian.casalaina-martin@colorado.edu.

Please follow CU Boulder Department of Mathematics on LinkedIn.

Department Has Five New Postdoctoral Fellows

Dr. Sheagan John is a Meyer Postdoctoral fellow, who received his Ph.D. at Texas A&M University. His research is on Non-Commutative Geometry and he is being mentored by Professor Markus Pflaum.

Dr. Vlad Margarint is a Meyer Postdoctoral fellow, who received his Ph.D. at Oxford University. His research is on Probability and he is being mentored by Professor Kyle Luh.

Dr. Sarah Petersen is a National Science Foundation Research Training Group Postdoctoral Fellow, who received her PhD at Notre Dame University. Her research is in Algebraic Topology and she is being mentored by Professor Agnès Beaudry.

Research Postdoctoral Fellows are crucial for the research life of the Department and expose our students to the very latest in mathematical progress. Unless otherwise noted, the funding for them comes from a generous bequest by our former colleague, Burnett (Bernie) Meyer and from support of the College.

Teaching Research Fellows are all mentored by Teaching Assistant Professor Harrison Stalvey, and are crucial for the teaching mission of the Department. They are being funded on an experimental basis by the College (see article about this new program in this issue). This year's cohort is:

Dr. Rebekah Jones, who got her PhD at the University of Cincinnati.

Dr. Andrew Meier, who got his PhD at the University of South Carolina.

The Department had an Ulam Visiting Professor in the past year, **Professor Ryszard Nest**, of the University of Copenhagen. His research is in Non-Commutative Geometry and his visit was sponsored by Professor Alexander Gorokhovsky.

Undergraduate News

Undergraduates **Matt Guerrero** and **Tianna Juarez** (later joined by **Luke Coffman** and **Oscar Bender-Stone**) started an organization called Math COSMOS, which stands for "Community of Support for Marginalized Students." The group is mentored by faculty Padi Fuster and Marcos Mazari Armida.

As it says on the Math Club website (math.colorado.edu/mathclub), Math COSMOS is "a student-led organization, to provide mathematics students with resources more directly suited to benefit them. Historically, minority populations (e.g., female scientists or people of color) have been underrepresented within STEM fields. We intend to help CU students from marginalized groups, particularly those interested in the field of mathematics, overcome these challenges."

A picture from this year's Departmental Pi Day Celebration. In honor of gravitational waves confirming the Theory of Relativity, the picture is taken from the perspective of the pies

Last year Math COSMOS had 12 meetings, with an average of 10-15 students attending each time. COSMOS hosted speakers, as well as other events, like a panel on graduate schools. It also provides social and study time. For more, see tinyurl.com/mathcosmos

Our Summer Research Experience for Undergraduates program continues to thrive. In summer 2022 we were able to fund 15 undergraduates and 15 first-year graduate students. We had five different projects mentored by

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Professors Beaudry and Moreno, Fuster, O'Rourke, Pflaum, and Vernerey.

Every year the Mathematical Association of America holds the William Lowell Putnam Mathematical Competition for university students in mathematics. Students attempt to solve twelve notoriously difficult problems over the course of six hours on the first Saturday in December. This year was the 83rd Putnam context, and there were 3,415 students at 456 institutions who participated.

The top participants from CU Boulder were **Evan Indge** (first place), **Brandon Baggett** (second place), and **Patrick Pillans** (third place). The top three scorers all receive cash prizes from the Department of Mathematics in recognition of their achievement.

The Experimental Mathematics Lab continues to support undergraduate research projects, led by graduate students, lecturers, and faculty in the Mathematics Department. In the past two years these included projects on the famous Collatz conjecture, dynamical systems, integer transforms, topological data analysis, and the Numberscope web app project for visualizing integer sequences, as well as the design of new software for interactive mathematical writing. These projects provide an opportunity for undergraduates to be involved in many different aspects of mathematical research, from data collection, to visualization, to writing and proving theorems.

The Department's Diversity Committee has created a new graduate TA position, *Teaching Assistant for Inclusive Pedagogy*, whose job it will be to teach support courses for the calculus sequence, mentor graduate students in our Graduate TA training course, and engage in departmental service activities that support our mission of inclusive pedagogy. The brainchild of Professor Agnès Beaudry, and teaching Professors Kevin Manley, and Harrison Stalvey, the new TA will be mentored by Stalvey. Fourth-year graduate student **Maggie Reardon** has been chosen to be the first to hold the new TA position.

Teaching Assistant Professor Harrison Stalvey has created a new 1-credit support course for introductory Calculus called MATH 1301: Calculus 1 Supplemental Lab, which will be offered for the first time in Fall 2023. In addition to attending their regular Calculus 1 class, MATH 1301 students will meet two more times per week and engage in an exclusively active learning environment. Stalvey also was a pioneer of MATH 1151, our successful 1-credit support course for students taking precalculus mathematics.

