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Jeremy Quastel latest Alfred P. Sloan Research Fellow

Growing from its first awards in 1955, the Alfred P. Sloan Foundation awards 100 Research Fellowships in six fields (chemistry, computer science, economics, mathematics, neuroscience and physics) each year. Twenty young mathematicians in North America were selected for this award in 1996. The purpose of this award is `to stimulate fundamental research by young scholars of outstanding performance' as is stated in the Sloan Foundation's brochure. Furthermore, `Selection procedures for the Sloan Research Fellowship are designed to identify those who show the most outstanding promise of making fundamental contributions to new knowledge'. Nineteen former Sloan Research Fellows have gone on to receive the Nobel Prize.

Professor **Jeremy Quastel** is the third faculty member from our department to become an Alfred P. Sloan Research Fellow in the past seven years. Professor *Joel Hass* was a Sloan Fellow for 1989 to 1991 and Professor *Abigail Thompson* received her Sloan Fellowship for the years 1991 to 1993.

Many models in Mathematical Physics rely on partial differential equations to describe the macroscopic evolution of some physical quantity, e.g., the diffusion equation, the Euler and Navier-Stokes equation, Maxwell's equation, etc. In these equations appear phenomelogical constants that characterize various physical properties of the macroscopic quantities: diffusion constants, viscosity, dielectric constants. It is the province of nonequilibrium statistical mechanics to provide a microscopic justification and domain of applicability based upon microscopic dynamics (classical or quantum) for the constants appearing in these partial differential equations. Such a program started by the founders Boltzmann and Gibbs is highly nontrivial. This is also the general framework of Jeremy's research program, but he is coming at it from a different vantage point, from the point of view of interacting particle systems. These provide caricatures of

the real microscopic dynamics, but since they have some microscopic noise built in, they are tractable. So one can provide rigorous derivations of macroscopic equations directly from such microscopic dynamics. This program uses and develops tools from the modern theories of probability and nonlinear partial differential equations.

Recent successes in the program include the first derivation from a physical microscopic model of the Leray-Hopf solutions of the incompressible Navier-Stokes equations.

In his spare time Jeremy enjoys downhill skiing and ski mountaineering in the winter, and cycling and rock climbing in the summer.

Three Outstanding Mathematicians Join the Department

The new faculty members that joined the Department of Mathematics this Fall add mathematical power and luster to two areas where the Department had already established a solid base. All in all, this has probably been the most successful recruiting year in the Department's history.

Professors Greg Kuperberg and William Thurston will strengthen our topology group, while Professor Bruno Nachtergaele will add a new dimension to our already strong mathematical physics team.

Professor Greg Kuperberg

Greg Kuperberg came to Davis after occupying a prestigious Dickson Instructorship at the University of Chicago (1992-1995) followed by an equally prestigious Gibbs Assistant Professorship at Yale University (1995-1996). He received his Ph.D. from University of California at Berkeley in 1991, collected an NSF Postdoctoral Fellowship and spent the academic year 1991-1992 as Adjunct Assistant Professor at Berkeley.

Although he might have been hired as a `topologist', Greg's real specialty is solving difficult problems in different areas of mathematics. He has made contributions to Convex Geometry, Dynamical Systems, Enumerative Combinatorics, Quantum Groups and 3-dimensional topology.

For example: In dynamical systems he has studied questions such as when a flow on a manifold has a closed orbit. In one paper, he constructs a volume preserving flow on the 3-sphere with no closed orbits. In another one, a joint piece of work with his mother, Krystyna Kuperberg (also a Professor of Mathematics at the Auburn University), he shows that the 3-sphere has a real analytic dynamical system in which all the limit sets are 2-dimensional.

In the paper `Involutory Hopf algebras and 3-manifold invariants', he shows how to construct various 3-manifold invariants using algebraic objects such as Hopf algebras.

Others papers deal with the topological properties of quadrisecants of links and knots --he proved that every tame knot has four colinear points--, with the representation theory of a quantum group, Lie algebra, or other group-like object, and for a radical change of pace, with covering designs.

Greg is now settled in Davis with his wife, Rena Zieve, a low-temperature physicist, who has accepted a position with the Department of Physics at UC Davis.

Professor Bruno Nachtergaele

Bruno came to Davis from Princeton University where he was Assistant Professor of Physics. After receiving his Ph.D. in 1987 in Physics from the Katholieke Universiteit Leuven in Belgium, he spent the years 1989-90 as a Research Associate at the Universidad de Chile. In the Fall of 1991 he was appointed in the Department of Physics at Princeton University.

His research is in mathematical physics in the area of statistical mechanics with emphasis on quantum statistical mechanics. He has already an impressive number of published papers to his credit.

In recent years the main focus of Bruno Nachtergaele's research has been on quantum spin systems. Quantum spin models are widely used in condensed matter physics to study magnetic properties of a variety of materials: metals, polymers, superconductors, etc. There are also applications of quantum spin models and related quantum lattice models, such as e.g. the Hubbard model, in theoretical chemistry. Quantum spin systems are notoriously difficult compared with classical spin systems. For example, the existence of spontaneous magnetization in classical spin models has been proved for many decades, but a rigorous proof of this same phenomenon for say the three dimensional Heisenberg ferromagnet is still lacking. This is a difficult field and one that will become increasingly important.

Bruno is especially interested in developing techniques to study spectral properties and features of the phase diagram for general classes of quantum spin models. This is crucial to the understanding of the underlying mechanisms that generate the rich behavior of these systems.

