



Sabbatical in the South

by Jonathan Graham

My sabbatical during the 2003-04 academic year was spent in the Departments of Statistics at the University of Virginia (autumn) and North Carolina State University (spring). I selected these schools because they were my undergraduate and graduate alma maters, were close geographically to the extended families of both my wife, Anne, and myself, and maintained a group of active researchers in spatial statistics (NCSU). Anne also received a sabbatical from Missoula's Sussex School where she teaches Spanish. After an eight-day

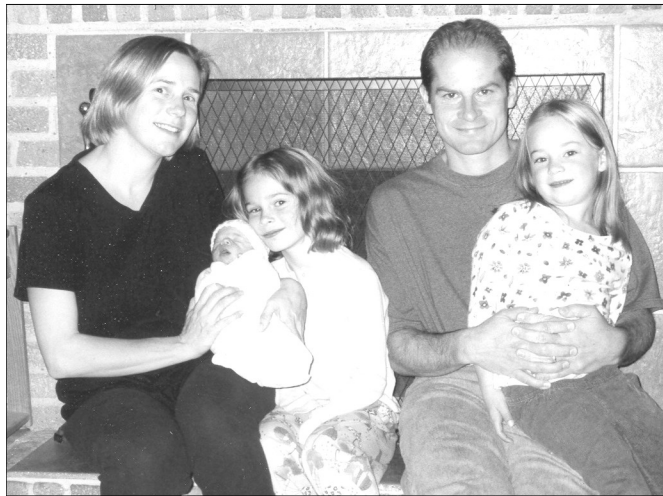
drive from Missoula through Michigan's upper peninsula and

eventually to Virginia (in a van which somehow did not explode from all its

cargo), Anne, my two girls, Emily and Carolyn, and I settled in at Anne's parents' home in Virginia's beautiful Shenandoah Mountains.

As it turns out, UVa's Statistics Department was in the process of being absorbed into its Mathematics Department, so that the statistics faculty had either left or were overwhelmed with students and their research. As a result, my research was conducted independently, except for numerous email contacts with Missoula collaborators. The research portion of my

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**Anne & Jon Graham with their children,
Liam, Emily & Carolyn**

UM Well-represented at ICME

by Bharath Sriraman

Department faculty Rick Billstein, Libby Krussel, Johnny Lott and Bharath Sriraman participated in the 10th International Congress of Mathematics Education (ICME-10), held in Copenhagen, Denmark, July 4-11, 2004. ICME is a quadrennial event held under the auspices of the International Commission on Mathematics Instruction and typically attended by mathematics educators, education policy makers, curricular specialists, cognitive psychologists and mathematicians. The Congress' overarching aims are for participants to learn what is happening in mathematics education research and practice worldwide, in addition to finding out about recent mathematical advances and their curricular

implications. ICME-10 drew approximately 2500 participants from 108 countries.

Professor Billstein attended the Topics Study Group *New developments and trends in mathematics education at pre-school and primary level* and the Discussion Group *Current problems and challenges in lower secondary mathematics education*. He also attended the Thematic Afternoon *Technology in mathematics education* and the National Presentation of Korea. His overall impressions of the Congress are perhaps best captured in the following quote:

"I left the conference feeling that the problems we are facing in the United States in mathematics education are not unique and that although our students do not do well

on international tests, most countries of the world are looking to us for leadership."

Associate Professor Krussel was awarded a competitive travel grant by the NCTM to attend ICME-10. She participated in the Focus Group *Representations* and the Topics Study Groups *Reasoning, proof and proving in mathematics education* and *Research and development in the teaching and learning of advanced mathematical topics*. Dr. Krussel met several plenary speakers at the meeting. One of the high points of her ICME experience was a long intellectual exchange with Istvan Lénart, creator of the Lénart Spheres. (See, e.g., the website <http://www.learningforallages.com/Lenart.htm>)

Professor Lott participated in the

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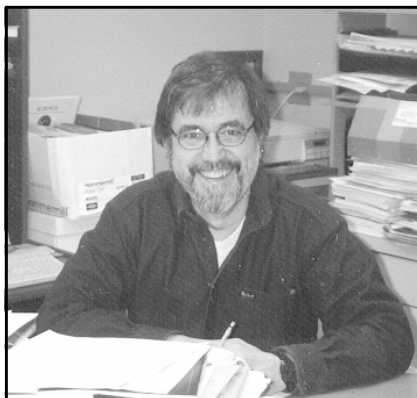
Notes from the Chair's Desk

Last spring in this column, I wrote about Dr. N.J. Lennes and his tenure as Professor and Chair in the University of Montana's Department of Mathematics, as it was known in his time. I invited readers with remembrances of Professor Lennes to drop me a line. I received a wonderful letter from Mrs. Lena Bravo Riveland (B.A. Mathematics, '36).