Department inaugurates innovative "Teaching Postdoc" Program

Harrison Stalvey

In 2022-2023 the Department started a new postdoctoral program, hiring "teaching postdocs," recent mathematics PhDs who seek academic careers focused on teaching, instead of research. One of few such programs in the country, the Department attracts candidates because of its national reputation for educational innovation, making extensive use of active-learning techniques in its introductory courses, employing learning assistants, and teaching our many students in coordinated, small classes.

The teaching postdocs are mentored by Assistant Teaching Professor **Harrison Stalvey**, a perfect match for the role – he got his PhD in math from Georgia State University, with a thesis about the teaching and learning of mathematics, before joining our department seven years ago. He was also a researcher on the NSF-sponsored SEMINAL grant our department played a leading role on, which helped institutions nationwide adopt active learning techniques in their calculus and precalculus courses.

Stalvey explains that the teaching postdocs bring fresh ideas to the teaching of our courses and will in return disseminate ideas from CU to other institutions when they move on to other jobs. He said we got 65 applicants our first year for two open postdoctoral positions and got 120 applications in our second year. So

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word is getting out about our teaching postdocs, which are hired on a 3-year contract and given professional growth opportunities.

For starters, their first semester they get the teaching orientation all new postdocs and lecturers get before school starts, and during the school year they attend weekly meetings with their course coordinators. They also meet once a week with Stalvey to discuss the behind-the-scenes of what happened in class that week. In addition, they have made presentations in our graduate student teacher-training course (MATH 5905).

The program is currently funded by the College as a multiyear experiment. As the Chair said in his communiqué, it is the dream of the Department to get some alumni support to endow the program in perpetuity, so generations of our student can reap its benefits.

The inaugural class of teaching postdoctoral fellows consists of **Dr. Rebekah Jones** and **Dr. Drew Meier**, who have just completed their first year. Having now learned the ropes of our calculus sequence, including training learning assistants, they will be coordinating calculus courses in their second year.

Dr. Drew Meier

Meier earned his PhD at the University of South Carolina, and all along was preparing for a teaching career. He explained that he went to a small liberal arts college, where his teachers really influenced him, and his goal is to land a position teaching at a similar school, where he could have the same impact on his students.

Meier said that although CU has "a big research campus with diversity," in some ways our math department feels like a small college, since we have "small, coordinated classes, and students get support."

Meier won a fellowship to participate in Project NExT (New Experiences in Teaching), which is a highly selective professional development program for recent PhDs sponsored by the Mathematical Association of America (see www.maa.org/programs-and-communities/professional-development/project-next)

Meier is excited about participating, saying he relished "any opportunity to expand my horizons and challenge my own biases."

Jones got her PhD at the University of Cincinnati, and her first job after that was at New College of Florida, where she decided she wanted to emphasize teaching in her career.

Jones said she really enjoys it here at CU. "This is what I was looking for. I wanted experience at a large university. The experience has been really good," she said.

She added, "I could have gotten a job coordinating somewhere, but I wanted experience in active learning, and it's built into the culture here."

Dr. Rebekah Jones

"It's really nice that we get to participate in the calculus sequence, which is different from other places," Jones said, adding, "I really like the instructor meetings. The discussion is where you share the ideas."

Summarizing the experience of the first year of the teaching postdoc program, Stalvey said, "I think it's working out really well. The postdocs have been able to come in and identify holes in our materials and make suggestions for improvements."

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Math For All in Boulder

Math for All is a conference designed to foster inclusivity in mathematics. The goals are to create a diverse network of students, professors, and researchers, and to provide students with a sense of belonging so they are encouraged to pursue careers in mathematics.

The conference was originally started in New Orleans by one of our post doctorate fellows, **Padi Fuster**, when she was a graduate student at Tulane. The conference has since branched out to seven satellite locations. CU Boulder hosted a virtual installment of the conference in February 2022, and with the generous support of the Math Department's Diversity Committee and the National Science Foundation (NSF), CU was able to host its first in-person meeting in February 2023, due to the efforts of organizers Fuster, **Professor Magdalena Czubak**, and graduate student **Breeann Wilson**.

Some of the components of the conference are poster presentations by undergraduate students and research talks by graduate students and postdocs. There were a total of 54 attendees this year (including seven poster presenters and eight research talk speakers). See tinyurl.com/mathforallboulder for more on the event.

Fuster reports that on the after-conference feedback survey, in answer to the question: "Did you feel comfortable?," 100 per cent said "yes." "This brings me joy that we did a good job," she added.