Techniques come from different fields in mathematics: analysis, probability and algebraic methods have often to be combined to approach a problem in quantum statistical mechanics successfully. It has proved to be very fruitful to combine old problems with new mathematics and vice versa.

Even more recently Bruno got interested in interfaces. Quite a few of the most interesting phenomena seen in solids actually occur at the interface between two different materials or between two regions where the material is in a different phase, or physical state. For example, in a magnet the orientation of the magnetization (North-South axis), can be different in two domains with a common boundary.

This is one of the research directions Bruno hopes to develop with students at Davis, and with local and outside collaborators, in particular with the theoretical condensed matter physicists already here at Davis.

Bruno is now living in Davis with his wife Marijke Devos and his children Sigrid (9) and Shanti (5).

Professor William Thurston

Bill's move to Davis only required a 55-to-60 mile trip. He was Professor of Mathematics at University of California at Berkeley. However, he hasn't totally given up commuting regularly to Berkeley: he still is Director of the Mathematical Sciences Research Institute (MSRI). He came to Berkeley from Princeton where he had been appointed Full Professor only two years after receiving his Ph.D.

He is widely regarded as being among the most creative mathematicians in the world. A leading mathematician ranks him in the same league as Archimedes, Descartes, Riemann, Poincare, Cartan, Lefscheftz, Whitney and Thom. He has solved or clarified dozens of fundamental problems in geometry and topology. Two of his research endeavors stand out above the others. In his work on foliations, Thurston transformed an existing field of mathematics. In his independent work on the geometry and topology of 3-manifolds, he created a new one.

The list his achievements and honors is too long to do them justice in this short summary. The two most

prominent ones are probably: He is a member of the National Academy of Sciences --elected in 1982 at the early age of 36-- and a Fields Medalist in 1983.

The Fields Medal is the highest honor in mathematics. The entry of the Encyclopedia Britannica reads: `Fields Medal, awarded to mathematicians under 40 years of age for outstanding, seminal research in mathematics. Carrying the prestige of a Nobel Prize, the Fields Medal is awarded to no fewer than two and no more than four young mathematicians on the occasion of the quadrennial International Congress of Mathematicians. The medals have been granted since 1936.' Since the first awards were made, 38 mathematicians have received the medal, and 15 Fields Medalists are currently affiliated with American institutions (not counting emeriti and visitors).

It is the custom at the International Congress of Mathematicians for a senior mathematician to speak on the work of the newly announced Fields Medalists. At the Warsaw Congress in 1983 Professor C. T. C. Wall spoke of Thurston's work. What follows is from C. Wall's lecture:

"Thurston has fantastic geometric insight and vision; his ideas have completely revolutionized the study of topology in 2 and 3 dimensions, and brought about a new and fruitful interplay between analysis, topology and geometry.

"The central new idea is that a very large class of closed 3-manifolds should carry a hyperbolic structure -- be the quotient of hyperbolic space by a discrete group of isometries, or equivalently, carry a metric of constant negative curvature. Although this is a natural analogue of the situation for 2-manifolds, where such a result is given by Riemann's uniformization theorem, it is much less plausible -- even counter-intuitive -- in the 3-dimensional situation. The case of a manifold fibred over a circle with fibre a surface of genus exceeding 1 seems particularly implausible, and this was the case Thurston examined first. The fibration is determined by a homeomorphism H of the surface, and in seeking to put H (and hence its iterates) into normal form, he was led to consider the images of curves under high iterates of H : these may eventually become dense in some regions, leading to measured foliations. In general, he was led to consider a lamination, which is a disjoint union of injectively immersed curves, which may be dense in some regions and not in others. These ideas gave rise to a geometric model of Teichmueller space and its compactification, which revolutionized thinking in this already highly developed subject. ...

"Thurston's work has had an enormous influence on 3-dimensional topology. This area had a strong tradition of `bare hands' techniques, and relatively little interaction with other subjects. Direct arguments remain essential, but 3-dimensional topology has now firmly rejoined the main stream of mathematics."

Before Bill Thurston, no one knew much about the catalogue of 3-manifolds. Some topologists speculated that there could be many 3-manifolds with hopelessly complicated fundamental groups, as is the case for manifolds of dimension four and higher. Others conjectured that all (irreducible) closed 3-manifolds are either Seifert-fibered or Haken. In an early contribution, Professor Thurston showed that the vast majority are neither, leaving the classification of 3-manifolds wide open. But shortly afterwards, he was led to consider hyperbolic 3-manifolds, and he discovered by examining hyperbolic polyhedra that most closed 3-manifolds appear to have a hyperbolic structure. This observation eventually became the Geometrization Conjecture and the Geometrization Theorem. The Conjecture asserts that every closed 3-manifold, after cutting along essential spheres and tori, has one of eight geometries, the richest one being hyperbolic geometry. The Theorem proves this for Haken manifolds. The Geometrization Theorem by itself subsumes a long list of interesting previous results about 3-manifolds, including the decision problem for equivalence of knots. The Geometrization Conjecture reaches even further; it subsumes the Poincare conjecture and would provide a classification of 3-manifolds. In further support of the conjecture, Professor Thurston proved geometrization theorems for almost all Dehn surgeries on a link and for most orbifolds. Yet another kind of evidence is provided by Snap Pea, a program that tries to find hyperbolic structures and was developed by Thurston's former student Jeff Weeks. Thurston's hyperbolization theorems are celebrated in the computer graphics

video Not Knot.

Since then Bill has gone on to make similar fundamental contributions in rational maps --in the theory of complex dynamical systems--, group theory and other areas.

