THOUGHTS FROM EMERITUS PROFESSOR FLOYD WILLIAMS

Regarding the recent political unrest in our country that has focused on the issues of racism, black lives, etc, I submit the following thoughts. These are not intended to be political but to express some broader personal concerns as well that in some sense flow beyond the sad, tragic events that transpired in Minnesota — the May 25th 2020 killing of George Floyd. Like so many others, I have experienced racial discrimination over the course of many years. This with other ills I see as part of the general fabric of society that manifests itself in the positive and negative behavior of human beings. I have tried to use these negatives, coupled with my own personal faults and failures, as a platform for personal growth. As has well been said, life’s troubles and tragedies can make us bitter or better. I realize that numerous other groups suffer as well from discrimination — racial, religious, or otherwise. Whether they be Tibetans, Irish, Christians in Eritrea, Muslims or Indians in America, or Indians in India by way of Hindu nationalists, the list seems to go on and on. The poignant question that Rodney King asked during the six days of the 1992 LA riots still lingers in the air decades later: “Can’t we all just get along?”

When I was asked to speak in Poland for the second time, I took the opportunity to visit both Camp Birkenau and Auschwitz and thus I was able to see first hand the cruel instruments of terror and death imposed by the Nazis on the Jews, Gypsies, Czechs, Yugoslavs, Austrians, Poles, and others.

HABEN MICHAEL INTERVIEW

Haben Michael was featured in the last newsletter, as one of three new assistant professors in 2019-20. Hearing of his interesting and non-traditional back story, I interviewed him last summer. — Ed.

MW: Can you give us a summary of your career?

HM: I received a BS in Mathematics and a PhD in Statistics, both from Stanford. In between the two I went to law school, worked in mergers & acquisitions for a couple of years, and practiced law for a time. I also worked (and continue to work) in housing court, representing tenants in the Boston area.

MW: What is law school like for someone with a math background? Easier? Harder? Weirder?

HM: It was fun, it didn’t feel like work. I was a TV junkie, but rather than watch TV, I would just read cases. The philosophy or policy conversations I had with friends (“is that really legal? but then why is this illegal?”) suddenly had a clear purpose. I would compare the difference between philosophy conversations on the one hand and practicing the law on the other, to the difference between working on a challenging textbook problem and doing research.

It’s a different type of intellectual challenge. You don’t encounter the kind of problem you do in math, which hurts your head to even think about too long, the mental equivalent of moving an awkward piece of furniture up a spiral staircase. But in litigation or negotiations there is the challenge of quick thinking, time plays an important role. And there is often another different kind of challenge. It’s doing something that seems simple, and the simple solution will in fact work 98% of the time, but a lawyer is brought in to make sure it goes off without a hitch 99.5% of the time. That requires some thought and imagination

One difference is that these challenges seem to ease up with experience. As far as I can tell math doesn’t ever get any easier.

By the way, I think nowadays it is much more common to find law students who have a math or related background. The methods of STEM fields have been adopted by the law and legal practitioners just as in many other humanities disciplines.
As I write this, the US presidential election is still weeks away and the world seems very turbulent and full of suffering. The impact of COVID-19 will be felt for a long time to come. In mid-March the university abruptly moved to fully online instruction, and we are still at it. Budget problems have led to staff furloughs and even layoffs, and there is no end in sight. I am confident that we will weather the storm, eventually. Reading of the often difficult lives of famous mathematicians in history helps to give some perspective. Of course, we don’t read about the ones who died of some easily preventable disease before they had the chance to achieve great things.

This issue is a little different from usual, for example because various events such as the Student Awards ceremony were not held in person and hence did not yield the usual photos. I have tried to keep some sense of stability among all the instability we are living through, by reverting to a more normal production timetable (you may recall that last issue was very late). If all has gone well, you will be seeing this issue just before Thanksgiving, although only in electronic form this year.

Department members rose to the substantial challenge of remote teaching. Of course, some already had experience. A column in the local Daily Hampshire Gazette recently made favorable mention of Joanna Jeneralczuk’s course taught online via the University Without Walls program. A departmental Slack channel set up to share teaching techniques in the new environment generated a great collaborative spirit and many useful ideas.

Apart from COVID-19, the big domestic news story of the last several months has been a renewed emphasis on racial inequality, and inequality more generally. Universities and professional organizations have certainly been thinking harder about inclusion over the last few months. UMass Amherst has a long tradition of social activism and progressive thought. One interesting data point is the fact (gleaned from Nate Whitaker’s article mentioned in this issue) that at his appointment in the last 1980s he was the third Black professor then in the department, whereas zero or one was a much more common number for a math department in a large research university (even now the average is less than 1). Some thoughts from one of the other two, Emeritus Professor Floyd Williams, are included in this issue.

Of course, there is always work to be done, and members of our department have set to it. Some of that work is discussed later in this issue.

Our departmental community sends best wishes for the holidays to all students, faculty, staff, alumni, emeriti and friends. Here’s to the better world that we can all play our part to create in 2021!
DEPARTMENT HEAD’S MESSAGE

The Department of Mathematics and Statistics continues to grow and renew itself. The number of Mathematics majors is now over 1000. The most popular concentrations continue to be Actuarial, Computational Math, Statistics and Applied Math. In addition, the Department teaches over 15,000 students each year. We hired 10 new faculty members this past year (3 Assistant Professors, 5 Visiting Assistant Professors and 2 Lecturers). The Department has a pressing need for more space. The University is in the planning stage of renovating 2 wings in Lederle Tower vacated by Chemistry for the Department.

This pandemic will be considered as a watershed in history when people look back on this time. Our university, our state and much of our nation have stepped up significantly. This pandemic has had a tremendous impact on the University and the Department. For the safety of its students and faculty, the University moved its classes to remote in the middle of Spring 2020. This remote teaching continued into Fall 2020. This was a huge adjustment for our faculty, graduate students and staff that have done a tremendous job that I want to commend them for. I can only see departmental growth from all of these efforts. I am amazed at all of the sharing and the helping of each other from our marvelous graduate students, staff and faculty. These types of events are destined to happen in history and we get through them by working as a community and supporting each other.

On top of this pandemic, the George Floyd incident and the illumination of racial injustice moved the University and especially our Department to have discussions and take actions relating to inequities in our discipline. I am very proud of the efforts of my Department. I am an African-American who grew of in the 1950s and 1960s in the south. I lived during the transition from segregation and Jim Crow laws. When I was a very young boy, my family went to a drive-in theatre every Sunday with a fence down the middle separating whites and blacks with separate concession stands. I have seen many changes in our country since then, but racism and inequities still persist. Nevertheless, I am very proud to be a part of this Department. When I came to the University 33 years ago, I was the third African-American faculty member along with Don St. Mary and Floyd Williams. Especially then and even now, most Math Departments have no African-American faculty. I follow in the footsteps of Don St. Mary as the second African-American Department Head. This is even rarer and I thank the Department for their support and their trust in me.

I have been around much longer than most. I also grew up in a time when things were unsettling for me and those who looked like me, and they still are in many ways. Nevertheless, I believe that it is very important to look at the silver lining in things. We may have no control over things outside of our bodies but we do have some control over how we react to them. Life always has its ups and downs for everyone. It is important to try to adapt to this time and be optimistic. Take advantage of extra time and try to accomplish things that you did not have time to do before. This pandemic will end and I believe that we would be very happy to look back and see how we took advantage of this time in some way. The pandemic has made us appreciate the simple things in life more. I cannot wait to have coffee with a friend, work side by side with someone on a math problem or just pass someone in the hall and say hello. Be safe and optimize the moment!! — Nate Whitaker
2020 PROBLEM CHALLENGE

1. In base-2020, the number $2020! = 2020 \cdot 2019 \cdots 2 \cdot 1$ ends with how many zeroes?

2. Find the average of the squared-distance $\|P - Q\|^2$ between all pairs of points $P, Q$ on the unit-radius sphere $S^2 \subset \mathbb{R}^3$.

3. Let $K$ be the set of 27 points in $\mathbb{R}^3$ of the form $(x_1, x_2, x_3)$ with $x_i = 0$ or $\pm 1$. What is the smallest number of planes perpendicular to the coordinate axes and disjoint from $K$ that can be removed from $\mathbb{R}^3$ so that each remaining component of space contains exactly one point of $K$?

4. Fix $a, b, c \geq 0$, and consider the space curve $C \subset \mathbb{R}^3$ parametrized by $C(t) = (at, bt^2, ct^3)$ for $t > 0$. Let $P(t)$ be the plane normal (perpendicular) to $C$ at the point $C(t)$, and let $V(t)$ be the volume of the solid bounded by $P(t)$ and the three coordinate planes. If the limit of $V(t)$ as $t \to 0$ equals 1, then what does the product $abc$ equal?

5. Given a positive integer $n$, determine all possible positive values of $x$ such that

$$\sum_{i=0}^{n} (x + i)^2 = \sum_{i=n+1}^{2n} (x + i)^2.$$

6. Can all 3 vertices of an equilateral triangle in $\mathbb{R}^2$ have integer coordinates? How about all 4 vertices of a regular tetrahedron in $\mathbb{R}^3$?

7. For each $n = 1, 2, 3, \ldots$, define the subset $X_n$ of the unit interval $[0, 1]$ as the following union of closed intervals: $X_n = [0, \frac{1}{2n}] \cup [\frac{1}{2n}, \frac{2}{2n}] \cup \cdots \cup [\frac{2n-2}{2n}, \frac{2n-1}{2n}]$. Each $X_n$ has total length $|X_n|$ equal to $\frac{1}{2}$. Find the total length $|Y_n|$ of the difference set $Y_n = X_{2n-1} \setminus X_{2n}$.