Mrs. Riveland first worked with Dr. Lennes as a paper-grader when she was an undergraduate student. After she graduated, he offered her a job typing some of his books. She recalls:

"Dr. Lennes was brilliant, a dedicated prolific writer of textbooks at all levels of mathematics. In 1936-37 we completed a high school algebra textbook. It was tedious at times, but a real sense of accomplishment when we received the completed book from the publishers. It was an interesting and rewarding experience for me.

"Dr. Lennes was a controversial figure on campus, involved in campus politics. He was impatient in the



classroom, particularly with students taking the class to complete a math requirement. However, he was a true educator and I feel privileged to have had the association with him."

I was delighted to receive the three Lennes books that Mrs. Riveland included with her letter: Whither Democracy (1927), A Second Course in Algebra (1935), and Trigonometry (with A. S. Merrill, 1939). We've had a good time sharing the books among the faculty and students. A few topics no longer appear in current textbooks, such as computing square roots formally and using log tables, but most of the material would fit right in to today's mathematics classroom. The methods are refreshing, from "sight work" to advanced examples. Dr. Len-

nes writes in his introduction to pupils, "In this course you will find an attempt to avoid the *mere* routine study of the subject; you will find the persistent effort to *develop ideas* in such a way that they have meaning, not only in subsequent topics in algebra itself, but also in related subjects such as arithmetic and even in geometry."

The Department of Mathematical Sciences continues to remember Professor Lennes with an annual competition named in his honor (see the website <http://www.umt.edu/math/Awards/lennes.html>). An exam for undergraduate students is written and scored by our faculty, often with clever contributions from our emeritus colleagues. The winners share a modest cash prize generated by the Lennes Fund. Most students tell me this is the first time they ever took a math test for fun!

James Hirstein

Faculty:

Jim Hirstein, *Chair*
Mark Kayll, *Associate Chair & Newsletter Editor*

John Bardsley, *Applied Mathematics*
Rick Billstein, *Mathematics Education*
Lauren Fern, *Lecturer*
Rudy Gideon, *Statistics*
Jon Graham, *Statistics*
Jim Hirstein, *Mathematics Education*
Leonid Kalachev, *Applied Mathematics*
Mark Kayll, *Combinatorics*
Libby Krussel, *Mathematics Education*
Johnny Lott, *Mathematics Education*
Jenny McNulty, *Combinatorics*
George McRae, *Optimization*
Adam Nyman, *Algebra*
David Patterson, *Statistics*
Matt Roscoe, *Lecturer*
Greg St. George, *Analysis*
Regina Souza, *Lecturer*
Bharath Sriraman, *Mathematics Education*
Brian Steele, *Statistics*
Emily Stone, *Applied Mathematics*
Karel Stroethoff, *Analysis*
Thomas Tonev, *Analysis*
Carol Ulsafer, *Lecturer*
Nikolaus Vonessen, *Algebra*

Faculty Emeriti:

William Ballard	Merle Manis
Mary Jean Brod	Robert McKelvey
Charles Bryan	William Myers
Bill Derrick	Howard Reinhardt
Stanley Grossman	George Votruba
Gloria Hewitt	Keith Yale
Don Loftsgaarden	

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Discussion Group *Politics and public perception of mathematics and mathematics education*, and the Topics Study Group *The use of technology in mathematics*. In addition, he worked with a small group of participants funded by the National Council of Teachers of Mathematics and the National Science Foundation on assessment issues. He gave a paper entitled *Improving Perceptions of Mathematics Education through Political Action* in the Discussion Group. In addition to his numerous activities, he participated in the ICME-10 special sessions of the Park City Mathematics Institute International Seminar.