At UC Davis, he plans to take an experimental, interdisciplinary approach to graduate education.

Bill is now settled in Davis with his wife Karen who is pursuing her studies in Veterinary Medicine.

New Davis Research Assistant Professors

prepared by Allan Edelson, Chair of the 95-96 VRAP Search Committee

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The Department is very pleased to announce the appointments this year of two new Visiting Research Assistant Professors. These visiting faculty members are selected from an outstanding pool of applicants, generally new Ph.D.'s working in research areas that are closely related to the research interests of faculty members here at UC Davis. Since its inception in 1992 many young scholars have had the opportunity to teach and do research under the auspices of this program.

Alexander Astashkevich was a student of Bertram Kostant at MIT. He is a graduate of Tomsk State University in Russia, and will be working with Dmitry Fuchs. His interests are in Poisson manifolds and representations of Lie algebras and Lie groups. While a student in Russia he taught courses in Multivariable Calculus and Mathematics for Engineers.

Mark Sussman studied with Stanley Osher at UCLA. His research interests are in computational fluid dynamics. He will be working with Angela Cheer and Gerry Puckett in the Mathematics Department, and in view of the broad interest in computational mathematics on the campus we anticipate that he will find common interest with other faculty outside of the Mathematics Department.

Major mathematics conference held at UC Davis

This August saw over one hundred visiting mathematicians from around the world wandering around the UC Davis campus. They were here for a major mathematics conference, sponsored by the Conference Board on Mathematical Sciences. The conference was organized by Professor **Joel Hass**, with vital support from **Lynda Jones**. It featured ten lectures by Professor **Hyam Rubinstein**, of the University of Melbourne, Australia on the topic: Normal surfaces and decision problems in 3-manifolds. There were also two talks given by each of Professor **William Jaco** of Oklahoma State University and Professor **Abigail Thompson** of UC Davis. Mathematicians and graduate students from across the world attended the conference, including researchers from Australia, China, England, France, Hong Kong, Italy and Japan.

In brief, the subject concerns the question of how we recognize spaces. In olden times people wondered whether we lived on a round or flat earth. Today, we can ask similar questions about the shape of the universe around us. How can we tell what it is? Rubinstein has discovered powerful tools and algorithms for uncovering these mysteries, and opened up new directions in the study of three dimensional geometry.

In a successful experiment, most of the organization of the conference was done via the internet and the

world wide web. Those of you with web access can check out the conference activities in detail by looking at: http://www.math.ucdavis.edu/~hass/conf.html.

The mathematicians spent the week at Thoreau Hall and various hotels in downtown Davis. Many of them purchased T-shirts produced for the conference, which featured the logos `Normal' on the front and `Almost Normal' on the back. The overall response from the attendees was very positive. We should be seeing more such conferences at Davis in the years to come.

Well-deserved Recognition for some of our Best Teachers

The 1996 Prize for the Outstanding Teacher of Lower Division Mathematics was awarded at the Annual Departmental Awards Ceremony on June 5, 1996 by Professor Craig Tracy, Chair of the Department. The recipient was **Dr. John Chuchel**. In the citation, Professor Tracy read these comments from Dr. Chuchel's student evaluations: `Dr. Chuchel is really a great math teacher', `...He is the best professor that I have had since I came to Davis. I hope that he is rewarded for his excellence.' It should be noted that John Chuchel was awarded the very first Prize for the Outstanding Teacher of Lower Division Mathematics in 1987.

At the same Awards Ceremony, our Chair, Dr. Craig Tracy recognized **Professor G. Thomas Sallee** for having been given the Award for Distinguished College or University Teaching of Mathematics of the Northern California Section of the MAA. Professor Sallee was noted for his profound humanitarian concern for young people and a totally unselfish dedication to the promotion of their welfare in the educational process.

Curtis Feist received a UC Davis, `Teaching Award for Outstanding Graduate Students'. An excerpt taken from Curtis' invitation to the award ceremony states, `The committee for the award sincerely appreciates your participation in recognizing and supporting excellent teaching among graduate instructors'. Curtis plans to finish his Ph.D. dissertation by June, 1997. The title of his dissertation is "Low Dimensional Topology". His Faculty Advisor is Abigail Thompson.

News from the Graduate Program

prepared by Joel Hass, Vice-Chair for Graduate Affairs

The 1995-96 academic year saw nine students completing Ph.D. degrees in the Mathematics Department or the Graduate Group in Applied Mathematics. This is the same number as last year, but considerably higher than the historical average. Since our students are the center of our graduate program, I will begin this article by briefly describing their achievements. I am glad to report that despite a very tough job market, all are currently employed.

In the Mathematics program, six students completed Ph.D.'s. **Igor Aleinov** wrote a thesis on `Matrix models with non-holomorphic potentials' under the guidance of Professor Albert Schwarz. Igor is currently a Post Graduate Researcher at UC Davis. Also working with Prof. Schwarz was **Mikhail Alexandrov**, whose thesis was titled `On some problems of quantum field theory and the theory of integrable systems'. Michael is a postdoctoral fellow at the NASA/Goddard Institute for Space Studies at Columbia University in New York. **Lynelle Lang**, whose thesis was on `A generalization of Massey products with applications to deformation theory', worked with Professor Dmitri Fuchs. She is now an Assistant Professor of Mathematics at St. Mary's

College in Moraga, California. **Joseph Good**, who was working with Professor Motohico Mulase, did his thesis on `Embeddings of sl(2,C) into the ring of differential operators'. He is an instructor at City College of San Francisco. Also working with Professor Mulase was **Masato Kimura**, whose thesis was on `Commutative algebras of differential operators with matrix coefficients'. After spending a year at the University of Wisconsin at Eau Claire, Mas is now an Assistant Professor at the College of William and Mary, in Williamsburg Virginia. Finally, my own student **Michelle Stocking** wrote a thesis on `Almost normal surfaces in 3-manifolds'. She is currently an Assistant Professor at Boise State University in Idaho.