This coming year Math For All in Boulder will take place on April 5 2024, enjoying NSF support, but also a University of Colorado Impact Grant, which was won by Fuster and Czubak and incoming faculty member **Florencia Orosz Hunziker**, who is joining the organizing team for the event. The Impact Grant will also fund a Spanish language version of Math for All, created here in Boulder, called "Mates para todes," which will be open to everybody.

Fuster came to Boulder in 2021 as a postdoctoral fellow working under the supervision of Czubak on partial differential equations. A significant part of her efforts have been on expanding access to mathematics for traditionally underrepresented groups. Besides being a cofounder of Math For All, she is a cofounder of Meet a Mathematician, a collection of short video interviews of mathematicians from historically excluded backgrounds (see www.meetamathematician.com).

Fuster was just awarded an NSF Mathematics and Physical Sciences (MPS) Ascending Postdoctoral Research Fellowship, set up "to support postdoctoral Fellows who will broaden the participation of groups that are underrepresented in MPS fields in the US." We are

Participants from CU Boulder's 2023 Math For All conference

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▶ *Math For All Continued*

thrilled that she will also be spending that Fellowship here in Boulder.

One of the things she does for her students is to include "poster assignments" in her courses, so students learn how to prepare and present a poster for conferences, and to engage them in the process of doing and reporting on research. The CU Impact Grant will allow Math For All to conduct an instructor workshop so other instructors can learn how to incorporate these poster assignments into their courses. Fuster is also one of the faculty mentors for Math Cosmos, a new student organization dedicated to diversifying the CU Boulder Mathematics Department (see sites.google.com/colorado.edu/math-cosmos)

Padi Fuster

Faculty News

Promotions

Professor Robin Deeley was promoted this year to the rank of Associate Professor and was granted tenure. Deeley specializes in index theory and dynamical systems, and came to our department in 2017 as an assistant professor.

He did his undergraduate work at the University of Waterloo, starting by studying applied mathematics, and then branched out into theoretical math. He earned his PhD at the University of Victoria in 2010, working under Heath Emerson.

He then won a 3-year NSERC Postdoctoral Fellowship, which he took at the Mathematisches Institut of Georg-August Universität, in Göttingen, Germany, before doing a postdoc at Université Blaise Pascal in Clermont-Ferrand, France, from 2013 to 2015. This was followed by a position at the University of Hawaii Manoa, in Honolulu.

Grants and Awards

Dr. Padi Fuster, one of the Department's postdoctoral fellows, won an NSF Mathematics and Physical Sciences (MPS) Ascending Postdoctoral Research Fellowship, set up "to support postdoctoral Fellows who will broaden the participation of groups that are underrepresented in MPS fields in the US."

Professor Robin Deeley won a three-year National Foundation Science Fellowship entitled: "C*-algebras associated to minimal and hyperbolic dynamical systems."

Lecturers **Wafa Yacoub** and **Xingzhou Yang** are the 2022-2023 recipients of a new award, the Prime Time Lecturer. The Prime Time Lecturer award recognizes a lecturer in the Department of Mathematics for outstanding service in teaching undergraduate courses. Nominations are solicited every spring from lecturers, postdocs, teaching professors, and tenured/tenure-track faculty. Nominations are reviewed by course coordinators and the department's Undergraduate Committee. The Undergraduate Committee selects the recipient based on the nominator's endorsement and the nominee's student evaluations.

Faculty **Padi Fuster**, **Magdalena Czubak**, and **Florencia Orosz Hunziker** won a University of Colorado Impact Grant, that will help fund this coming year's Math For All in Boulder conference on April 5 2024. For more on the conference and grant, see the article on *Math for All* in this issue.

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Department Welcomes New Faculty

Florencia (Flor) Orosz Hunziker

The Mathematics Department is thrilled to welcome a new assistant professor, **Florencia (Flor) Orosz Hunziker** to its faculty. Orosz Hunziker got her PhD at Yale under Igor Frankel, after having earned her undergraduate degree at the Universidad Nacional de Córdoba in Argentina.

Flor's research is in Mathematical Physics and Representation Theory, specifically on the mathematical aspects of string theory, quantum field theory, and topological field theory. She explained that her work centers on algebraic tools like vertex algebras and infinite dimensional Lie algebras, which are the sorts of things that mathematicians can use to prove conjectures that physicists make.

After graduate school, Orosz Hunziker spent a year at Harvard as a lecturer, and then came to CU Boulder as a Meyer Postdoctoral Fellowship. She arrived at CU in the middle of the pandemic, and said she found teaching online was "interesting and challenging," but that she "had a wonderful time working on zoom with students and colleagues despite the challenges of the pandemic." She employed active learning in teaching her classes here, as she did at Harvard.