8. Consider the set $\mathcal{E}_{2020}$ of all even-sized subsets, and the set $\mathcal{O}_{2020}$ of all odd-sized subsets, of the set $\{1, 2, 3, \ldots, 2020\}$. Construct an explicit 1-to-1 function from $\mathcal{O}_{2020}$ onto $\mathcal{E}_{2020}$.

PREVIEW OF ARTICLE IN NOTICES OF THE AMERICAN MATHEMATICAL SOCIETY

Nate Whitaker has given public talks (well received by students in particular) about his life story. Now he has written an article to appear in the February 2021 issue of Notices of the American Mathematical Society (which will be freely available online).

It begins as follows — see the full article when it comes out. Personally, I found the story extremely interesting, and in places very moving. — Ed

As we stood at Fort Monroe at 6AM, gazing into the sea, I could imagine the ships approaching, bringing the first Africans to what would become this country, bringing my own ancestors. My wife and I had traveled to Fort Monroe in Hampton, Virginia on August 24, 2019 to observe the 400th anniversary of this arrival. Amazingly, this site was only three miles from where I grew up. It is also the city where the Black women mathematicians in the book and movie Hidden Figures lived and worked. Their stories were hidden as were the stories of the triumphs of many African Americans. During much of my time navigating the White world as a mathematician, I myself have felt hidden and invisible. This invisibility is what the narrator in Ralph Ellison’s landmark book The Invisible Man feels. He is a Black man who feels invisible to Whites as he maneuvers through their world. This invisibility to the White world can also be a handicap when trying to further one’s education or academic career, since the support from your fellow students and faculty can make a huge difference in your success. The combination of the recent death of George Floyd and the COVID-19 pandemic has somewhat uncloaked or made visible the plight of African Americans and sparked interest in their hidden history. This is the story of my journey from segregation to becoming the Head of the mathematics and statistics department at a major R1 university.
SOLUTIONS TO 2019 CHALLENGE PROBLEMS

Solution 1. Firstly, we need to impose conditions that guarantee existence of logarithms: \( a > 0, a \neq 1 \) and \(|6x - 5| - 18 > 0\). The last inequality is equivalent to \( 6|x - 5| - 18 \neq 0 \), which in turn is equivalent to \( x \neq 2, x \neq -8 \). The given equation can be rewritten as \( \log_a |6x - 5| - 18 = \log_a 72a^2 \), or equivalently
\[
|6x - 5| - 18 = 72a^2.
\]
So we need to find all values of the parameter \( a > 0, a \neq 1 \), for which the equation \( |6x - 5| - 18 = 72a^2 \) has exactly two solutions. This equation is satisfied if either \( 6|x - 5| - 18 = 72a^2 \) or \( 6|x - 5| - 18 = -72a^2 \). The first equation, \( 6|x - 5| = 72a^2 + 18 \), always has two solutions. The second equation, \( 6|x - 5| = 18 - 72a^2 \), doesn’t have any solutions if and only if \( 18 - 72a^2 < 0 \), i.e. \( |a| > \frac{1}{2} \). Since we also have that \( a > 0, a \neq 1 \), we see that the original equation has exactly two solutions if and only if \( |a| > \frac{1}{2}, a > 0, a \neq 1 \). Equivalently, \( \frac{1}{2} < a < 1 \) or \( 1 < a \).

Solution 2. Consider 4-dimensional vectors \( \vec{u} = (1, x, y, z) \) and \( \vec{v} = (1, 1, 1, 1) \). Then we compute \( \vec{u} \cdot \vec{v} = 1 + x + y + z, \vec{u} \cdot \vec{u} = 1 + x^2 + y^2 + z^2 \) and \( \vec{v} \cdot \vec{v} = 4 \). So the inequality follows from the Cauchy–Schwarz inequality \( (\vec{u} \cdot \vec{v})^2 \leq (\vec{u} \cdot \vec{u})(\vec{v} \cdot \vec{v}) \).

Solution 3. Firstly, we solve for \( x \) using the quadratic formula,
\[
x = -19 \pm \sqrt{19^2 + 4y^2}.
\]
In order for \( x \) to be integral, \( 19^2 + 4y^2 \) must be a perfect square, say \( n^2 \) with \( m > 0 \). Then \( 19^2 = m^2 - 4y^2 = (m - 2y)(m + 2y) \). Since \( y > 0 \), we have that \( m + 2y > 0 \) and is also larger than \( m - 2y \). Since 19 is a prime number, this leaves only one possible factorization: \( m + 2y = 19^2 = 361 \) and \( m - 2y = 1 \). Solving for \( m \) and \( y \) gives \( m = 362 \) and \( y = 361 \). Thus \( m = 181, y = 90 \) and \( x = \frac{-18 + \sqrt{18^2 + 4y^2}}{2} = 81 \).

Solution 4. Let \( \vec{u}_1, \vec{u}_2, \vec{u}_3 \) be the vectors that give sides of the parallelepiped of length \( a_1, a_2, a_3 \), respectively, and let \( \vec{d} = \vec{u}_1 + \vec{u}_2 + \vec{u}_3 \) be the vector that gives its diagonal. Using properties of the dot product, we have
\[
\vec{d} \cdot \vec{d} = (\vec{u}_1 + \vec{u}_2 + \vec{u}_3) \cdot (\vec{u}_1 + \vec{u}_2 + \vec{u}_3) = a_1 \cdot a_1 + a_2 \cdot a_2 + a_3 \cdot a_3 = a_1 a_2 \cos \theta_1 + a_2 a_3 \cos \theta_2 + a_3 a_1 \cos \theta_3.
\]
Dividing by \( d \) gives the required formula.

Solution 5. We will use the following fact: \( 10^m - 1 = 9 \cdots 9 \) (\( m \) digits all equal to 9). We have
\[
x_0 = \frac{9 \cdot 9 \cdot 9 \cdots 9}{3 \cdot 10^m} = \frac{10^{2m+1} - 1}{3 \cdot 10^m}.
\]
So
\[
x^2 = \frac{10^{2m+1} - 2 \cdot 10^m + 1}{9 \cdot 10^m} = \frac{10^{2m} - \cdots - 10^2 + 1}{9 \cdot 10^m} = \frac{10^{2m} - 1}{9 \cdot 10^m}.
\]
Notice that \( 0 < \frac{10^{2m} - 1}{9 \cdot 10^m} < 1 \). So the first integer larger than \( x^2 \) is \( \frac{10^{2m} - 1}{9} = 1 \cdots 1 \) (\( 2n \) digits all equal to 1).

Solution 6. Consider one intersection where the warp goes over the weft and enumerate all warps starting with this given warp, which we assign number 0. Then the warps numbered by \( xa + yb \) can go over the weft, where \( x \) and \( y \) are integers. (a) Arguing by contradiction, suppose the g.c.d. of \( a \) and \( b \) is \( d > 1 \). Since \( d \) divides \( xa + yb \), warps indexed by integers not divisible by \( d \) never go over the weft. But this is impossible by the definition of the weave, every warp should go over (and under) some weft. (b) We need to prove that every positive integer \( n \) except 1, 2, 3, 4, 6 can be written as a sum of coprime positive integers \( a, b > 1 \). The first choice is \( 2 + 3 = 5 \) and the next choice is \( 2 + 5 = 7 \) (or \( 3 + 4 = 7 \)). Equivalently, we need to show that there exists a coprime to \( n \) such that \( 1 < a < n - 1 \). If \( n \) is odd, take \( a = 2 \). If \( n = 2^k \geq 8 \) is a power of 2, take \( a = 3 \). More generally, write \( n = 2^m k \), where \( k \geq 1 \) and \( m \geq 3 \) is odd. The number of integers from 1 to \( n \) coprime to \( n \) is called the Euler function \( \phi(n) \). So we need to show that \( \phi(n) > 2 \). Since the Euler function is multiplicative, we have
\[
\phi(n) = \phi(2^k) \phi(m) = 2^{k-1} \phi(m) > 2
\]
if \( m \geq 5 \) or \( m = 3, k \geq 2 \). (c) Since \( f(n) = \phi(n) - 2 \), it suffices to prove that \( \lim_{n \to \infty} f(n) = \infty \).

Write prime factorization \( n = p_1^{e_1} \cdots p_r^{e_r} \) with \( p_1 < \cdots < p_r \), then
\[
\phi(n) = (p_1^{e_1} - p_1^{e_1-1}) \cdots (p_r^{e_r} - p_r^{e_r-1}) = \left( 1 - \frac{1}{p_1} \right) \cdots \left( 1 - \frac{1}{p_r} \right) \geq \frac{n}{2r}.
\]
Note that
\[
\log \left( \frac{n}{2} \right) = k_1 \log(p_1) + \cdots + k_r \log(p_r) - s \log(2) = \sum_{i=1}^r (k_i \log(p_i) - \log(2)).
\]
For every \( \rho > 0 \), there exists \( \epsilon > 0 \) such that if \( n > \epsilon \) then either \( p_r > \rho \) or \( k_1 + \cdots + k_r - s > \rho \). In the first case, \( \log \left( \frac{n}{2} \right) > \log(\rho) - \log(2) \). In the second case, \( \log \left( \frac{n}{2} \right) > \rho \log(2) \). Thus \( \lim_{n \to \infty} \log \left( \frac{n}{2} \right) = \infty \).
THOUGHTS FROM EMERITUS PROFESSOR FLOYD WILLIAMS

The visits there, and visits to the homes of Gandhi in Mumbai, India, Saint Mother Teresa in Calcutta, Einstein in Bern, Switzerland, Dostoyevsky in St. Petersburg, Russia, etc, all have helped me to see the world in a broader view — in a vision that in the short life we occupy on this planet we are admonished to seek the humanity and value of all persons, regardless of creed or cultural distinction. Gandhi’s movement of non-violence which culminated in 1947 with independence from Britain was the template used by Martin Luther King, Jr. Einstein labored unceasingly as a champion of human rights. The Space X astronauts that docked a few days ago with the International Space Station viewing our little blue planet from their vantage point reminded us again that ours is a shared atmosphere and a shared place in this universe, and hence for the good of all we do need to “get along together”, as Rodney King so wished.