Assistant Professor Sriraman presented three papers in as many Topics Study Groups. He gave a paper on an instructional model for

curriculum differentiation in the heterogeneous classroom in the Group *Programs and activities for gifted students*. He also presented a paper on developing new connections between mathematics, science and the arts in the Group *Relations between mathematics and other subjects of art and science*. His third paper, on design experiments for the empirical verification of hypothesized relationships between affect and cognition, appeared in the Group *Students' motivation and attitudes towards mathematics and its study*. His work with researchers in the second Group resulted in him co-organizing an Annual International Symposium. The inaugural event is scheduled for May 2005 at the University of Schwäbisch Gmünd, Germany.

UM—Toyo U Symposium: Bio-Nano Technology & Sciences

by Leonid Kalachev

During the Fall semester, the department continued its fine recent tradition of hosting international conferences. Professor Emeritus Bill Derrick and Professor Leonid Kalachev co-organized The University of Montana —Toyo University Symposium on Bio-Nano Technology and Sciences from 29-30 September 2004 in Missoula. Its primary goal was to bring together scientists from Japan and the Montana University System for an exchange of scientific ideas and discussions on potential collaborations. The symposium included eleven principal speakers and twenty-three graduate student and faculty poster presentations, and the participant list contained a respectable 85 names.

Symposium presentations ranged from purely experimental ones (e.g., *On supra-molecular materials for metal recovery* and *On glutamate transport*) to the highly theoretical (e.g., *On mathematical modeling of heterogeneous bio-switches* and *On self-organization in micro-nano systems*).

The meeting demonstrated the wide variety of interesting research projects in which UM faculty are involved. It was clear from the presentations that many of these studies call for more thorough mathematical analysis and modeling.

In conjunction with the symposium, one of the speakers, Professor Toru Maekawa (Director of the Bio-Nano Electronics Research Center at Toyo) delivered the UM President's Lecture Series address on *Bio-Nano Science and Technology*. This well-attended event was directed at a general audience.

During their Missoula visit, the Toyo delegation also visited the Montana Technology Enterprise Center (MonTEC). MonTEC designs and produces pollution-sensing devices, environmental cleanup resins and many other products. As a result of symposium-initiated interactions, several new collaborations between Montana and Japanese scientists have begun.

The Symposium was widely publicized in Missoula, including in the Missoulian newspaper, on two radio stations and on television.

Summer 2005 Graduate Courses in Mathematics Education at The University of Montana

The department has scheduled three courses for mathematics teachers for the 2005 summer session:

June 13 – July 22, 2005, (web-based course)

MATH 504 *Topics in Mathematics Education – the Anatomy of Curves*

This course is designed for middle school mathematics teachers. It will provide a background in functions and equations of curves in two dimensions. Beginning with a review of linear functions, we will also explore non-linear functions and equations such as conic sections, exponential and power functions, and trigonometric functions. The approach will be from a modeling point of view.

June 13 – July 1, 2005, 9:00 am – 12:00 noon, DAILY in Room 305/306

MATH 540 *Probability and Statistics for Teachers*

This course presents a survey of modern topics in probability and statistics as they relate to content introduced in middle-school and high-school mathematics curricula. The course will use technology to enhance the teaching and learning of probability and statistics. There is an emphasis on the applications of statistics in real-world situations.

July 5 – July 22, 2005, 12:00 noon – 3:00 pm, DAILY in Room 305/306

MATH 530 *Geometries for Teachers*

This course investigates different approaches to geometry for the secondary schools. Beginning with topics in synthetic geometry, we will also consider solutions using analytic geometry, vectors, and the properties of geometric transformations. Approaches and solutions to geometry problems will also be illustrated using computer software.

For further information about summer session registration for these courses, check out the website www.montanasummer.com and search in Mathematical Sciences.

(Continued from page 1: Sabbatical)

sabbatical was funded by the Intermountain Fire Sciences Laboratory through *Systems for Environmental Management* as a joint venture with Pat Andrews, an IFSL fire researcher. She was originally referred to me by Professor Emeritus Don Loftsgaarden, who for many years provided statistical help to Fire Lab researchers. Over the past fifteen years or so, numerous satellite-based fire danger rating indexes have been developed for use in fire models to predict a given area's wildfire potential. Numerous environmental variables, fuel models, and indexes are now available to help fire researchers manage resources in preparation for future wildfires. The choice of a particular index is typically made based on a manager's beliefs and experience with that index; however, little has been done to quantify the predictive capability of these indexes.