After one year at CU, Orosz Hunziker won an NSF postdoctoral fellowship, which she took at the University of Denver. After two years at DU, she was hired here into a tenure-track position. Flor said she is "thrilled and really honored to join the faculty and the Department. It's a wonderful university. "

"I really enjoyed working with the undergraduates here in the past and I am looking forward to being a part of the CU Boulder community" she added.

Department welcomes new Accounting and HR Professional

Greta Moores

This past May the Department was very happy to welcome its new Accounting and HR Professional, **Greta Moores.**

Greta grew up in Duluth, and only recently moved to Colorado. "I always wanted to move out here," she said. "The weather and the sun and the mountains, all the hiking trails, it's amazing – and no bugs, too!" she added.

Her job involves taking care of all the accounts and programs in the department, including federally-sponsored research accounts, and endowment funds set up by our generous alumni.

She reports that she is very excited to be part of the math department and looking forward to helping in any way she can.

Awards Won by Students in the Department

Undergraduate Students
(funded by gifts from our readers)

Emmett Fitz and **Malayne Perry** are the recipients of the 2023 Jack Hodges Award for Excellence in Mathematics, given annually to advanced undergraduate students majoring in Mathematics who have demonstrated the greatest promise in the mathematical sciences.

CJ Girard and **Max Prue** are the recipients of the 2023 Marlene Massaro and David Pratto Scholarships in Mathematics. This scholarship is awarded annually to exceptional upper-level undergraduate Mathematics majors.

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▸ *Awards Continued*

Raymond Cole and **Oscar Bender-Stone** are the recipients of the 2023 Mr. and Mrs. J. Tour Scholarship, which was established to benefit full-time "senior class or graduate students in the advancement of the study of physical sciences and engineering."

Nate Ward-Chene, **Caleb Ogle**, and **June Means** received 2023 Sieglinde Talbott Haller Scholarships, given annually to graduate and undergraduate students in Mathematics who show exceptional mathematical promise.

Thomas Stewart was awarded the 2023 Jack N. Hyatt Award, given annually to provide scholarship support for students majoring in Mathematics and planning on becoming high school or junior high school math teachers or attorneys in the State of Colorado.

Devin Driggs and **Oscar Bender-Stone** were the 2023 Jim & Laura Marshall Scholarship recipients, given annually to the advanced undergraduate students majoring in mathematics who have demonstrated the greatest promise in the mathematical sciences.

Raymond Cole was the 2023 winner of the Robert C. Gunning Scholarship, given annually to a student in the math department who shows potential for achievement in mathematics, its applications, or related areas.

Awards won by Graduate Students

(funded by gifts from our readers)

Jackson Carpenter, **Nicholas Christoffersen**, and **Courtney Hauf** are the winners of the 2023 W. E. Briggs Teaching Excellence Awards, given annually to first-year graduate teaching assistants or graduate part-time instructors in the Department in recognition of outstanding accomplishments in teaching.

Andrew Campbell, **Christopher Eblen**, and **Breeann Wilson** are the winners of the 2023 Burton W. Jones Teaching Excellence Award, given annually to veteran graduate teaching assistants or graduate part-time instructors in the Department in recognition of outstanding accomplishments in teaching.

The Briggs and Jones Teaching Excellence Awards are supported by the B. W. Jones and W. E. Briggs Teaching Excellence Award funds.

Christopher Eblen, **Bob Kuo**, **Erik Knutsen**, **Juan Moreno**, and **Peter Rock** won the 2022 Frances C. Stribic/University Summer Fellowships.

Chase Meadors was the winner of the 2022 W. J. Thron Summer Fellowship, awarded annually to the most outstanding third or fourth year graduate student.

Mateo Muro and **Patrick Wynne** were awarded the 2022 Richard Laver Graduate Fellowships. The Laver Fellowships are awarded annually to support graduate education.

Andrew Campbell, **Levi Lorenzo, Joseph Macula**, **Eli Orvis**, and **Michael Wheeler,** won the 2022 Sieglinde Talbott Haller Scholarships, which get awarded annually to select students in the Math Department.

Rachel Chaiser, **Helena Davenport, Erik Knutsen**, **Connor McCranie**, **Connor Meredith**, **Ian Miller**, and **Breeann Wilson** were recipients in 2022 of University Fellowships.