Whether we go through the pandemic of a virus or seemingly unsurmountable challenges of race relations, we all share a common earthbound destiny.

There is worldwide agreement that what happened to George Floyd in our country was absolutely horrific and unjust. I think we all agree and hope for and would want to see progress towards better training, better community relations, etc, and to see the good riddance to any and all police persons not worthy of the badge they wear. I personally have no animus for police (nor for any group) and I would not paint them all with the same brush unfairly. Nor did I paint with the same brush unfairly all in the same race as the person by whom I was assaulted and robbed on the streets of St. Louis some years ago. My nephew is a policeman/detective, and I have noted his bravery and fidelity with that of other men and women that place their lives on the line daily in service to others in assisting and saving lives. In some small ways I have tried to bridge racial and cultural divides in my volunteer work in various local communities. The work includes weekly visits to about six different Nursing Homes (which host only about 1% of African American patients), playing the piano, and assisting patients with hospital rides for cancer or other treatments. I also invest time helping two children (ages 5 and 7) with reading challenges, and I work with bi-racial families that have experienced discrimination. Thus I believe in using the many blessings that God has granted to me to be a blessing to others, and thus to attempt to see the humanity, value, and needs of others, in contrast to being wrapped up in myself with prejudice and misunderstandings of persons so different from myself.

I now mention some of my experiences with minority students and mathematicians who have been mentors to them, and to me — here I speak not as an expert on a broader area of racism in mathematics. I grew up with no mathematics heroes, but only sports or music persons to emulate. I knew of the courageous sports executive Branch Rickey who helped to break the color barrier in major league baseball by signing the gifted black player Jackie Robinson in 1947. The Branch Rickey type for me, so to speak, was Prof. Isador Hirschmann who broke a color barrier by admitting me as the first doctoral student in the Washington Univ. Mathematics Department. It was actually music that kept me from dropping out of high school. There I had the wonderful support and investment of many other Professors, including Prof. Ed Nussbaum who made such an important contribution to my mathematics learning, along with my thesis advisor Ray Kunze. I was also very fortunate to have Prof. Bertram Kostant as my MIT Postdoc mentor. My point is that many minority students have less preparation sometimes for rigorous classroom courses. We often deal with basic survival matters under conditions of poverty and racism, with mainly sport or entertainment figures for role models. It is very helpful to have Professors not take a negative attitude nor devalue or underestimate the potential of these and other students.

I feel that if educators see themselves more as serving the needs of students and providing mentorship, when possible, rather than being “lords” in the class room, then possibly the amount of discrimination might be lowered.

I did spend ten years as a member of the New England Board on Higher Education working with other mathematicians and scientists in the grand effort to reach and mentor, and to recruit underrepresented students. I also worked with Phil Kutzko in Iowa on a project in Florida, and in Valparaiso, Chile, and I worked with Bonita Ewers at Johnson C. Smith University in North Carolina, for example. Many other mathematicians like Paul Sally and Ken Gross have also dedicated much time and effort to mentoring minority and other underrepresented groups of students to open doors of mathematics to them.

I think we all hope for some good ends to emerge from the tragedy of George Floyd. While focused on that tragedy we also need to be mindful of the hundreds of weekly shootings in Chicago (and in other cities) – of victims that include children and babies the fate of whose black lives does not always garner the commensurate national and world attention, and action. We are bound by a common destiny on this small blue planet.

When Francis Bacon described the aim of science as to “enlarge the bounds of the human empire,” he expressed the great hope
that the understanding of nature would promote human welfare.

On the other hand, we must be reminded, as Gauss was, of the limitations of science. Leibnitz and Kant rebuked attempts by Hobbes, Laplace and Voltaire to reduce humans to a meaningless concourse of atoms devoid of a morality base. Without a moral core we become as “they who cut the stones, but cannot truly lay them, seekers bound to their own tasks, each following his own quest, his (perverted) fragment of truth” — quoting from Goethe’s Book of the Earth II.

— Floyd Williams

MATHEMATICAL CULTURE

MATH 370 (Junior Year Writing) is an unusual course – relatively few universities offer such a course, let alone make it compulsory, as it has been at UMass Amherst since 1982. Along with the usual mundane but useful topics such as mathematical typesetting, reading and writing papers, and producing a CV, there is scope for the instructor to expose students to mathematical culture. Franz Pedit has taken students to the art museum, while my tastes run more to jokes and songs. Below are some jokes (none original to me, alas) from a list I use to lighten the mood just before plunging into another Zoom session where the students are confronted with my pedantry and punctiliousness.

— Mark C. Wilson

Q: Why do they never serve beer at a math party?
A: Because you shouldn’t drink and derive.

Q: What’s purple and commutes?
A: An abelian grape.

Q: How do you tell whether a play is abelian?
A: If all of the characters are one dimensional.

Q: Why did the chicken cross the Moebius strip?
A: To get to the same side.

NEW FACULTY

Martina Rovelli will join the Department as an Assistant Professor in January 2021. She received a PhD in mathematics from École Polytechnique Fédérale de Lausanne in 2017, followed by postdocs at Johns Hopkins University, Mathematical Sciences Research Institute and Australian National University.

Her research interests lie at the intersection of algebraic topology, higher category theory, and homotopy theory. The collection of all mathematical objects of a given kind, such as sets with a certain algebraic structure or state spaces and the time evolutions between them, often assemble naturally into a higher category, and higher category theory provides the tools and the necessary language to express and understand how the examples of interest from different areas interact with each other. She develops foundational aspects of higher category theory, and studies how different models and approaches are related.

Yulong Lu joined the department as an Assistant Professor in September 2020. His research interests lie broadly in the areas of applied analysis, applied probability and statistics. He is mainly interested in developing analytic and probabilistic tools for understanding problems from physics and machine learning.

Yulong received his PhD in Mathematics and Statistics from the University of Warwick in 2017 under the supervision of Andrew Stuart and Hendrik Weber. Prior to joining UMass, he was a Research Assistant Professor at the department of mathematics at Duke University.

Wei Zhu joined the department as an Assistant Professor in September 2020. His research is mainly motivated by the open challenges in data science including the mathematical understanding of deep neural networks and designing provably efficient machine learning models for the small/corrupted data regime. He is particularly interested in exploiting the symmetry and low-dimensional geometry within the data to improve the interpretability, stability, reliability, and data-efficiency of deep learning.

Wei received his PhD in applied math from UCLA under the supervision of Stanley Osher. Before joining UMass, he was a Phillip Griffiths Research Assistant Professor in the Department of Mathematics at Duke University.
COMINGS AND GOINGS

Details of the three new Assistant Professors are above.

The department welcomes five new Visiting Assistant Professors: Theodosios (Theo) Douvropoulos, Vefa Goksel, Navid Mohammad Mirzaei, Charles Ouyang, and Yuejiao Zhang. Daniel Ecaizabarrena is now working with Andrea Nahmod as a postdoc.

Also welcomed are new Permanent Lecturers: Eric Sarfo Amponsah, and Shai Gorski (Mt Ida campus).

Terry Mullen had been in a temporary departmental assistant position for 18 months, and is now in a permanent role of Academic Program Manager.

Ivan Mirkovic and Brian Burrell each took advantage of the university’s budget-driven Voluntary Separation Incentive Program to retire earlier than expected. Ivan will remain active in research and supervising graduate students.

Nestor Guillen has resigned from the department to seek his fortune in Texas, and we wish him well.

STAFF FEATURE

The Research Computing Facility (RCF) manages the infrastructure and endpoint systems for the Department of Mathematics & Statistics. We support 344 active department users, comprising 120 faculty members, 36 visiting academics, 160 graduate students, and 28 staff members, as well as over 1000 undergraduate students.

The RCF is composed of Alan Boulanger, Rachel Aronow, and graduate student assistant Renato Spacek.

Alan Boulanger is the acting Director of Research Computing and joined the department in 2008. Prior to joining the RCF, Alan worked at IBM Watson Research Labs where he conducted information security research and consulted with various government and law enforcement agencies as a subject matter expert on active cases. At the RCF, Alan is responsible for the design, implementation, and security of the department’s IT infrastructure as well as managing the daily support operations.

Rachel Aronow came to UMass in 2017 to pursue a Masters degree in Applied Mathematics. During this time, she worked as a graduate assistant for the RCF, and chose to join the team full-time as an EDP Programmer upon her graduation in 2019. She received her undergraduate degree in Astronomy and Mathematics from Wesleyan University, where she began building an interest in data science and software. In addition to continuously learning about new technologies to support the mathematics department, she currently manages the new RCF computing cluster and assists in the implementation of IT infrastructure. She can be spotted jogging across Amherst as she waits for rec sports leagues to safely open up again!

Renato Spacek is the current graduate student assistant for the RCF. He received a dual degree in Mathematics and Chemical Engineering from UMass, before starting his Masters degree in Applied Mathematics in 2019. His interests lie in analysis and computational research. For the RCF, Renato helps with various production tasks and responds to support help requests.

Alan says “The RCF has been focused on keeping our department servers safe and secure during this time of increased online activity. Our external services experience thousands of daily attacks and active measures are constantly being taken to keep your accounts and data safe. Throughout the transition to remote learning, the RCF has adapted in order to provide remote assistance to our faculty and staff. We have deployed a department VPN, so that our staff can continue with their familiar workflows while off-site (any department members who believe they would benefit from utilizing the VPN should reach out to us via email to request access). We respond to email help requests and have been utilizing Zoom and remote screen sharing technologies to provide hands-on support for our faculty and staff. We have identified common problems working off-site and have written up documentation for how to resolve these issues. This includes how to remote access, avoid & resolve triggered security blocks, and much more. These guides are available on our new RCF web page (look for the right-most tab on the menu bar of the math website!)”
ANDREA NAHMOD RECOGNITION

Andrea was selected for 2020-21 as one of two Conti Fellows in the UMass Amherst College of Natural Sciences.