My research objectives were to explore the development of quantitative tools for assessing the predictive ability of fire danger rating indexes for a given area, taking into account scale effects and the inherent spatio-temporal correlation present in these indexes. To accomplish this, a twelve-year fire history and two fire danger rating indexes (*relative greenness*, RG, and *departure from average*, DA) for the state of Nevada were acquired. The key issue was how to measure the association between the fire history (a point process in space and time) and the fire index (a lattice process in space and time). After dealing with numerous computational issues due to the large sizes of these data sets, two methods were developed. These provided a means of comparison between the indexes at any scale down to one kilometer over a given area. One method used Monte Carlo simulation with random points chosen throughout a region, while the second employed an autologistic regression model to account for the spatial correlation present among the fire indexes and histories. These methods were compared using the Nevada data and presented at the

American Meteorological Society's *Fifth Symposium on Fire and Forest Meteorology* in Orlando, November 2003.

After the Orlando meetings, my time shifted toward the second portion of my sabbatical: the development of course materials for UM's large-lecture introductory statistics course (Math 241). In my eight years of teaching in the department, I have taught a wide variety of statistics courses, but always to classes of size fifty or fewer. Math 241 serves approximately 480 students per semester in just two sections. As this is clearly not an optimal way to teach mathematics, I was thankful to have the time to explore teaching methods uniquely tailored to holding students' interest in large classes. The materials developed encourage the students to work problems with other students during class and make use of the interactive software package known as *ActivStats*. I taught Math 241 for the first time in this format during the fall 2004 and will continue teaching it for at least three more semesters.

In the spring, our family moved to a tiny apartment next to a lake in Raleigh, North Carolina, about three miles from the NCSU campus. Although this sounds quiet and quaint, there were far too many undergraduate students with agendas other than ours living nearby, and bicycling to school was hilly and "adventurous." But NC State proved to be fruitful in developing collaborative efforts toward my fire research problem and others. Their Statistics Department contains about forty faculty working on a wide variety of problems. I was fortunate to work with Professors Montse Fuentes, Marcia Gumpertz, Marc Genton and Len Stefanski on the development of teaching materials for my spatial statistics course, some fire rating index problems for the state of Florida, and my fire index assessment research. Through weekly meetings, numerous ideas were discussed, some leading to fruitful assessment methods, such as the use of a "Mantel statistic" (borrowed from the ecology literature), Ripley's " $K(1,2)$ function"

for examining correlation between two spatial point processes, and some spatial quadrat methods.

Due to the size of the NCSU statistics program, I also had the luxury of attending three special topics courses, on *spatial data analysis methods*, *statistics in ecology* and *spatial experimental design*. The second of these was especially enjoyable, as many of the problems I work on in Montana are ecological ones, and the course was primarily a discussion of common problems with the use of statistics in ecology.

In addition to the planned research and course development, I appreciated having focused time to devote to ongoing research projects with UM students and faculty. Much of this was done via email, but I also made two trips to Missoula. I am grateful to my colleague Jenny McNulty for letting me stay at her home and to our department's office manager, Michelle Johnsen, for arranging the faculty-student softball game during my April visit. Next year, I will try not to break my elbow a month before the game (recall the adventurous Raleigh biking)!

Although I had a productive sabbatical—in terms of my research, teaching material development, evolving collaborations with other statisticians, and continued work with UM students and faculty—what I will most remember about the experience is the time I was able to spend with my wife and children. We visited as many places as we could (Luray Caverns, Petersburg Civil War Museum, hiking in the Appalachians, biking everywhere, and of course Disney World) and dubbed our Friday afternoons, "Field Trip Fridays." For all the hassles of packing up and renting my house, driving across the country, living two other places for nine months and then finding our way back to Missoula, taking a sabbatical from the day-to-day teaching, meetings, and steady line of students out my door was truly a wonderful and rejuvenating experience.