Howy Jordan, **Isabelle Kraus**, **Sangman Lee**, **Adrian Neff**, and **Justin Willson**, are recipients of the 2022 Adele V. Leonhardy Memorial Scholarships. These scholarships are awarded annually to outstanding students who plan careers in teaching mathematics

Degrees Awarded

In 2022, the Department awarded 8 doctorate degrees. The recipients were:

Sarah Arpin, PhD
Graduate Advisor: Dr. Katherine E. Stange
Dissertation Title: Supersingular Elliptic Curve Isogeny Graphs

Andre Charles Davis, PhD
Graduate Advisor: Dr. Agnès Beaudry
Dissertation Title: A Computation of the Action of the Morava Stabilizer Group on the Lubin-Tate Deformation Ring

Jordan Daniel DuBeau, PhD
Graduate Advisor: Dr. Keith Kearnes
Dissertation Title: Jónsson Jónsson-Tarski Algebras

Richard George Dyer, PhD
Graduate Advisor: Dr. Martin Walter
Dissertation Title: The Positive Definite Functions on a Group as a Dual Object for Finite Groups and Applications to Representation Theory

Lucas Roman Kledzik Gagnon, PhD
Graduate Advisor: Dr. Nathaniel Thiem
Dissertation Title: Advances in the Combinatorics of the Unipotent Upper Triangular Groups

Ali Lotfi, PhD
Graduate Advisors: Dr. Sean O'Rourke and Dr. Julien Langou (CU Denver)
Dissertation Title: Numerical

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▸ *Awards Continued*

Stability of the GSXO Orthogonalization Scheme

Cherry Cheuk Ching Ng, PhD
Graduate Advisor: Dr. Agnès Beaudry
Dissertation Title: Bredon homology of the non-abelian group of order 21

Andrew McDowell Stocker, PhD
Graduate Advisor: Dr. Robin Deeley
Dissertation Title: Synchronizing Dynamical Systems, Groupoids, and C*-Algebras

In 2023, the Department awarded 7 doctorate degrees. The recipients were:

Clifford Bridges, PhD
Graduate Advisor: Peter Mayr
Dissertation Title: Occurrences of the Embedding Problem with Galois Groups of Prime Power Order

Andrew Campbell, PhD
Graduate Advisor: Dr. Sean O'Rourke
Dissertation Title: Spectral Properties of Random Matrices with Dependent Entries

Connor Michael Meredith, PhD
Graduate Advisor: Dr. Keith Kearnes
Dissertation Title: Nilpotence and Dualizability of Algebras of Finite Type

Maya Faye Ornstein, PhD
Graduate Advisors: Dr. Joshua Grochow (CSCI) and Dr. Keith Kearnes
Dissertation Title: GENeralizing DEcompositions of Representations: Transitioning from Representations to Visible Actions

Jonathan Quartin, PhD
Graduate Advisor: Dr. Jonathan Wise
Dissertation Title: Stable Maps to Grassmannians in Genus One

Michael Wheeler, PhD
Graduate Advisor: Dr. Agnes Szendrei
Dissertation Title: A Nonstandard Approach to Keisler's Order

Justin T. Willson, PhD
Graduate Advisor: Dr. Richard Green
Dissertation Title: Vectors of small norm in lattices of 2-roots of simply laced Coxeter groups

The Department also awarded 12 Masters Degrees (departmental advisors listed in parentheses) in 2022 to:

Rachel Marie Chaiser, MA (Dr. Robin Deeley)

Bob Kuo, MA (Dr. Jonathan Wise)

Levi Lorenzo, MA (Dr. Robin Deeley)

Joseph Hennessey Macula, MA (Dr. Katherine E. Stange)

Trevor Manders, MA (Dr. Nancy Rodriguez (APPM))

Connor Alexander McCranie, MA (Dr. Markus Pflaum)

Juan C. Moreno, MA (Dr. Agnès Beaudry)

Adrian Neff, MA (Dr. Jonathan Wise)

William Eli Orvis, MA (Dr. Katherine E. Stange)

Peter Robert Rock II, MA (Dr. Jeanne Clelland)

Breeann Meralou Wilson, MA (Dr. Nathaniel Thiem)

Justin T. Willson, MA (Dr. Richard Green)

and two awarded concurrently with a BA degree:

Ezzeddine El Sai, BA/MA (Dr. Markus Pflaum)

Chance Takeshi Beyer Yung, BA/MA (Dr. Robert Tubbs)

The Department also awarded seven Masters Degrees (departmental advisors listed in parentheses) in 2023 to:

Spencer Shortt, MA (Dr. Stephen Becker (APPM))

Nicholas Christoffersen, MA (Dr. Kyle Luh)

Andrew Doumont, MA (Dr. Markus Pflaum)

Jennifer Gensler, MA (Dr. Nathaniel Thiem)

Nicholas Jamesson, MA (Dr. Peter Mayr)