The selection of the Conti Fellows is based on campus nominations, endorsed by the department and dean and on external letters of support. These nominations are reviewed by a faculty committee of previous Conti Fellows who provide a recommendation for the selections. Conti Fellows receive release time from other duties for one year, in order to concentrate on the research project they have proposed, as well as a cash stipend.

The citation reads: “Andrea Nahmod’s research lies at the interface of nonlinear partial differential equations (PDE) and nonlinear Fourier and harmonic analysis, while bringing to bear tools and ideas from geometry, analytic number theory, and probability. References praised the superb quality of Nahmod’s research; as one stated succinctly: “Professor Nahmod is one of the most prominent and well-respected senior researchers in the field of Partial Differential Equations (PDEs).” This Conti Fellowship will allow Nahmod to focus on studying the invariance of the Gibbs measure and the almost sure existence of strong solutions in its statistical ensemble for the periodic defocusing Wick ordered cubic NLS in 3D.”

Andrea’s work was also recognized by an invitation to give an AMS Invited Address at the Joint Mathematics Meetings in January. Her talk is entitled “Propagation of randomness under the flow of nonlinear dispersive equations.”

ALUMNI INTERVIEW

Athena and Julianne Higgins are recent math majors from our department who work at Sun Life Financial in Waltham, MA. Athena is a 2018 graduate and Julie is a 2020 graduate. Both sisters interned at Sun Life after their respective junior years. Eric Sommers interviewed them recently.

ES: What are your current positions?

Athena: We are both student actuaries at Sun Life Financial. I’ve been here 2.5 years. We are in a rotational program, where we switch roles every two years. I was most recently working in what you could call Actuarial IT, doing programming in SAS (a statistical programming language).

We get time to study for our actuarial exams. I’ve passed 4 exams (P, FM, IFM, and SRM) and I’m now studying for my fifth exam. I took the FM prep class at UMass, but I passed Exam P while there by studying on my own.

Julie: I’m working as a valuation actuary, calculating the reserves that Sun Life needs to cover all claims and expenses. Day-to-day it’s a lot of SAS programming and Excel Visual Basic too. I started my position in mid-June, so all my work has been remote. My team is based in Kansas City, so I would be doing a lot of online meetings even without COVID. We use Zoom and Workplace by Facebook to stay connected.

I also get time to study for my actuarial exams. I passed P and FM at UMass and I’m studying for IFM now. I took the Exam P prep class at UMass, but I studied for FM on my own.

ES: Tell me more about your use of SAS and Excel in your jobs.

Athena: A lot of our older processes are in Excel, with Excel files all over the place, and we are moving more things to SAS since it allows us to demonstrate more clearly that particular processes are doing the correct thing, which the auditors like. SAS is also faster.

Julie: It also goes the other way where we take a SAS process that’s built into a model and then take the idea of it and build an Excel file to prove that it’s working correctly.

Athena: That’s true. We have modeling software to project out 100 years. Say we want to manipulate one variable and see what happens. We can apply the change to every insurance policy, but if we first want to test it, we’ll take the idea of what the modeling program is doing and apply it to a single policy using...
Excel and then do the same hundred-year projection to prove the modeling software is working correctly. It reminds me of sensitivity analysis in differential equations.

**ES:** What was your path toward pursuing actuarial science?

**Athena:** I came to UMass interested in Applied Math, maybe something related to environmental science.

**Julie:** I began as a biochemistry major, planning to study pharmacy, and was a double major in math. But after talking to Athena, who loved the math department and was then pursuing the actuarial track, I decided to switch completely to math.

**Athena:** We learned from each other and found our way to the actuarial track together. We only overlapped at UMass for one year — it was a lot of fun to have that year together.

**ES:** What research experiences did you have at UMass?

**Athena:** I did an REU (Research Experience for Undergraduates) at the Scripps Institute after sophomore year, using MATLAB to model the ocean current off the coast of San Diego. There was a camera that took tons of pictures per minute and the code analyzed the photos to model the current.

**Julie:** I participated in the LEE-SIPS program (through the College of Natural Sciences), working with Biostatistician Laura Balzar on an HIV/AIDS study. I also attended weekly lab meetings with Nicholas Reich and his team. For my project, I used R (statistical programming language) to do various simulation studies. Laura was an amazing mentor and teacher, and I am very grateful I had this summer experience to open my eyes to the real-world applications of math/statistics.

**ES:** What were your favorite or most important courses at UMass?

**Julie:** Statistical Programming (STAT 535) with Patrick Flaherty — a great course where we learned Python and how to apply it to statistical questions. Also, Linear Regression (Stat 525) with Erin Conlon. We learned to use SAS, which as I mentioned is important for my current job.

**Athena:** So many great courses. Math Modeling with Nate Whitaker. I loved the exploratory nature of the course and doing the group and individual projects. Also, Stat 525. I took it with Daeyoung Kim and we also used SAS. He met with each group several times during the semester to help us with the project, which was great.

**ES:** You both studied abroad during your final semester.

**Julie:** Yes, I was in Ireland last spring, before being sent home in March because of the COVID outbreak.

**Athena:** I spent my seventh and final semester in Switzerland. Outside of class time, I backpacked throughout the country by train and went on countless hikes. The Swiss cherish, celebrate, and work hard to preserve their country’s ecology — I admired this during my time there.

**ES:** Both of you were actively involved in AWM (Association for Women in Mathematics). Tell me about that.

**Julie:** I was involved since my first year. I became the treasurer and then the president of AWM.

**Athena:** I was treasurer sophomore year when our AWM chapter was founded. AWM was the best thing that happened to me. I made some great friendships through AWM (my good friend, Shelby Cox, was the chapter’s first president). AWM is great at helping building confidence. It was great to talk with graduate students about math.

**Julie:** Yes, the graduate students are a bridge between the faculty and the undergrads. They helped me decide what classes to take. Sometimes math can be isolating, so AWM helped me with finding students to study with. Math has a gender-imbalance, but the actuarial field is quite balanced gender-wise.

**ES:** Rumor has it there is a third Higgins sister who is a UMass graduate?

**Julie:** Yes, I have a twin sister, who majored in computer science at UMass. She also works in insurance, for Liberty Mutual as a computer programmer. We never had a class together, but we would study together while taking the calculus classes. It was fun to compare notes while she was taking CS 250 (Discrete Math for CS) and I was taking Math 300 (Introduction to Abstract Thinking). The courses overlapped for a while, before diverging.

**ES:** Any parting thoughts?

**Athena:** Insurance impacts everything. It touches on the environment, which comes up in Property and Casualty Insurance. Julie’s and my work touches on public health issues (like the Affordable Care Act). As Elon Musk recently said (on Twitter), we need some creative actuaries to figure out how to insure self-driving cars. Insurance is needed for so many things.
Haben Michael Interview  Continued

MW: Obviously the pro bono work is interesting for readers, so details of any specific cases/results would be great to have.

HM: In law school clinics I spent a lot of time representing prisoners, in parole hearings, suits over their conditions, etc. A longer project involved the data analysis that went into the expert report submitted to the Connecticut state legislature when they were considering overturning the state’s death penalty. The thrust of our argument was that the state’s prosecutors were choosing whether to charge the death penalty in an arbitrary and inconsistent manner. Side-stepping the basic moral questions about the death penalty, ours was a position that, if true, many could back without too many misgivings.

MW: How do you manage to keep doing it, with your other job?

HM: Since moving into statistics I mostly assist with relatively small-stakes cases like landlord-tenant disputes, CORI seals, etc. As far as time commitment goes, probably an average of 2-3 hours per week. But it’s different enough from statistics that it’s a nice break. The last year and half I’ve been helping a friend, also a statistician, in a suit with his landlord. We talk about it for hours, and it’s like a break from work. I heard of a math professor at U. Toronto who is also a lawyer who takes part in large cases, but that’s beyond me.

MW: I saw a book by Leo Katz: “Why the law is so perverse”. My recollection is that it is related to social choice paradoxes, What is or should be the relationship between law and mathematics, in your view?

HM: I think for the law, as with the sciences and many other endeavors, math holds out the ideal of universally accepted truths and a universally accepted method of establishing those truths. Can the law get close to that kind of ideal? I think our legal system accepts there will never be consensus on what is true or right, and just focuses on dispute resolution. You just agree on a way to obtain the truth, a proof system, so to speak, whether it be trial by fire, trial by jury, judicial finding, etc. It seems similar to the role that p-values play in some applications of statistics. Maybe the European legal tradition gets closer to the mathematical ideal. Of course if you aren’t using a proof system as reliable as math’s, you will probably wrongly assert something as objectively true, which may be worse than what we’re doing.
INTERVIEW WITH GEORGE AVRUNIN, ON THE OCCASION OF HIS RETIREMENT FROM THE DEPARTMENT

After 44 years at UMass, George AVRUNIN retired at the end of the spring term. On the occasion of this milestone I had a chance to interview George to get some perspective on his experiences as a teacher, researcher, and department head. George was born in Detroit and grew up in the Detroit area. He received his bachelor's and doctoral degrees from the University of Michigan. He came to our department in 1976, and in addition to his research and teaching, he served for eight years as associate department head, three years as head and two terms as acting head. He has also been an adjunct faculty member of the computer science department since 1992. — Brian Burrell

BB: What was your impression of UMass when you arrived?
GA: It was already one of the strongest institutions in the state, but perception hadn’t caught up with that yet. There was the Zoo Mass mentality. At the time, the UMass graduate programs were much smaller than they are now; it was very much an undergraduate institution. That has changed. We have a lot more out-of-state students, and the university has continued to get better. The students and their families in the state recognize that now, and they treat us as a serious place.