In the Graduate Group in Applied Mathematics we saw three Ph.D.'s awarded this year. **Michael Xiaopeng Dong**, working with Professor Roger Wets, wrote his thesis on `Estimating density functions'. He is currently with Silvaco International in San Jose. **Keijan Shi**, working with Professor Richard Plant (Agronomy and Range Science), wrote a thesis on `The effect of spacial heterogeneity on the probability of failure of the sterile insect technique'. He is working as a lecturer at UC Davis this year. **James Pilliod** wrote a thesis with Professor Gerry Puckett on `A second order unsplit method for modelling flows in two-dimensional compressible flow'. He is a currently a postdoc at the Lawrence Berkeley Laboratory.

Finishing with Master's degrees this year were Felix Angel and Rita Hurst. Rita is now writing software for Carl Corp. of Aurora, Colorado, and Felix is teaching at Holmes Jr. High School in Davis.

New students

Twenty new students have joined the Graduate Program this Fall. Eleven new students in the M.A and Ph.D. programs in mathematics, seven in the Graduate Group in Applied Mathematics, and two in the M.A.T. program.

Graduate Classes/Seminars

We continued our regular research seminars in analysis, geometry/topology, variational analysis and mathematical physics, as well as the weekly colloquia in Pure Mathematics and Applied Mathematics. For a current list of colloquia and seminars click here.

Several advanced courses on current research areas were given in 1995-96, including:

- A. Cheer - Classical papers in numerical analysis.
- D. Fuchs - Characteristic classes.
- J. Hunter - Nonlinear evolution equations.
- A.Thompson - Knot theory, normal surfaces and 3-manifolds.

Against the Odds: Increasing Extramural Support

Although federal support for mathematical research has been declining steadily during the last few years, the members of the Department have been able to substantially increase the grants they received from extramural sources to support basic research in mathematics and mathematical education. The largest part of this support comes from the National Science Foundation with grants to Professors Fannjiang, Hass, Hunter, Mulase, Puckett, Quastel, Schwarz, Stuart, Temple, Tracy and Wets. Professor Angela Cheer and 3 other colleagues from the Institute of Theoretical Dynamics, (Alan Hastings, Joel Keizer and Maureen Stanton) received a

particularly significant Research Training Grant of nearly $2 million.

But other sources also provided support: The Department of Energy to Professor Puckett, The Air Force Office of Scientific Research to Professor Krener, the CRESS Center to Professor Silvia, the Eisenhower Foundation to Professor Sallee, and Macsyma Inc. to Professor Fannjiang.

The Institute of Theoretical Dynamics

prepared by Joel Keizer, Director ITD

The primary mission of the Institute of Theoretical Dynamics (ITD) is to provide the infrastructure for research in the mathematical sciences at UC Davis. This mission involves numerous different activities that range from the weekly ITD seminar series, which brings faculty in diverse areas to speak about their research; serving as host and providing research space for visitors that in the last year alone has included more than half a dozen scientists from other countries and numerous scientists and mathematicians from the US -- including a UC Regents Professor (Joel Smoller). The Institute also sponsors and provides the organizational staff for major scientific meetings and workshops, which recently have included the UC Conference on Nonlinear Science and the international meeting of the Society for Nonlinear Control.

With the recent funding of our NSF Research Training Grant, Nonlinear Dynamics in Biology, the program in Computational Biology will become the lead activity of the Institute over the next few years. This grant involves a campus-wide commitment with matching funds from the Vice Chancellor for Research, the Dean of Graduate Studies, and the Deans of MPS, DBS, and Engineering. A commitment of more that $3 million from all these sources will support research training for graduate and undergraduate students and postdoctoral fellows working on problems in biofluid flows, cellular biophysics, and ecology/population biology. Twenty-two faculty trainers, headed by the co-PIs Professors Hastings (DES), Cheer (Mathematics), Stanton (EVE) and Keizer (NPB/Chemistry), will be involved in this program, which seeks to unite these three areas of biology using mathematical and computational approaches.

The Graduate Group in Applied Mathematics (GGAM) was created in the early 1980's as a masters and doctoral degree granting program to support campus-wide graduate education in the mathematical sciences. Part of the mission of ITD is to function as the ``research arm" of the GGAM, and the past four chairs of the GGAM have all been members of the Institute. The graduate group and the Institute work closely to ensure that this mission is fulfilled.

The Institute supports the Graduate Group in a number of ways. First, the Institute's weekly seminar series provides an opportunity for students in the GGAM to be exposed to diverse fields of research in the mathematical sciences. Moreover, when students have finished their doctoral dissertation they are invited to present a seminar in this series dealing with their research. Second, the Institute provides open access to our workstation network for both graduate and undergraduate students working with ITD faculty. When appropriate, students are also provided with research desks and shared office space. Students are invited to attend conferences and workshops sponsored by the Institute as well.