In Loving Memory of Lucas Alexander Casady (1974-2004)

by Hillary VanSpronsen

Just after Spring semester ended last year, the department suffered a tragic loss. Luke Casady, a graduate student in Applied Mathematics working with Professor Leonid Kalachev, died Saturday night or Sunday morning, June 12 or 13, 2004 in an avalanche on Liberty Ridge, on the North side of Mt. Rainier, Washington. Luke and his climbing partner, Ansel Vizcaya, both 29, were caught in a freak sudden storm which overcame them Saturday afternoon. Both were experienced climbers and were within 1000 feet of the summit when the storm hit. Authorities recovered Luke's camera and two rolls of film taken during their climb. These pictures confirmed the timing of the storm and their location. As far as rangers could tell, neither climber had done anything wrong; they were caught in an avalanche in conditions beyond their control. Luke's body was recovered on Friday, June 18th, and Ansel's was recovered later in the summer. The following passage from Luke's obituary appeared in the Missoulian newspaper.

"He was born August 24, 1974, in Klamath Falls, Oregon to Gary and Linda Casady. Most of his adolescence

was spent in Kenya, East Africa. He received his Bachelors degree in Mathematics from Oregon State University in 1997. After a year spent teaching in Lesotho, southern Africa,



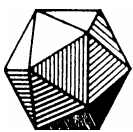
Luke proposed to his future wife on the 16,000 foot summit of Mt. Meru in Tanzania, at sunrise. He married Callyn Jio, daughter of Allan and Marilyn Jio of Pendleton, Oregon in 1999. Their son Maikol was born in 2000, in Corvallis, Oregon where Luke worked as a technical writer for Hewlett Packard. In 2001, he taught at Monument High School, Monument,

Oregon and at Heppner, Oregon in 2002 while completing a Masters degree in Education from Western Oregon University. He recently obtained a Masters in Applied Math from the University of Montana, Missoula and had begun research there towards a Doctoral degree also in Applied Math.

Luke was a passionate person whose intensity touched everything and everyone that he met. His family and friends will remember him by this intensity and by his love for the outdoors and especially the mountains where he felt closest to God whom he loved and is with now.

Survivors include his son, Maikol, 5, and wife Callyn, 27 of Missoula; brothers Grant and his wife Nancy, of Tucson, Arizona, and Brian of The Dalles, Oregon; parents Gary and Linda of The Dalles; and grandparents Lena Totten of Arizona and Calvin Casady of Colorado."

Luke will be remembered fondly in the mathematics department as an intelligent and skilled mathematician. He was kind and giving to his students, fellow graduate students, and faculty. Always genuine and helpful to all, Luke will be greatly missed.



by Jenny McNulty

The Math Club has been very active this year. The club meets weekly to attend the Undergraduate Mathematics Seminar and sponsors several special events. Our big fall event was "Gambling Day". The day includes mathematics lectures, gambling, and prizes (we use Club money). A new addition this year was a table for "Texas Hold'em", a professional Hold'em dealer, and a mathematical analysis of the game. Our

Math Club Corner

<http://www.math.umt.edu/mathclub/>

big spring events are Pi Day (can you guess the date?) and the Mathematics Film Festival. The festival is held during Math Awareness Month (April) each year. Last year's favorites included *Funny Numbers* (in which author/actor Steve Martin chats with mathematician Robert Osserman of the Mathematical Sciences Research Institute), *Copenhagen* (the fictionalized intellectual thriller tracing the mysterious real-life 1941 visit by German physicist, Werner Heisenberg, to his longtime friend and mentor,

Niels Bohr, and his wife Margrethe), and *The Importance of Mathematics* (a lecture by Timothy Gowers, one of the best mathematicians of the modern age, on the deep and important question of the relevance of mathematics to society). Save the date, April 19, for this year's edition. (We'll be selling T-shirts with the awesome department logo at the film festival.)

The weekly seminar series gives students the opportunity to explore various areas of mathematics that

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2004–05 Mathematics Scholarships & Awards

Joseph Hashisaki Memorial Scholarship

(for outstanding upper division
math majors, \$1500)

Gretchen Moe

Mac Johnson Family Endowment Scholarships

(for students who have completed at least one semester of
calculus and shown exceptional talent in mathematics,
\$1000)

Owen Applequist
Chelsea E. Bestram
John Case
Curtis Norman

N.J.Lennes Awards

(cash prizes based on performance
on a competitive exam)

Curtis Norman (1st)
David Yao (2nd)
Gretchen Moe (3rd)
John Case (3rd)

Chelsea E. Bestram (Honorable Mention)
Lesley Herrmann (Honorable Mention)

Undergraduate Teaching Scholar

(works with a professor to improve a class,
\$1500/semester)