BB: Who else came in when you were hired?
GA: Richard Ellis and Eduardo Cattani came in a few years before, but H.K. Hsieh and a mathematical physicist named Jay Rosen were hired in my year.

BB: As we speak, they are tearing down Worcester Dining Commons. When I arrived here in the early ’80s there was a cafeteria on the lower level. It was a gathering place for people in the department. I bring this up because I wanted to ask you how the university atmosphere has changed in your time here.

GA: When I got here we had that 16th floor area, and many of the faculty had come from departments that had very active common rooms, places with a lot of informal interaction among grad students and faculty. But we didn’t have that kind of thing here. My first couple of years a bunch of us kept coming up with ideas to make that into a gathering place. We would have newspaper subscriptions delivered there, and we would have cookies every afternoon, and the same three of us would show up every day for the cookies. I think the department has never had that kind of place where faculty and graduate students mix, and we’re hopeful that the renovations now being planned will make that possible.

BB: I know that your field is algebra and representation theory, but I was also aware in the ‘90s that if anybody had a question about LaTeX or any software oriented question, you were always the go-to guy. How did that come about?
GA: I have always worked in other areas beyond mathematics. In my senior year of college I wasn’t sure whether I wanted to apply to graduate school in math or psychology. I was working as a research assistant in what we would now call cognitive psychology. Back then, as a math graduate student, you had to take some courses outside of the department, so I went to the mathematical psychologist Clyde Coombs, who taught a famous graduate course I had taken as an undergraduate. Together we made up some independent study courses. These dealt with what are called single-peaked preference functions, in which respondents have some ordering of choices. It turns out that these situations are quite common for simple choices. ["With simple stimuli like amount of sugar in coffee or grade expectations in courses, the preference orders of individuals can be represented by single-peaked functions of an underlying ordering. When stimuli are more complex, as in candidates for office or automobiles, there is usually no natural ordering underlying the stimuli, and hence the preference orders cannot be single-peaked functions in one dimension." Coombs & AVRUNIN, 1977] One of Coombs’s major research contributions had to do with developing scaling techniques for these things. One day Coombs came into the office and he drew some pictures related to complex preference functions in 2 dimensions, but all he had were these pictures. So I turned the pictures into mathematics and extended it to n dimensions. We wrote two papers that explained the interplay between the properties of the options and the properties of the preferences. So even when I was doing my research in the cohomology of groups, I was doing this other kind of work. I came to UMass and did algebra, but I maintained the contact with Coombs, and we eventually published a monograph on social conflict.

BB: And computer science?
GA: That began during a budgetary crisis when there was talk of layoffs of untenured faculty. I thought I’d better be thinking about options, so I went to Jack Wileden, who had been my undergraduate roommate for a couple of years and had gotten a job in computer science at UMass [note: he is currently Associate Dean of Student Affairs]. I said I wanted to sit in on a few classes, and Jack suggested data structures, the compiler course, and a couple of others. Then he came to me with a problem. He was trying to read a paper in distributed systems, written by a
famous guy using some pretty sophisticated math in set theory and logic. So we read this paper together, and Jack and I said, “We can do better than this.” This is how I got into computer science. By the way, Robin Milner, the guy who wrote that paper, won the Turing Award, the highest award in computer science, partly for the stuff we thought we could do better than.

BB: At that time computer science was in the low-rise. When did it become a serious presence on campus?

GA: It was already a department by the time I got here. One of the reasons it was successful is that of the top 25 computer science departments from the ‘80s onward, there were two departments that had a reputation as being very collegial. These were UMass and Washington. If you asked anyone in academic computer science about where people worked well together, they all said the same. The UMass computer science department shared resources very well, and they built up a strong department quickly. When I first interacted with them they had a decent graduate program. They were open to having me work with their people. One of the things I am really grateful for is how the computer science department has allowed me to be a computer scientist, but also, and more importantly, the way the math department has allowed me to do these other things. They didn’t say, “We hired you to do group theory, so you should be doing group theory.” And it wasn’t just the math department. I have the letter that the dean [Fred Byron] wrote on my tenure case, and he said here is someone who is making contributions in three different areas, and we should foster that. So UMass was a place that let me do that, and I’m not sure there are many other places that would have let me do it the same way.

BB: So you had your hand in the new technology.

GA: I set up the RCF and served for several years as its first director. In fact, I am the person responsible for bringing TeX to UMass. Jack and I had a grad student, Laura Dillon, who was working on a thesis that had lots of mathematical notation. At that time, to print it we used something called Runoff. You printed on printers with daisy wheels, and you had to swap the daisy wheels, and it was terrible. In 1982 the computer science department bought a laser printer for $25,000. With a laser printer you could run TeX. I had read about it in the AMS Bulletin, and I said, “We should get this.” I was particularly interested in this because my father was a printer. He was involved in some early and not very successful attempts to use electronic typesetting, but he got me interested in typography from early on. There was a UMass grad student who was spending the summer at Stanford, and after I requested it, he brought back a tape with a pre-release version of TeX82, which became the widespread TeX. It took some work for Computer Science to compile it and get it to work on their laser printer. Laura Dillon wrote her thesis using it a year later. She went on to become the computer science department chair at Michigan State.

BB: What are your plans now that you are stepping down?

GA: I’m not stepping down completely just yet. I’m going to teach two courses in the fall and not teach in the spring. My recent research has been related to the idea of looking at systems where the people are really part of the system, not just end users. So we talk about things like elections, voting systems, and medical care, in which users interact with medical devices. We’ve been treating these as concurrent or distributed systems, and modeling them using a programming language that focuses on the kinds of interactions and choices that occur in these situations. This work has been supported by the NSF and the NIH, and we’ve just received a four-year renewal of our NIH grant applying this to computer-aided surgery. We’re using models to analyze and identify problems that could come up when things don’t synchronize properly. (I now know a lot about the kinds of things that can go wrong in cardiac surgery.) Also we are measuring proxies for the cognitive load on the leaders of the surgical teams, and trying to identify situations where they are more likely to make mistakes because the cognitive load is high. In situations where some part of the procedure is especially complicated, we hope to provide ways to reduce the load through a smart checklist which is generated from our models for human processes. So I will be working on that, I hope, for four more years, and in retirement will do some other fun things I have had less time to do.

AWM CHAPTER UPDATE!

Our student chapter of the Association for Women in Mathematics (AWM) continues to build and grow a community of gender minority mathematicians and statistics undergraduate students, graduate students, faculty, and staff members. The AWM chapter is continuing to run in our new remote format by hosting discussions through Slack and events through Zoom.

Some of our big hits from last year to this year are:
- Undergraduate Homework Night
- The AWM Summer Book Club
- AWM Undergrad + Grad Student Mentoring Lunches
- AWM Grad Student + Post Doc Mentoring Lunches
- AWM Departmental Coffee Hours
- The AWM Fall ’20 Hidden Figures Book Club

We are hoping to plan a remote career panel for the Spring semester, so if you are a UMass alum who would be interested in sharing a bit about your career with us, please reach out to mathwomen@math.umass.edu.
IN MEMORIAM

In order to commemorate former members of the department, Tom Braden has created an “In Memoriam” page at https://www.math.umass.edu/in-memoriam. Please let us know if you can supply further details including new names for the list.

RIP JIM HUMPHREYS

The department was saddened by the untimely death of Emeritus Professor James (Jim) Humphreys in late August. Department Head Nate Whitaker informed us:

I am very sorry to say that our former colleague Jim Humphreys passed early yesterday morning. He was a very important part of our department from 1974 until his retirement in 2003. He was a highly respected Mathematician in Representation Theory, a mentor to many of our younger faculty and a great departmental citizen. He published a classic textbook in 1974, “Introduction to Lie Algebras and Representation Theory” with a 7th edition in 1997.

Many colleagues in the department and elsewhere sent heartfelt emails, which have been collated below. We hope that a more permanent and fitting memorial will be possible when life returns to normal. A short obituary can be found here: https://www.legacy.com/obituaries/erietimesnews/obituary.aspx?pid=196925399

Reminiscences

When I first joined the department there were limited activities in number theory and I didn’t have a lot of people to talk to. Besides David Hayes, Jim and Peter Norman (who is alive and doing very well) were very helpful to me and offered many useful advice on mathematics and departmental affairs. I really appreciated that.

The thesis of my first student (John Cullinan) makes heavy use of group theory and representation theory; Jim stepped in and offered helps at critical junctures. And from Jim I inherited his collection of Glenn Gould on LPs. In his memory I will play the Goldberg Variations now. —Siman Wong

Jim was always a big figure in the department and was very influential to me. I always really liked him and looked forward to seeing him. Also my understanding is that he was a key player in getting our graduate program going (maybe others can confirm). RIP.

I have one anecdote I can share, although there are many happy memories I have of him. I remember when he was giving away some math books after his retirement. He had some that he had preselected to give to certain people and then others where one could select anything one wanted. I saw that the 2nd collection contained a copy of “Linear Lie Groups” by Freudenthal and de Vries. It’s hard to describe this book but it’s something like if Lewis Carroll had decided to write a book about Lie groups under the influence of PCP. It’s a personal favorite. I quickly snatched it up, and Jim’s expression was inscrutable. I think I must have failed some kind of test that day :) — Paul Gunnells

I am very saddened by the news of Jim Humphreys’ death. For more than 30 years he was one of the most influential and best known members of our Department. In fact, a common response when somebody found out I was from UMass was to ask if that’s where Jim was. His research and his books on Lie Theory brought him a well-deserved worldwide recognition.