Perhaps the most important contribution of the Institute to the campus in recent years has been the development of a world-class network of scientific workstations that are available to all students and faculty working in the mathematical sciences. The Institute's network is a distributed network based primarily on unix and linux workstations running X11. Because the network is distributed, every computer, including a great range of software for scientific computation and graphics, is available to anyone with an account. The

configuration also permits mass storage, printers, and other peripheral devices to be accessed from any location. This allows not only great flexibility for users at any terminal, but permits a calculation to be run in parallel simultaneously on several computers. In addition, our computers can be used at remote sites on campus (e.g. the Center for Population Biology and the Center for Neuroscience) and elsewhere in the world. Like all of the facilities at the Institute, the computer network is truly a shared facility available to all participants. With more than 30 workstations currently supported by the Institute, our computing facility is among the best currently available anywhere in the US.

Generous Bequest from the Alice Leung Estate

In January, 1996, the Department of Mathematics received a generous bequest of $50,000 from the estate of Ms. Alice Siu-Fun Leung, who received a masters degree in mathematics from UC Davis in 1975.

Ms. Leung spoke highly of her experiences at UC Davis. She missed the campus after leaving it and mentioned to her family that she would have liked to come back to Davis for a visit. Ms. Leung was employed as an accountant with Swire, a global property management company, headquartered in Hong Kong. She enjoyed gardening and animals and was a volunteer at the Metro Zoo in Florida.

Craig A. Tracy, Department Chair, has formed a committee of faculty to draw up guidelines for an Alice Siu-Fun Leung Award to be established in memory of her. The department plans to announce the first award recipient at the annual Department of Mathematics Awards Ceremony to be held in the Spring of 1997.

W. K. Schwarze Scholarship to Anne K. Haney

At the annual Departmental Awards Ceremony on June 5, 1996, the Department awarded the William Karl Schwarze Scholarship in Mathematics. The scholarship was made possible by a bequest in the amount of $10,000 annually made to the Department by William Karl Schwarze who received his bachelor's degree in our Department and subsequently became a high school teacher of mathematics in San Francisco. Mr. Schwarze remembered his studies in the Department with such fondness that he decided to leave funds for students in our Department who demonstrate outstanding mathematical scholarship and exceptional promise of making a strong professional contribution as a mathematics teacher and educator at the pre-college or undergraduate college level. The presentation was made by Dr. Peter Rock, Dean of the Division of Mathematical and Physical Sciences. The recipient of this award, who received a $10,000 scholarship, was **Anne K. Haney** , who is expecting to receive an M.A.T. in Mathematics in June 1997 and plans to teach at the high school or community college level.

Undergraduate Students receive Departmental Honors

The University awarded 49 students a Bachelor's degree in Mathematics during the academic year 1995-96. Three very deserving graduating seniors received the Departmental Citation: Tate Birnie, Laura Loos, and Eugene Sy. Particularly noteworthy is that **Tate Birnie** was our Peer Advisor for the 1995-96 academic year. **Laura Loos**, in addition to being awarded the Lawrence J. Andrews Prize for 1995-96, won a Regent

Scholarship Award renewable her Junior year and continuing through her senior year. She was a university scholar during the 1993-94 year, and received highest honors for her thesis entitled "Matrix Integrals and the Topology of the Moduli Spaces of Riemann surfaces" under the direction of Motohico Mulase. **Eugene Sy** most recently won an award for one of the best papers presented by a student at the Pi Mu Epsilon Sessions of the MathFest held in Seattle. He received highest honors for his thesis entitled, "Pipeflow in the Region of a Bifurcation" under the direction of Angela Cheer. All three students have outstanding records in mathematics courses taken at UC Davis.

In addition to Laura Loos and Eugene Sy earning highest honors at graduation, **Leslie Levine** also earned highest honors this year. Leslie graduated with a B.S. degree in Winter 1996.

The winners of the 1996 Undergraduate Mathematics Contest were **Bradley Ballinger** and **Mike Henry**; both tied for first place. Congratulations!

Saul Cooperstein wins the Third Robert Lewis Wasser Prize

The third Robert Lewis Wasser Prize, in the amount of $500, was awarded at the Annual Departmental Awards Ceremony by Dr. Peter Rock, Dean of the Division of Mathematical and Physical Sciences. It was made from funds received from the endowment of the Robert Lewis Wasser Memorial Fund in excess of $10,000 named in memory of Robert Lewis Wasser, a junior student in our Department, tragically killed in a car accident on September 11, 1993. The prize is awarded to the winner of the Robert Lewis Wasser Memorial Contest conducted annually for freshmen and sophomore students at Davis. The third contest was held on May 6, 1996. Many students participated in the contest. The winner, who received an outstanding score on this very challenging contest, was **Saul Cooperstein**, a first year student majoring in mathematics. The prize was handed to him by Mrs. Vera May Wasser, Robert's grandmother, the initiator and main contributor to the Fund. Also present at the ceremony were Robert Wasser's mother, Cheryl Booth, and her husband, Michael Booth.

Justin Nakisher named Undergraduate Peer Advisor

The peer advisor offers advice to any student seeking information on the mathematics curriculum and helps those who like to get a perspective from a student's point of view in addition to that of a faculty member. To carry on the tradition, we have again appointed a Peer Advisor. Justin Nakisher, a senior in Mathematics, will be the peer advisor for the 1996-97 academic year.

Justin began as a freshman here at UC Davis in Fall 1993. He plans to graduate in Spring Quarter 1997 and is considering a couple of options upon graduation. He is either planning to pursue a teaching credential or to pursue a master's degree in applied mathematics. He will be holding the position of Vice Chair of the `Math Club' this coming year. In his capacity as Vice Chair of this group AND Peer Advisor his hope is to facilitate an Undergraduate User Group so that Undergraduates may use the internet to make inquiries on anything related to Mathematics. In this way, math majors would become more interactive.