Maggie Reardon, MA (Dr. Robin Deeley)

Calum Shearer, MA (Dr. Markus Pflaum)

and one awarded concurrently with a BA degree:

Dominick Raymond Fiscalini, BA/MA (Dr. Markus Pflaum)

In 2022 five undergraduates graduated with honors in Mathematics:

Catherine Faith Brennan (summa cum laude)

Jacob Vernon Gaiter (summa cum laude)

Theodore Gonzales (summa cum laude)

Michael Stephen Barry Walker (summa cum laude)

Xiaoming Wang (summa cum laude)

In 2023 five undergraduates graduated with honors in Mathematics:

Raymond Gareth Baker (summa cum laude)

Nathaniel Aaron Collins (summa cum laude)

Continued ▸

▸ *Awards Continued*

Robi Oyan Huq (summa cum laude)

Dion Mann (magna cum laude)

Brooke Wei (summa cum laude)

In 2022, 38 graduating seniors were awarded memberships in the Pi Mu Epsilon (PME) Math Honor's Society:

Jordan Parker Boucher, Adam Charles Claman, Jacob Daugherty, Ezzeddine El Sai, Asher Joseph Farr, Dominick Raymond Fiscalini, Jacob Vernon Gaiter, Theodore Gonzales, Emma Ruth Goodwill, Isabel Greenhut, Darian Taylor Hall, Huilin Han, Alexander Jai Herbert, Zuocheng Hu, Ian Downey Jorquera, Thomas Jochen Kauffman, Brandon Thomas Korb, Peter Ardell Lande, Yucong Li, Yunhao Li, Korye Hasani Lockett, Nicholas Owen Miesch, Kyle Gerrit Moe, Brett Schechter, Chase A. Schwartzman, Sarah L. Sego, Eric E. Senn, Amy Elizabeth Sullivan, Zhouming Sun, Wenxuan Tan, Georgy Trubnikov, Michael Stephen Barry Walker, Luke Robert Walther, Wei Wang, Dennis Robert Windham, Alan Huaao Yu, Xin Yuan, Chance Takeshi Beyer Yung.

In 2023, 30 graduating seniors were awarded memberships in the Pi Mu Epsilon (PME) Math Honor's Society:

Omar Almutawa, Fletcher Sean Collins, Nathaniel Aaron Collins, Cole Jackson Davis, Nicholas Dreux Entin, Dominick Raymond Fiscalini, Stephen Charles Gately, Richard Bo Han, Mark Philip Hanna, Rachel Stacy Hill, Narisak Hiri-o-tuppa, Robi Oyan Huq, Morgan Bailey Knuesel, Zheng Liu, Dion Mann, Tuscany Vennard Que McCann, Marissa McMaster, Kyle David Newman, Ethan Viet Khoa Nguyen, Ethan Thomas Olander, Roméo Samuel Lazar Petric, Taylor Kay Renquist, Andrew VanPelt Scheck, Erica Morgan Shaub, Levi Simon, Henry Jacob Waldstreicher, Brooke Wei, Cheng Hsun Wu, Zhanchao Yang, Evan Thomas Young.

Commencement Keynote Speakers

In 2022 and 2023 the Department was thrilled to have two of its cherished alumni, **Den Ducoff** and **Doug Norris**, as its six and seventh annual Commencement Speakers.

Den Ducoff

Den graduated CU with a BA in Mathematics in 1982. After graduation, he participated in the "Boulder Tech Startup Scene," being on the ground floor of several software startup companies over the next 30 years. Since then, Den has been a professional math tutor. He enjoys family life, hiking, traveling, and doing nothing in particular. Now that he is retired, Den continues to enjoy learning mathematics at his own pace and occasionally tutoring math students. And he still loves sharing that "AH.... I get this!" moment.

Doug Norris

Doug Norris earned his doctorate in optimization from CU's math department in 2002. After what he describes as "a mercifully short career" as a professor, he is now a principal and consulting actuary with Milliman in Denver, and is the emeritus chair of the Society of Actuaries' health section. His main focus involves strategy and tactics for commercial and managed Medicaid health insurers, but his passion lies in solving complex healthcare problems (of which there are plenty) and building actionable insights from complex data. Doug lives in Golden with his wife and children, and in his spare time he loves high-altitude hiking, sports analytics, music and hockey goaltending.

In Remembrance

Professor William Jones passes away at 91

Bill Jones with his wife Martha

We are sad to report that our former colleague, **Professor Emeritus William B. (Bill) Jones**, passed away in January. He was 91. Bill was on the CU faculty from 1963 until his retirement in 1996, and he served as Department Chair from 1987 to 1990. For those of you who weren't lucky enough to know Bill, he was a man of great integrity, kindness, and generosity. Our readers probably know him best as the founder of Prime Bits, which he started in 1987 and then kept producing until 2015. He played a major role in securing endowed funds for our department and our students, through the great generosity of our alumni.