As Paul mentions, Jim was central to the development of the graduate program, serving as GPD for many years and attracting many students who knew of him by his celebrated book on Lie Algebras.

Jim was very generous of his time and was, as Nate says, an exemplary citizen who believed strongly that a Department was more than the sum of its members.

I always admired Jim’s appreciation of beautiful mathematics as well as his commitment to human rights causes. I will miss him. — Eduardo Cattani

Very sad news. Jim was an amazing colleague and knew an infinite amount of mathematics which he willingly shared with us. My personal favorites were the UMass-Northampton bus rides Jim. I probably learnt more Representation theory from these rides than from graduate studies. He will be missed by all of us. RIP. — Alexei Oblomkov

Jim came to UMass a few years before I did; he was the one whose interests were closest to mine then and was a big influence on me, too.

In his department service, especially as GPD, as well as his editing, reviewing, and general guidance about things, I’ve always thought of him as one of the fairest and most honest people I’ve known. — George Avrunin

I’m very sorry to hear about Jim’s passing. He was extremely kind to me when I first arrived at UMass (and many times thereafter). He put real effort into making me feel welcome in the department, and I will always be grateful to him for that. — Tom Braden
Jim was one of the foundational authors of present day modular representation theory. He was widely appreciated in mathematics. For instance a paper of Bernstein, Gelfand and Gelfand, which has become one of organizing principles in representation theory, starts with the explanation that they are applying Jim’s work in a simpler setting.

Jim and I had offices next to each other and many occasions to talk. In time his student Cornelli Pillen married my first student Elena Galaktionova. They had a long happy marriage with two great kids.

Before UMass I thought that Jim’s field, the modular representation theory, was a jungle of random coincidences and that I would never touch it. Through Jim’s teachings I learned of hidden beauties and spine of this new world — many of which have originally been established by Humphreys himself. Consequently, this became one of two principal fields where I was successful in mathematics. The key factor in this was my student Dmitriy Rumynin who was really a joint student of Jim and me. When I was away Jim taught him the classical modular representation and presented him with a problem that eventually had a radical geometric solution and resulted in a thesis paper in Annals of Mathematics. Methods of modular representation theory have in time percolated in many fields of mathematics and were influential in physics.

My long term study of physics of Quantum Field Theory has colored much of my view on mathematics and the world. It started when Jim gifted me 1500 pages books on the subject, the joint work of Deligne, Witten, and others.

I have heard a gossip that Jim said that, getting my tenure through, was the hardest work he has ever done. I imagine that it may have taken more than one person’s effort, but otherwise it is completely in keeping with my image of Jim. For years he was organizing the representation theory seminar and used it to take care of many less known mathematicians, with huge emphasis on people rather than on fame. For me it was important to have someone close that I could adore as a human being.

These are just a few aspects of my relation with Jim and my gratitude to him. Many I may never be able to express. — Ivan Mirkovic

I was very sad to learn of Jim’s passing. I read his SL(2,p) paper as an undergraduate and he was the main reason I came to UMass to begin my graduate studies in 1999. I took four or five regular classes with him and an independent study in modular representation theory. He encouraged me to attend the Representation Theory seminar in addition to the Number Theory and helped me immensely with my dissertation. After finishing graduate school we kept in touch and he was always extremely helpful whenever I had mathematical questions.

Outside of mathematics, I will miss our dinners together when I would visit Northampton. We would catch up on family, local politics, and music (we had a shared love of classical music and Bruce Springsteen). He usually gifted me a book or two from his vast collection when I would visit, and I will cherish them always. — John Cullinan, Associate Professor and Chair of Mathematics Bard College

I would wish to emphasize the huge contribution of James Humphreys to the professional mathematical education worldwide in the area of Lie algebras, algebraic groups, finite groups of Lie type and their representations. His book “Linear algebraic groups” appeared in Russian under my translation in 1975 and influenced a lot to algebraic research in the USSR. His last book “Modular representations of finite groups of Lie type” (2006) is a real piece of art, and accumulates enormous research material developed in the previous 50 years. These and his other books will serve for long as an important source of information in the area. His own research publications concerned important problems and were very encouraging for solving hard problems. In my view James Humphreys was a very significant figure in my part of the mathematical world.

I never met James personally but was in contact on many occasions since 1975. He was always very willing to help and share his knowledge with me. I feel his death as a personal loss. — Alexandre Zalesski, Emeritus Professor, University of East Anglia, UK
DEPARTMENTAL EFFORTS TO PROMOTE INCLUSIVITY

This topic has become much more urgent nationally given the events of last summer. Our College of Natural Sciences has been strong on this issue (see https://www.cns.umass.edu/diversity-equity-inclusion). — Ed

The Department of Mathematics and Statistics’ Climate Committee is dedicated to understanding and improving the professional climate of our department. The committee includes representatives from the faculty, staff, graduate student, and undergraduate student populations, and is working to systematically review and improve the experiences of all these groups.

The 2019-2020 Climate Committee conducted an extensive survey of the experiences of our undergraduate students, with almost 400 respondents. We also held a pre-COVID social lunch with faculty and undergraduate Math majors at a dining hall, and worked to get more information for prospective majors on the departmental website. The graduate student group is establishing an extensive graduate mentoring structure. The climate committee has also financially supported pre-talks before seminars to make them more accessible to all department members, meals for graduate students with visitors, and the purchase of books for graduate students for the antiracist teaching reading group. The climate committee has also worked to streamline the shared use of conference rooms. The climate and teaching committees also co-hosted a training session on intersectionality led by the UMass Stonewall Center. — Krista Gile

Department members were moved by the killing of George Floyd and following events this summer to examine the role of racism, and therefore antiracism, in our professional work. Department members have been active in dialogues in our local and professional communities, as well as on campus and in the department. There is now a faculty-graduate student reading group on antiracist teaching and a grad-student led reading group of the book Hidden Figures. There is also a Slack channel where department members can share actions or insights, and a working group of passionate volunteers interested in anti racist action and change. This group is planning many additional projects to foster antiracism in our department. We are learning about barriers to success for our Black students and students from other under-represented groups and working to direct recourses to reduce these barriers, including allocation of departmental resources and pursuing external funding sources. We are also developing a long-term strategic plan for antiracism in our department. — Krista Gile

People from many different roles in the department started meeting biweekly this summer to discuss texts on antiracist teaching. The group first read “Teaching Across Cultural Strengths” by Alicia Feledina Chávez and Susan Diana Longerbeam, which describes different cultural learning frameworks, and the need for instructors to rely on all of them so as not to underserve learners who grew up in a particular framework. The group then moved on to “Political Conocimiento for Teaching Mathematics and Rehumanizing Mathematics” where Rochelle Gutiérrez challenges the idea that learning and teaching mathematics is universal and culture-free. The pièce de résistance was “Teaching to Transgress” by Bell Hooks in which education is presented as a practice of freedom, and the importance of creating learning communities within our classrooms is emphasized. The group is planning to continue meeting and further educate themselves on antiracist teaching. — Annie Raymond

DEPARTMENTAL SPACE

The department is nearing the end of the planning phase of a project to renovate and expand the department’s physical space. The plan includes acquiring 2 new wings of Lederle tower, former laboratory space on the 15th and 16th floors, to the left as you exit the elevators. This space will allow for a nicer undergraduate advising and lounge space, 3 new sizeable meeting rooms, and 24 new offices for faculty, staff, and graduate students. The 15th floor will also include 2 discussion nooks to encourage spontaneous conversations. The project also includes renovation of the 16th floor colloquium space, including substantial renovation of the kitchenette and the section to the right of the colloquium room as a common room. This renovation is needed to support the recent growth necessary to support all of our students. The design has prioritized making space for everyone, while also creating more opportunities for community and connection within the department. Construction was scheduled to begin this academic year, but will be delayed due to the pandemic and its budget and logistical impacts. — Krista Gile

M.S. OPTION IN STATISTICS IN THE BOSTON AREA

The M.S. option in Statistics at the Newton Mount Ida campus of the University of Massachusetts Amherst began its second year in Fall 2020, under the direction of Associate Professor Erin Conlon. This program is an evening program. There are eleven graduate courses being offered during the 2020 - 2021 academic year, including Mathematical Statistics I and II, Statistical Computing, Statistical Methods for Data Science, and Data Visualization, among others. Applications are currently
being accepted for the Fall 2021 class. More information on the program is available at https://people.math.umass.edu/~conlon/statmtida/ — Erin Conlon

UNDERGRADUATE RESEARCH

There were 10 REU students for summer 2020: six were supported thanks to the Barksdale fund, two were supported through the UMass TRIPODS Institute, and two were supported through faculty grants. There was a wide range of exciting research carried out this summer, and many of the students presented at an online Math REU conference organized by UConn. The projects presented were:

“Circle Dynamics: Arnold Tongues” by Rebecca Rosenblum, with faculty mentor Robin Young

“Hooklength Formulas for Semi-Standard Young Tableaux” by Peter Cassels, with faculty mentor Alejandro Morales

“Exploring the Naples parking functions” by Christo Keller with faculty mentor Laura Colmenarejo

“Clustering of Uveal Melanoma Patients” by Nathan Grant with faculty mentor Leili Shahriyari

“Adjusted Per-Protocol Analysis in Vaccine Efficacy Trials” by Erica Laidler with faculty mentor Ted Westling

Additional projects, not presented at the REU conference:

“Exploring Patient Gene Expression in Lung Adenocarcinoma” by Joseph Cormier with faculty mentor Leili Shahriyari

“Alternate Algorithms for School Choice” by Morgan DiPilla with faculty mentor Mark Wilson

“Using Neural Networks to Identify Parameters for Lane Changing Model from Traffic Data” by Yaocao Chen with faculty mentor Qian-Yong Chen

“Thermodynamic properties of billiards-like heat conduction model” by Zoe Duan with faculty mentor Yao Li

“A data-driven method for invariant probability measures of nonlinear dynamical systems driven by non-Gaussian Levy processes” by Liwen Ouyang with faculty mentor Jiayu Zhai

— Matthew Dobson

CONFERENCES

The 32nd International conference in Formal Power Series and Algebraic Combinatorics (FPSAC), the main conference in the field, was held online from July 6 to July 24, 2020. The organizing committee included Assistant Professor Alejandro Morales as chair, VAP Laura Colmenarejo, and PhD student William Dugan. The conference had more than 600 registered participants from around the world and an average of more than 100 virtual attendees. There were 27 contributed talks and 69 contributed posters including presentations by VAP Laura Colmenarejo and VAP Theo Douvropoulos. The best student presentation prize of the conference was supported by our department. The virtual meeting included social activities like a puzzle hunt, a virtual excursion using the website Geoguessr, a virtual banquet, and a design your own t-shirt contest.