The Department of Mathematics wishes Justin a very fruitful year as Peer Advisor.

Picnic Day Alumni Luncheon Overwhelming Success

Never was Room 593 Kerr Hall appreciated more than on April 21, 1996, when the Department of Mathematics, in conjunction with Pi Mu Epsilon/The Math Club sponsored a Picnic Day Luncheon where alumni, current math majors, prospective math majors, faculty, staff, the Dean of Mathematical and Physical Sciences, and family and friends gathered for what became an unexpectedly huge turnout.

Although Pi Mu Epsilon/The Math Club sponsored such an event in recent years, this is the first year that the Department of Mathematics offered support for the function and expanded the function to include Department of Mathematics' alumni. The event was held in Room 693 Kerr with a traditional `picnic' theme. The students in Pi Mu Epsilon/The Math Club donated the dessert for the event. Over 140 people attended the luncheon, which included approximately 70 alumni and their families.

Anyone who has been in Room 693 Kerr, the main conference room for the Department of Mathematics, knows that it could not possibly seat 140 people for a luncheon. Unfortunately, other rooms on campus were not available because of the picnic day festivities happening on campus that day; therefore, the chief organizers of the event (Judith Ryan, Lynda Jones, and Patricia Teal) moved some of the overflow crowd to Room 593 Kerr Hall. Never was Room 593 Kerr more appreciated than on that day!! It was nice to see faculty, alumni, and current students interacting which was the primary purpose of the picnic. The Department hopes to continue this event on a biennial basis.

Three Staff Members Receive Incentive Awards

prepared by Judith Ryan, Deparmental MSO

Three Mathematics staff members received College of Letters & Science Incentive Awards in Fall, 1996. Incentive awards are given to recognize accomplishments that exceed normal job duties and to those who promote the goals of the Department and/or the College.

Bill Broadley , the Department's system administrator and programmer, is honored for his extraordinary contributions in improving the Department's computer systems and for his customer service. Bill played a major role in planning the Mathematics Department's Undergraduate Instructional Computer Facility that opened last Fall. Bill also is the recipient of a second incentive award that was given by the Dean's Office for his service on the College of Letters and Science's Electronic Technology Assessment Committee.

Kathy LaGiusa, Graduate Coordinator in Mathematics, was nominated for an incentive award by thirty-seven Mathematics graduate students. She received an award for her outstanding customer service to graduate students in the Mathematics Department. Current graduate students, as well as recent alumni of our graduate programs, know that Kathy is a supportive and caring person who is committed to making their experiences at UC Davis as positive as possible.

Finally, **Tracey Rodrigues** was nominated for an incentive award by the Department Chair, Craig Tracy, and the Department's Management Services Officer, Judith Ryan. Tracey is being recognized for her over-all accomplishments and for her efforts on behalf of faculty who apply for and receive research grants. In particular, she often is praised for the outstanding service she provides to the principal investigators on extramural grants.

The Incentive Award program was established in 1995. The first staff member in Mathematics to receive an

incentive award is **Lynda Jones**, Undergraduate Coordinator in Mathematics. Lynda received her award in Fall, 1995, for her exceptional contributions to the Department and for strongly promoting the goals of the Department.

Life after Davis!

This is a new rubric of the Newsletter in which we let one or more of our alumni tells us about 'Life after Davis'! We are pleased to bring you letters from *Virginia Johnson* and *Robin Young*.

Virginia Johnson graduated with a Bachelor degree in Mathematics in '95 receiving a departmental citation. The letter that follows briefly summarizes her educatiuonal history, and maps out her plans for the future.

"The reader may find it somewhat unusual that a eighteen-year-old, female, Mexican-American, UCD mathematics graduate is attending UC Berkeley Law School (Boalt Hall); however, the most unusual part of my educational pursuit relates to how I managed to proceed to this point.

Four years ago, at age fourteen, I left my Sacramento home. I had just finished junior high school and, up until then, had been living with my mother and sister. I never met my father; my parents divorced before I was born. My mother implicitly approved of my decision to leave because she did not have the financial means to support me. She was on welfare and had trouble finding work. My sister was eighteen, also unemployed, and living at home. That was when I realized the vital role education would play in deciding my fate, and I became determined to expedite my education. I began to seriously consider the idea of bypassing high school and going directly to college. Furthermore, I wanted a quality education, so when I heard and read news stories about the numerous problems in high schools, such as drug use, shootings, stabbings, poor educational standards, and apathy, my decision about going to college became easy to make.

Soon after leaving home, I enrolled in a summer mathematics course at Sacramento City College. I moved in with a male friend who treated me like a member of his family.

At the conclusion of the summer math course, I was astonished to learn that I was the only one in the class to get an A. The following fall, I began my first full-time semester in college. In particular, I decided to enroll in trigonometry and geometry courses, simultaneously, to hasten my progress in mathematics. This was a difficult decision because all math instructors I spoke with at the college advised against it. My self-confidence overwhelmed me, however, and I was in a hurry to learn; I felt that if I did not do it then, I might not get the chance again. The results of that fall semester boosted my confidence even further; and for the next two years my college education continued the same way.