Bill earned his BA in mathematics from Jacksonville State Teachers College, and his MA and PhD from Vanderbilt. He then worked at the Central Radio Propagation Laboratory at National Bureau of Standards in Boulder before joining our faculty.

Bill had more than 100 publications spanning more than a half century, and supervised more than a dozen PhD and Masters students. An expert in analytic continued fractions, he wrote widely on topics in Approximation Theory, Orthogonal Polynomials, Complex Analysis, and Numerical Analysis, and maintained international collaborations that spanned decades. He created community everywhere he went and in every life he touched. He will be sorely missed.

For more on his remarkable life, see www.legacy.com/us/obituaries/dailycamera/name/william-jones-obituary?id=39472807

Bill was the founder and longtime editor of Prime Bits


PRIME BITS


PRIME BITS

Department of Mathematics Newsletter
University of Colorado, Boulder, Colorado 80309-0395

Mathematics Dept. to unveil art exhibit Jan. 24

Adele Leonhardy Memorial Scholarship

Kemprer Colloquium Fund exceeds initial goal of $50,000


PRIME BITS

Department of Mathematics Newsletter
University of Colorado, Boulder, CO 80309-0395

Fall 2012 Volume 14

Two new Assistant Professors bring shared passion for bicycling and math

Publication of memoir by Professor Emeritus Baggett

Continued ▸

Professor Robert Tubbs passes away at 69

Professor Robert Tubbs

We are very sad to report that our colleague, **Professor Robert (Rob) Tubbs** passed away in April. He was 69.

Rob joined our faculty in 1986, and had profound effects on the Department, the University, and its students, over his 37-year tenure.

His first field of research was transcendental number theory. He wrote an introductory text to the field (with Edward Burger). He spent the last quarter-century of his career researching the Intellectual History of Mathematical Ideas, writing the scholarly texts "What is a Number? Mathematical Concepts and Their Origins;" and "Mathematics in Twentieth-Century, Literature and Art: Content, Form, and Meaning." He had more than a dozen Masters and PhD students.

Rob performed truly transformative service to our unit, to the university, and to the profession. Over many years he was pivotal in converting our first-year calculus classes into coordinated small sections that employ active learning techniques. His efforts and his initiative were central in establishing our Calculus program as a national model.

Not content to just improve education here, he was the Boulder Principal Investigator on a National Science Foundation grant called SEMINAL, which helped many Colleges and Universities nationwide adopt active learning in their Precalculus and Calculus sequences.

His marks are everywhere in our Undergraduate curriculum. As Undergraduate Chair he set up our current major and created the Secondary Education track. He was instrumental in bringing Learning Assistants to our department and integrating them fully into our courses and curriculum. He created the Math Academic Resource Center. He championed the cause of "pathways" in our service-level courses, helping all students on campus get the math they needed for their majors as efficiently as possible.

He was also a champion of Diversity and Inclusion, directing The Miramontes Arts & Sciences Program, and serving on our Departmental Diversity Committee.

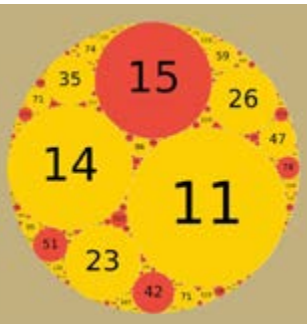
He has many living legacies, and had a profound impact on our campus community, and on all who knew him and loved him. He will be sorely missed.

For more on his remarkable life, see www.legacy.com/us/obituaries/name/robert-tubbs-obituary?id=51663484

▸ New Robert Tubbs Award for Mathematics and the Humanities

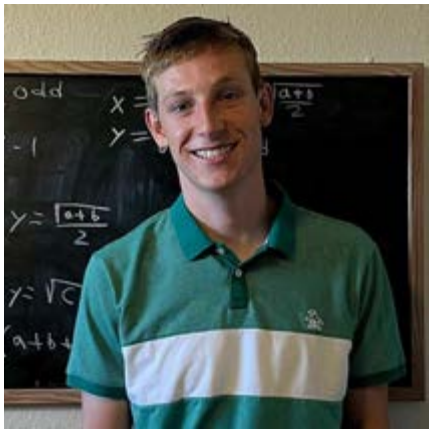
The Department of Mathematics has set up a scholarship honoring Rob's memory: The Robert Tubbs Award for Mathematics and the Humanities, which will be: "Awarded annually to an outstanding junior mathematics major(s) who exemplifies Professor Tubbs's passion for and scholarly interest in exalting the deep and multifaceted connections between mathematics and the arts and humanities." Donations can be made at giving.cu.edu/fund/robert-tubbs-award-mathematics-and-humanities.