— Alejandro Morales

ONLINE CONFERENCES

One feature of the COVID-19-ridden environment this year was the profusion of online academic conferences. I asked Laura Colmenarejo to report on her experiences — Ed.
an M-F conference with a 9-5 schedule and two or three poster sessions. Then, the question came up. What are we doing with FPSAC? Are we going online? Is this even possible? After many meetings, some calls to the community, and some decisions, there was a team aiming to get this conference organized. Leading this team, there was Alejandro H. Morales from our department, and I said yes when he asked for help. His proposal was to have three contributed talks for three days a week and for three weeks in July. Three, three, and three. And yes, three poster sessions, one each week this time, and trying to accommodate three time zones. But no, we did not have three months to organize it, we did in two. FPSAC took place virtually on July 5-24, and among the social activities, we had virtual coffee breaks with activities, a banquet, happy hours, and two puzzle events.

These are my tips for organizing a virtual conference.

**Conference talks—general ideas**

- 30 minutes talk, including questions.
- Make sure to be explicit about the available time for the speakers. Since interrupting during an online talk is complicated or cannot be done as discreetly as we would like, letting the speakers know that they have 30 minutes and that the time will be strictly managed is usually enough.
- No more than 2 talks with no break.
- For a day conference, 6 talks is a reasonable number. For a conference that extends to a few days, reduce the number to 3 talks per day.
- Take into account the time zones of the audience before fixing the schedule.
- A pre-registration form is a good way to obtain this kind of information.
- Record the talks if the speakers agree. Offer the option of recording the talk and letting the speaker decide afterward in case they want to check the recording. Also, ask the speakers to include “This talk is being recorded” in their first slide.
- Remember to be inclusive and include a variety of speakers including minorities and speakers at different stages in their careers.
- Ask the speakers for preferences about dates and times.
- Offer the speakers the opportunity to practice their settings before their talks.

**Relevant roles to consider during the talks**

- Chair for each session who will be in charge of introducing the speakers, and can also remind everyone about the statement of respect and inclusion at the beginning of each section.
- Chat moderator who will be responsible for asking the questions in the chat during the talk or at the end of the talk.
- Technical support and host, who will be in charge of handling the technical aspect of letting participants in, muting when necessary, and making sure that there are no strange behaviors.
- All the people assigned to these roles must be co-host as soon as they join the meeting, and the host should not be assigned to any of these roles apart from technical support.

**Social events are more than important, they are essential.** They help us keep the community active and engaged, as well as create a nice environment for the conference.

- Organize short breaks (coffee breaks) during talks with topics and breakout rooms with a reasonable number of participants in each room.
- Organize long breaks (for lunch or happy hour time) at the end of each session, so participants can engage in further discussion and/or socialize.
- Organize small activities such as scavenger hunts, puzzles, polls, topics for conversations, photo competitions, etc.
- Be inclusive while organizing the activities and keep in mind that there will be undergraduate and graduate students, or even postdocs and faculty, that are new to the community.
- Don’t be afraid to ask for videos! Elevator speeches are very interesting, a good practice for junior mathematicians and fun to record and watch! You can find my elevator speech for FPSAC [here](https://www.youtube.com/watch?v=1HTh9cdnSE&feature=youtu.be&t=4m12s).

**Software and technical support**

- Try to avoid Google apps to organize your conference. That includes Google sites, Google forms, Google Docs, etc.
- Zoom is a very standard app for conferences in the US. However, participants in other countries (like for instance France) may not be allowed to access Zoom with their work computer. Be open to experimenting with other options.
- For the Zoom extra license, be aware that it takes two weeks to activate it and you need to activate it also in your profile when you create the Zoom link.
- Include a password for your conference and give a nice hint in your emails, so the participants can guess the password. Have in mind that students will also participate, but it should not be easy to find out by searching the hint.
- Find out if you can use grant funding to pay for a company that edits your videos. It is not the craziest thing, the edits are usually really good, and not much funding is needed for an online conference.
- Save the chat, so you can send the comments and questions to the speakers since they will not have access to them later.
• Monitor the waiting room and make sure that all participants accepted in the talks have their full name in Latin characters before entering the room.
• For university Zoom accounts, only email addresses from the same university are allowed to be alternative hosts. Make sure you include more than one person in case there are any issues.

Organizational tips
• Weekly or biweekly meetings are at fixed times to help with keeping the organization going.
• Find a forum (Slack, hackmd, GoogleDrive, etc) where you write summaries of the meetings, to-do lists, and a brainstorming section.
• Find an instant way to communicate as a group (Whatsapp, Facebook Messenger, Google Doc, GroupMe, etc) during the talks, and avoid using the private Zoom chat.
• Try to minimize the number of emails to the participants and speakers by summarizing information.
• Emails to participants should be direct and contain the information and the links accessible.
• Make sure to include a statement of respect and inclusion on your website, and include it in one of your emails to the participants.
• Registration of participants should be mandatory in order to get the link for the conference. This allows the organizers to estimate the number of participants if there are any restrictions.
• Make sure you are aware of the limitations of the software you are using depending on the role of the participants (host, co-host, participant) and the software from which the participants are attending the conference (phone, laptop, tablet / Linux, Macintosh, Windows, Chrome).
• Ask speakers to provide another method of contact (apart from email) in case they do not show up and do not answer email.

Yes, I know these are many things to have in mind and that it seems complicated. However, I can tell you that you do not need to organize hotels, conference rooms, speakers and participants’ trips, funding for travel, etc. I just have two final suggestions.

Ask for help. Seminars and conferences are already happening all over the world and many of us have some experience we’d be happy to share.

Enjoy the conference and make sure all the organizers can participate actively in those parts they are most interested in.

RECOGNIZING STUDENT SUCCESS
The traditional awards dinner was not held owing to COVID-19, but we list the awards here. Congratulations to all students listed! Although in-person graduation activities were not possible this year, the department organized an online ceremony for graduating students, which can be found at https://www.youtube.com/watch?v=xmITePCTZ9pI.

Graduate Student Awards
Distinguished Teaching Award: Angelica Simonetti

Undergraduate awards
Honors research and theses
These students completed honors theses in mathematics or statistics this year:
Robin Armstrong, Ellen Burton, Max Cope-Flanagan, Lucy Grossman, Patrick Lei, Roy Siegelmann

REU students
The following students participated in an REU (research experience for undergraduates) this year:
Robin Armstrong, Ellen Burton, Peter Cassels, Owen Davey, Nuha Futa, Jimmy Hwang, Pranav Kalkunte, Long Le, Max Liu, Mridul Madan, Nghia Nguyen, Manan Patel, Advait Sinha, Matthew Trainor

Outstanding Academic Achievement in Actuarial Science
Julianne Higgins, Xiaoxi (Jenelle) Kang, Indrius Kveraga, Madelyn Nelson, Ruoying Zhao

Outstanding Academic Achievement in Applied and Computational Math
Jensen Beaumont, Daria Bobrova, Max Cope-Flanagan, Brian Dang, Collin Giguere, Joshua Marulis, Roman Sacks, Adam Viola, Devon Yu, Jiaming Yuan

Outstanding Academic Achievement in Pure Math & Individual Concentration
Thomas Bertram, Owen Davey, Alexander Fischer, Alexandra McGuire, Patrick Lei, Nathan Sherman, Matthew Trainor, Yankai Xiang

Outstanding Academic Achievement in Statistics
Timothy Cauley, Delaney Johnson, Derrick Liu, John Milmore, Mariah Morse, Sirisha Nouduri, Ilina Shah, Shuyi Tan, William Zhang

Outstanding Academic Achievement in the Teaching Concentration
Ellen Burton, David Dam, Lindsey Thunberg, Tongyu Zhou

M.K. Bennett award for outstanding achievement in geometry
The Robert and Veronica Piziak Fund endows an annual prize
in the Department of Math & Stat to the student of highest standing in Math 461.

Ellen Burton

Student Leadership Award

Julianne Higgins, President and former treasurer of the UMass chapter of the Association for Women in Mathematics Chan Kim, for his leadership in the teaching club and his service as a peer advisor

Winners of the Jacob Cohen Killam prize exam

Pranav Garg, First place
Gary Wei, Second place
Kirin Sarangkasari, Third place
Dhruba Basu, Joshua Bornstein, Stuart Lustig, Matthew Miller, Fourth place (tie)

Leon Emory Lincoln and Robert Bradley Lincoln Scholarship

The donation is from the estate of Annah Silsby Lincoln, daughter of Leon Emory and sister to Robert Bradley, both graduates UMass Amherst. This scholarship is given to a math major of high academic standing.

Li Shandross

Marcia Lockhart Ruma Scholarship

Established by Marcia Lockhart Ruma, Class of ’65, and her husband Charles, Class of ’64 and MBA ’65, this award is given to an undergraduate major in Math & Stat who has demonstrated financial need.