Gretchen Moe

Undergraduate Tutorial Scholars

(assist students in a lower-level course,
\$1250/semester)

Sharon O'Hare
Stephen Pettinato
Robert Sears

John A. Peterson

Mathematics Education Award

(book award to outstanding senior
in mathematics education)

Erica Lane
Lisa Wagner

Graduate Student Distinguished Teaching Awards

(\$500 awards to two
outstanding teaching assistants)

Jonny Comes
Brook Russell

Graduate Student Summer Research Awards

(\$1600 to \$3200)

Lucas Casady
Joran Elias
Katharine Gray
Hillary VanSpronsen

Pi Mu Epsilon New Members

Owen Applequist	Elodie Billionniere
John Case	Renee M. Fite
Jason L. Frazer	John A. Goldes
Mohammad S. Khan	Jeffery R. Kline
Daniel J. Lozar	Sean McGlynn
Gretchen E. Moe	Sharon B. O'Hare
Cindy Scavarda	

President's Senior Recognition Awards

Erin Emerson (Pure Mathematics)
Ted Fisher (Applied Analysis)
Rosny Jurniati (Pi Mu Epsilon)
Jared Rapp (Combined CS/Math)
Lisa Wagner (Mathematics Education)

might not otherwise be encountered in traditional coursework. In addition, the series includes lectures on careers, culture and popularization of mathematics. Lectures by UM faculty this year included "Synchrony in the behavior of insect populations: Modeling the fireflies of Thailand", by Associate Professor Emily Stone, "A Hurricane, an Earthquake, and 114 Wildfires, or What I did on Sabbatical", by Associate Professor Jon Graham, and "What do a Spring/Mass system and a Vibrating Beam have in common?: A nice little parameter estimation problem", by Assistant Professor John Bardsley. We also had a special presentation on careers and operations at the National Security

Agency by Dr. Michelle Wagner of the NSA.

The Math Club Book Club is alive and well. This year we chose two popular books: The Golden Ratio: The Story of Phi, the World's Most Astonishing Number, by Mario Livio and Cogwheels of the MIND: The Story of Venn Diagrams, by A.W.F. Edwards. We're turning to the latter book on March 30, so there's still time to join the discussion.

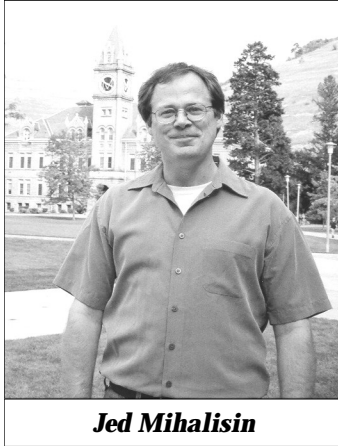
Our "Ask an Alum" lectures in our weekly seminar series are always popular with the students. In the fall and early spring, we were fortunate to have lectures by three alumni: **Scott Jones**, Actuary, Milliman Consultants

and Actuaries, **Isaac Grenfell**, US Contractor, Systems for Environmental Management, and **Bill Koures**, Mathematical Financial Analyst. If your travels bring you to Missoula, please consider speaking in this series. These informal talks provide a great avenue for sharing advice and experiences with our majors and give the department a chance to learn of your accomplishments. Alumni are always welcome to any of our activities. If you're interested in speaking or attending, please contact Professor Jenny McNulty (faculty advisor) at 406-243-2473, McNulty@mso.umt.edu, or by postal mail to the department. Thanks!

NSF Postdoc in Residence

by Adam Nyman

Jed Mihalisin, a National Science Foundation Postdoctoral Fellow, is visiting the department for the 2004-05 academic year. Dr. Mihalisin's main research interest is the study of polytopes – generalizations of polygons, pyramids, cubes and octahedra. Jed is a regular participant in several of our departmental seminars, is actively pursuing research with the department's combinatorics group, and gave both a contributed talk in the Big Sky Conference on Discrete Mathematics and a lecture in the department's Colloquium Series. He also used his mathematical ability in his capacity as a former professional poker player, even having participated in the World Series of Poker. Jed had this to say about his former profession: "My favorite part of being a 'professional' poker player was that a stranger would actually talk to me at a cocktail party or on a plane, instead of hurrying away or feigning a seizure as they often do when they discover you are a mathematician."



Jed Mihalisin

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