Students disprove well-known conjecture during summer project



An Apollonian circle packing is formed by choosing three circles inscribed into an outer circle in such a way that all three are tangent, and then recursively filling in the triangular gaps in a similar way. The circles in this example are labeled by their curvatures (the curvature is the inverse of radius), which in this example are all integers. The circles in the picture are colored by the residue of the curvature modulo 3. The local-to global conjecture concerns what the curvatures could be modulo 24, in the case that all the curvatures do not have a common divisor greater than 1.

Dr. James Rickards



Clyde Kertzer

Professor Katherine Stange

Summer Haag

A remarkable thing happened at the Math Department's Summer Research Experience for Undergraduates (REU) Program this summer. Undergraduate Clyde Kertzer and Graduate Student Summer Haag disproved a widely-believed conjecture in number theory, "The Local-Global Principle for Apollonian Circle Packing." (See the accompanying graphic explaining what an Apollonian circle packing is.)

Since the summer of 2014, the Department has sponsored its REU Program, which teams select undergraduate math majors with first-year graduates students on a research project mentored by CU faculty. (See www.colorado.edu/math/news-events/summer-research-undergraduate for more on the program, and information on past projects.)

A wonderful article describing what Haag and Kertzer accomplished while working with mentors Professor Katherine Stange and Postdoctoral Fellow Dr. James Rickards just appeared in Quanta Magazine (see www.quantamagazine.org/two-students-unravel-a-widely-believed-math-conjecture-20230810/)

The research paper the four of them wrote based on this new discovery, "The Local-Global Conjecture for Apollonian circle packings is false," can be viewed on the Math Arxiv, at arxiv.org/abs/2307.02749. Its abstract states:

"In a primitive integral Apollonian circle packing, the curvatures that appear must fall into one of six or eight residue classes modulo 24. The local-global conjecture states that every sufficiently large integer in one of these residue classes will appear as a curvature in the packing. We prove that this conjecture is false for many packings, by proving that certain quadratic and quartic families are missed. The new obstructions are a property of the thin Apollonian group (and not its Zariski closure), and are a result of quadratic and quartic reciprocity, reminiscent of a Brauer-Manin obstruction. Based on computational evidence, we formulate a new conjecture."

Alumni News

Full Circle Expedition

Class of 2012 mathematics major Eddie Taylor will be honored this year at Homecoming with the young alumni award. Taylor, who also majored in Biochemistry, was part of the first all-Black team to summit Mt. Everest last year. The team, Full Circle Expedition, "creates spaces for individuals to feel represented, supported, and empowered in the outdoors" www.fullcircle-expeditions.com .

Taylor, who competed in the decathlon while at CU, is a teacher and the head track and field coach at Centaurus High School in Lafayette.

See a wonderful article in the Coloradoan for more on Taylor, his team, and their accomplishments www.colorado.edu/coloradan/2022/11/07/cu-boulder-alum-part-first-all-black-team-summit-mount-everest .

Our Alumni Website: AfterMath

Our department's website for alumni and friends, aptly dubbed "AfterMath," is a one-stop portal for everything having to do with our cherished alumni and friends. It contains links to:

1) Alumni events (like our annual departmental Homecoming reception, which will take place in MATH 350 on November 3 from 3-5 pm);
2) A repository of past Prime Bits;
3) Information on how to donate to the Department, with a list of funds that you can donate to with the proverbial click of a button (or by mail);
4) An online copy of a book written by former professors Burton Jones and Wolfgang Thron, chronicling the history of the Department during its first century, starting from the time the first mathematics instructor arrived in Boulder in 1878;
5) Most importantly, there is a site where you can provide us with information about yourself for future issues of Prime Bits!

Check out AfterMath at math.colorado.edu/alumni.

You can also get to the site by pressing the "Alumni" button atop our department's home page, at www.colorado.edu/math/

Gifts from our generous donors

We are thrilled to report that our alumni and friends have been incredibly generous to the Mathematics Department in the past two years. University policy now precludes us from individually listing all the donors from 2021-2023, but the Mathematics Department had 94 donors giving a total $187,118. We are overwhelmed by your generosity and eternally grateful. It is these gifts that allow us to provide our students with the type of education they so richly deserve.

Interested in donating?

We are deeply grateful for these and all our donors. The easiest way to donate to the Department is to go to math.colorado.edu/alumni/donor.php, which has a list of funds that you can donate to with the click of a button or by mail.