At sixteen, I was admitted as a full-time student to U.C. Davis. I chose to major in Mathematics because I knew that I had an aptitude for that field; moreover, I found great satisfaction in solving complex problems. The mathematics courses I have taken have sharpened my reasoning skills, and I have had the opportunity to put those skills to use. During my first two years in college, I had a job tutoring mathematics at Sacramento City College in Davis, and in the Math Learning Center at Sacramento City College's main campus; I also tutored math privately, and I typically earned more per hour that way. These sources of income enabled me to pay for my education and basic needs. In the last few quarters of my senior year I was allocated 10 to 15 hours per week as a Reader for the Department of Mathematics at U.C. Davis; the pay was fairly decent. All of these positions not only gave me the opportunity to help others but helped me realize something about myself: my interest in mathematics was fulfilled, and I was anxious to put my analytical skills to use in a new arena--the field of law.

After completing law school, I want to practice family law (although, I also have a passion to teach law). In particular, I want to help financially-disadvantaged families because my experience in one has shown me that

their legal problems are often solved without much regard to future consequences. For example, although most minors are probably better off when they remain with their families (as legal statutes have been designed to keep them), a minor is frequently much better off choosing his or her own destiny and place to live, as in my case. Family and youth authorities would not have encouraged me to leave home; in fact, they would have advised against it. And had I followed the suggestions I was given more than once--i.e., to go to high school and stay home--today I would be, at best, a high school senior, living in poverty, with four years of twice-as-expensive college ahead of me. And I am not so sure that I would even have the will to go to college under those circumstances, for there is much more to pursuing an education than having it available to pursue. For example, after I left home I benefited from an environment conducive to good study habits: comfort, quiet, plenty of room, and plenty of good, healthy food in the house; and I had encouragement in my new home. The encouragement added fuel to my motivation. I looked forward to doing well on the next exam because I knew someone else would share in my celebration. I lived with someone who helped me learn. He even corrected me when I made grammatical errors. These were not errors related to English-Spanish trouble; on the contrary, I did not even learn Spanish until college. The grammatical errors I made were a product of my former environment. One who grows up in poverty learns to speak the language of poverty. I am certain that the route I chose was the only one in which I could have gone this far with my education. I know that I am much better off today than I would have been had I remained at home. Nobody could ever convince me otherwise.

These are only a few of the many reasons I have that give me the incentive and desire to learn the law and eventually try to help others possibly facing similar circumstances. I also want to study law because I believe that part of my overall education should include a familiarity with the laws of the society in which I live. I know I could read a few books on law, but this would not be enough to allow me to practice law and put those legal concepts to use. Law school will teach me how to use those tools necessary to help myself and others in the best way that I can."

Virginia Johnson

Robin Young finished his Ph.D. in Mathematics in '91 with Blake Temple guiding his research on conservation laws. That's our starting point. The rest follows in his own words:

Since leaving Davis I have lived on the East Coast, first in New York City and then Stony Brook (on Long Island), and I now live in Amherst, MA, where I hope to stay long enough to get tenure!!

I was lucky (some would say unlucky) to live in Greenwich Village in NYC from September 1991 - September 1994, while working at the Courant Institute, NYU. Courant is a very busy center for Applied Mathematics and Analysis, and there was always a lot going on there. Of course it was very intense, just as New York is supposed to be! While I was there I continued working on systems of conservation laws, trying to prove theorems about the existence of solutions, which I'm still trying to do.

Of course I played lots of squash while in NY, and got lucky in the city championships in the `B' division, which meant that I got promoted to `A', and haven't won anything since, which restored the Normal Order of Things. I have found some new partners in Amherst, so get to play a couple of times a week, when I have the time.

In September 94, I moved to Stony Brook after a rough time on the Job Market, to work with Jim Glimm, who is one of the leaders in hyperbolic PDEs. At Stony Brook I broadened my outlook a bit, doing some computation of solutions as well as analysis. While there I also organized the Fifth International Workshop on Compressible Turbulent Mixing in July 95, which was a big responsibility and `Too Much Work'. Hopefully I learned enough to be an advisor in the future, but stay away from the real work.

On this year's Job Market I managed to land a tenure track position (thanks, Blake!) which is a great relief. I am now at University of Massachusetts in Amherst, which is in western Massachusetts (not Boston!) It is a very nice area, and we've just had the Fall Colors, which were quite beautiful. I am happy to be here, and hope I'll be here long enough to get tenure and pay off my Brand New Car!

I now spend most of my day teaching calculus, but when possible I'm still analyzing the Euler equations, and have recently begun a program to simulate light waves via Maxwell's equations in nonlinear optical media. I now call myself an Applied Mathematician with a fair amount of conviction!

I have managed to return to Davis once a year or so, coincidentally planning my trips when friends get married, so I hope to see some of you sometime in the not too distant future ... Best wishes to everyone out there!!

Robin Young.

Lectures, Books, Etc.

Alan Edelson was an invited speaker at the Fall Meeting of the Southern California Analysis and Partial Differential Equations Conference and was appointed to the Editorial Board of `Communications on Applied Nonlinear Analysis'. Motohico Mulase was one of the two principal speakers of the Annual Fall Conference on Geometry and Nonlinear Analysis that was held at the Humboldt University of Berlin in September 1996. He gave five 2-hour lectures on the moduli theory of Riemann surfaces and Feynman diagrams. Albert Fannjiang gave a plenary talk at the IMA Workshop on `Disordered Media'. Joel Hass was invited to give an AMS-MAA lecture at the Joint Meeting in Seattle and was appointed on the Editorial Board of `Geometrae Dedicata'. Roger Wets was invited as a plenary speaker to the Second World Congress of Nonlinear Analysis in Athens and the Conference on Generalized Convexity in Luminy, France. Kurt Kreith continued his work with teachers at the Davis High School on the use of Stella II in a new course entitle 'Economics, Ecology, and Thermodynamics'. He also gave a short course for New York City teachers on the `Mathematics of Global Change'. Sherman Stein will be a luncheon speaker at the October meeting of the Southern California branch of the MAA. Henry Alder delivered the Annual Karel de Leeuw lecture at Stanford University; Karel de Leeuw was a member of the Stanford Mathematics Department who was killed by one of his graduate students.