Cynthia Camacho

Robert and Lynne Pollack Actuarial Award

This scholarship is awarded through a generous donation from Robert and Lynn Pollack to an outstanding student in actuarial science.

Siqi Gong

SCUDEM

Two teams from UMass competed in this event, in which students develop models using differential equations. The first team was rated outstanding (the highest possible rating)

Team 1: Frank Cole, Vishvesh Gandhi, Alexander Shilcusk
Team 2: Minh Nguyen, Xindong Tian, Freya Zhang

SABBATICAL NEWS

Jenia Tevelev has spent the 2019-2020 academic year conducting research, teaching, and mentoring at the Universidad Católica de Chile in Santiago. His sabbatical activities were generously supported by the Fulbright Scholarship “New Frontiers of Algebraic Geometry”, Simons Fellowship and National Science Foundation grants “Moduli Spaces: New Directions” and “ELGA. Latin American School of Algebraic Geometry and Applications.”

Photo by www.plainformstudio.com

Panos Kevrekidis was also on sabbatical, and contributed a detailed report in late June.

Some 15 years ago, current Department Head, Professor Nate Whitaker and I assembled a very bright team of 3 excellent UMass undergraduates to work on a topic of tumor dynamics. We were interested in how vascular networks form and provide the tumor with nutrients (in a process called angiogenesis) in the presence of an extracellular matrix and various other elements potentially inhibiting this process (so-called inhibitors). One of the talented undergraduates involved in this quest, that eventually led to a paper published in August 2007 in Mathematical and Computer Modelling was called Heather Harrington. Heather went on to win a Goldwater scholarship and then a prestigious NSF fellowship to go and study for her PhD at Imperial College. She continued on in Mathematical Biology and its interface with the techniques stemming from Pure Mathematics in the area of Topological Data Analysis and became an Associate Professor at the University of Oxford, one of the top institutions in the UK and around the globe in terms of its academic impact. In an unrelated development, less than 5 years ago, I learned about an exciting new computational technique called deflation. Suppose that you use a root-finding algorithm like the Newton-Raphson method and you find a solution. Now, suppose that your problem is very complex (possibly bearing infinite degrees of freedom) and therefore has not only one but many solutions. How do you find other solutions, given that you already have one? Deflation gives you a systematic way to “factor out” this first solution and solve a “revised problem” that allows to find a second root. Deflating then two roots, one can try to find a third one and so on. This young, freshly appointed Associate Professor, again at the University of Oxford and its Mathematical Institute, studying deflation was named Patrick Farrell. With Patrick and former postdoctoral research fellow, Visiting Assistant Professor and well-remembered Chief Undergraduate Advisor, Prof. Stathis Charalampidis now of Cal Poly San Luis Obispo, we wrote a paper on using deflation for finding solutions of nonlinear partial differential equations that appeared in 2017 in Communications in Nonlinear Science and Numerical Simulation.

Little did I know about the fact that these highly visible young colleagues at Oxford (Heather and Patrick) knew each other well and worked closely together, until, upon their invitation, the three of us ended up spending a good fraction of
Fall 2018 writing an application for the very highly competitive Leverhulme Trust Visiting Professorship scheme for a potential visit at the University of Oxford. Thankfully, we were lucky enough to be awarded such a fellowship, enabling me to spend the entire year at the University of Oxford. Indeed, I arrived here in Oxford (from where I am currently writing still under lockdown!) in early September and was immediately struck by the beauty of Oxford as a town, the ability to walk and/or bike everywhere and the remarkable strength and diversity of the Mathematical Institute and of the University. Of course, there were many nontrivial steps along the way. Getting one’s children to school within the UK system was a particular challenge for us, even getting a bank account here turned out to be rather complicated, but gradually and despite a number of hurdles we got acclimated and spent a really pleasant Fall semester here. The weather was quite mild throughout the Fall and Winter and enabled a number of trips and short visits both within the UK (e.g. to University of Essex, to Imperial College, to the University of Cambridge and some within Europe), for lectures, in parallel with numerous seminars and colloquia at Oxford.

Scientifically, it was a remarkable experience and a “true sabbatical” in the intended (as far as I can tell) sense of the term. First off, the number of seminars and talks and visitors and internal journal clubs and even conferences going on on a rolling basis here is truly staggering. Almost literally, one could spend days on end doing nothing more than going to interesting talks nearly one after another. They also have excellent programs of public lectures about Mathematics and its applications, as well as numerous very distinguished visitors in their high profile lecture series. I went back to learning -I hope- a good deal about tumor biology through different lecture series and weekly discussions with both a math biologist and also separately with a tumor biologist. I also learned a little about Alzheimer’s and Parkinson’s, i.e., neurodegenerative diseases and their modeling. Of course, I did not forget about my favorite areas of nonlinear PDEs and nonlinear waves especially. I connected with an engineer who is doing state-of-the-art experiments in fluids (on the so-called rogue waves) and collaborated with a plasma scientist exploring nonlinear waves within variants of the Maxwell’s equations. Of course, I also continued my iterations with Patrick on deflation techniques for highly challenging 3d problems (using state-of-the-art finite element techniques coupled to deflation) and with Heather (on the dynamics of vortices in atomic gases and how to use algebraic techniques to solve the associated equations efficiently, but also to find all possible solutions for small numbers of vortices of the relevant polynomial equations). I supervised a Master’s Thesis in Mathematical Physics, I mentored two graduate students (one in tumor dynamics and one in computational methods), I also mentored a junior researcher (analogous to our VAPs). In general, it was an ultra busy and extremely exciting period full of new ideas, directions and collaborations, ranging from exponential asymptotics to modeling quasicrystals and from plasma and fluid waves to studying τ proteins and cancer stem cells! Of course, I continued to mentor undergraduate student Jimmy Hwang (who completed his honors thesis and is now admitted in the PhD program), PhD students Ryan Ross and George Tsolias, and Visiting Assistant Professor Mithun Thudiyangal remotely at UMass, and also completed a project and paper submission with Applied Math M.S. student Jennifer Sullivan based on her earlier honors thesis. I was especially excited about the spring, when various trips to different Universities and countries and conferences were scheduled.

But then, there came COVID! And, of course, everything changed, as it has for almost all of us. The UK was one of the worst, if not the worst hit country in Europe. The initial less strict reaction towards social interactions and distancing was quickly observed to lead to unprecedented and unexpected results and was rapidly changed, although its impact was deep and lasting in terms of the rapid progress of the pandemic. Lockdown was imposed after mid-March although we as a family started observing it already earlier and we are still observing it despite the gradual relaxation of associated measures. Thankfully, here in the UK, there was a high quality supply system of goods that enabled (despite the strains on it by everyone using it concurrently) getting food and supplies without going outside one’s door. Here, as in the US, the number of cases is still very high and even in Oxfordshire, there have been more deaths in just this one county than in some much bigger (over 10 times in size) European countries.

COVID has also had a striking impact on research mobilizing the efforts of a huge number of researchers around the globe from Biology, Epidemiology and also Mathematics and Statistics towards the direction of attempting to help with understanding the pandemic from different perspectives. To that effect, I decided to try to assemble a team of collaborator friends and researchers from University of Sevilla, University of Illinois at Urbana Champaign and JRC in Italy, in order to look into epidemiological models for the spread of the pandemic. We are focusing on some regions that we know/understand better and have attempted to offer more detailed models accounting for some of the particular features of the spreading of this disease, such as most notably the role of the asymptomatic infectious individuals. Another point of emphasis is to offer a spatial analysis of the dynamics of the pandemic (instead of just a cumulative “well mixed” perspective of it), as well as the attempt to split the model into multiple interacting populations of different ages, due to the clear manifestation of the diversity
of COVID’s effects to different age groups.

For now, my family and I are just hoping to get back — a nontrivial exercise in its own right. Amid countless cancellations (including also our first batch of tickets for July!), and with only two companies flying from Europe to Boston at the moment, we are hoping to catch a flight of one of them to be able to safely return to Amherst and prepare for what promises to be a completely unique, in my 20 years of experience at UMass, Fall semester! The Oxford experience was a remarkable one, but for now we are all just hoping for a COVID vaccine and for the return of our world to a more stable, more safe and healthy state, to the degree that this may be possible. I certainly hope that this materializes between the time that these lines are written and the time that you are reading them!

Below is a list of donors to the department during the period 2019-10-01 to 2020-09-30. We greatly appreciate your support!

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FRANZ PEDIT EXPLAINS THE PICTURES

The surfaces shown are stationary solutions to the elliptic variational problem of minimizing the elastic membrane energy with a conformal (stretching) constraint. The classification of the minimizers and, more generally, the stationary solutions, among surfaces of finite topology is an open question which has been answered only for surfaces of genus zero and one. The higher genus case remains elusive, but inroads have been made, as can be seen in the Lawson surface examples of higher genus. The mathematical theory behind those images involves a combination of non-linear elliptic analysis, integrable systems, non-abelian Hodge theory over curves, and loop Grassmannians. The images are based on long term collaborative theoretical work with Dr. Lynn Heller, Dr. Sebastian Heller (Hannover University), Prof. Josef Dorfmeister (TU-Munich), and Dr. Nicholas Schmitt (TU-Berlin), who also carried out extensive mathematical experiments and produced all the images using his proprietary XLab Software Suite.

PUZZLE FUN

Vivien Ripoli from Solving Fun (https://solving-fun.com/) created the puzzle below for a departmental tea. To solve it, you may need to visit the department website to identify people; the boldfaced words are hints. If you get stuck, another hint is on page 2.

**Virtual Confusion**

Walking down the corridor, you notice a poster on the wall. It’s a screenshot of a Zoom meeting from the beginning of the lockdown. The participants were somewhat confused by the transition to remote teaching, but they still had some extra time to discuss a math topic. Which one?