Sherman Stein's trade book '*Strength in Numbers*' was published by John Wiley & Sons. Sherman's goal was to persuade everyone to appreciate mathematics! There are chapters on `mathematics and jobs', math education through the 20th century, debunking many myths about mathematics. etc. That's the first third. The remaining two-thirds assumes only arithmetic and a bit of algebra, but covers a lot of mathematics quite gently, usually sweetened with an anecdote. It culminates in the proof from India (before Leibniz) that pi is related to the reciprocals of all the odd whole numbers. An ideal birthday gift for ages 10 to 100.

ALUMNI NEWS

Compiled by Lynda Jones and Joel Hass.

- Allyson Angus Stewart (1989, MAT) has a full-time tenure track position at Napa Valley College
- Jim DeSanti (1984, PhD) is a Mathematician/Operations Research Analyst at the Naval Air Warfare

Center, Weapons Division (NAWC-WD)
- Pascasio Felisilda, Jr. (1988, BS) is a Programmer Manager at the State Treasurer's Office in Sacramento, CA.
- Ted Haard (1993, BS) received his MA degree in mathematics from Duke University in 1995 and is an Actuary for Health Net in Woodland Hills, CA.
- Melinda Hager (1995, BS) will teach mathematics for the Peace Corps in Guinea, West Africa starting July, 1996.
- Kathy Hann (Dedinas) (1991, PhD) is an Assistant Professor at CSU Hayward
- Michael Harrington (1992, BA) is a Senior Actuarial Analyst at The Doctor's Company and is taking actuarial exams for the Casualty Actuarial Society
- Edward Jenvey (1985, BS) received his PhD in mathematics from Stanford University in 1993 and is currently working as a Financial Engineer at Nikko Securities in Los Altos, CA.
- Eric Kaljumagi (1992, MAT) is a high school mathematics teacher at Clear Lake High School in Lakeport, CA. and also teaches at Yuba Community College at the Clearlake,CA extension campus.
- Aaron Klebanoff (1992, PhD) is an Assistant Professor of Mathematics at Rose-Hulman Institute of Technology in Terre Haute, IN.
- Irving Lubliner (1988, MAT) is a teacher and coordinator for grades 6 to 8 at Bentley School in Oakland, CA.
- Tracy Meyers (1989, BS) is a Lead Operations Support Engineer at Litton Computer Services in Sunnyvale, CA. and due to receive an MBA degree in May 1996 from San Jose State University.
- Anne Morris (1990, MAT) is a Professor of Educational Development/Mathematics Education at the University of Delaware in Newark, DE.
- Kathy Rodittis (1989, BS) is a Computer Systems Analyst for the Department of Defense at Edwards AFB.
- Mary Schumacher (1985, BS) has been working as a Project Manager for TRW, Inc.
- Fred Taverner (1987, BS) is a Systems Engineer for Sun Microsystems in Mountain View, CA.
- Elizabeth (Bethanne) Telford (Hinkle) (1989, MS) is working as a DSP/Software Engineer at ARGOSystems Inc., in Sunnyvale, CA.
- Jerome Coleman (1995, Ph.D.) is now a lecturer at Santa Clara University, Santa Clara, CA.
- Richard Kavinoky (1995, Ph.D.) is an Assistant Professor at the College of San Mateo, San Mateo, CA.
- Michael Penkava (1995, Ph.D.) is an Assistant Professor at the University of Wisconsin at Eau Claire.
- Xiaojun Wang (1995, Ph.D.) is a software engineer at Silicon Valley Research Inc, in San Jose.
- Marion (Wendy) Brunzie (Ph.D. 1994) after spending a couple of years at the University of Montana, is now an Assistant Professor at Beaver College, Glenside, PA.
- Adib Bagh (Ph.D. 1994), holds a postdoc at Humboldt University in Berlin.
- Lisheng Gao (Ph.D. 1993) is working at KLA Instruments in San Jose.
- Carlos Borges Jr (Ph.D. 1990) and Wei Kang (Ph.D. 1991) are both teaching at the Naval Postgraduate School in Monterey.
- MAT program alumni Scott Immel, Lil Birdsall and Ed Reed are all teaching at Dixon High School. A good place to learn math!
- Samson Cheung (Ph.D. 1989) is working for McDonnel-Douglas in Long Beach, CA.

As always, we would like to hear from former Davis graduate students about what they are presently doing and how they are applying their mathematical skills.

Alumni News Update Form

Please send us information about yourself

Name:

Address:

Phone:

Positions held since leaving UCD:

Current position:

Institution or company:

Location:

Other news about yourself and others:

Type of information (not included in this Newsletter) which you would like to see included in the next issue:

[ ] Check here if we can use the "news about yourself and others" in the next issue of the Newsletter.

Any comments and suggestions:

Please return the completed Alumni News Update Form to:
Dr. Henry Alder, Professor Emeritus
Department of Mathematics
University of California
Davis, CA 95616-8633
(530) 752-8130

or send the information to Ms Lynda Jones: jones@math.ucdavis.edu

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