



# Math Times

University of Illinois at Urbana-Champaign

Spring 1993

## Workshop to Honor Rubel

In honor of **Lee A. Rubel**, who will retire this summer, a workshop in Function Theory and Algebraic Differential Equations will be held May 18-21 in Altgeld Hall.

Several of Professor Rubel's former students will be returning to campus to speak. Among them are **Richard Timoney** from Trinity College, Dublin, Ireland; **Dan Luecking**, University of Arkansas; and **B. A. Taylor** from the University of Michigan.

Other speakers scheduled include **Georg Reinhart**, who is currently a student of Rubel's; Professor **Lou Van den Dries** of the UIUC math department; **Eric Bedford**, Indiana University; **A. Eremenko** and **L. Lempert**, both from Purdue; **Mario Bonk** who is visiting here this year, and Rubel himself.

**John D'Angelo**, workshop chairman, says that it is hoped that many former graduate

## Letter from the Chair

Dear Colleague,

As usual there has been much activity in the department this semester with mathematical talk, both formal and informal, seminars, panels and discussions. Our faculty has been busy with their work here; many of them have been invited to speak at various universities and meetings. As communication is so necessary to mathematicians we were also pleased to welcome a number of visitors bringing us news of their research.

The first three months of this year the Executive Committee and the Chair found themselves

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students will be able to attend. Contact him for more information. His e-mail address is (jpda@math.uiuc.edu).

extremely busy with the hiring process. For the positions we advertised there were 876 applications. Faculty and staff members helped us process these. We invited fifteen women and men to come for interviews. The first offer was made to Susan Tolman (Harvard 1993) who instead decided to accept a two-year position at MIT. Our next four offers were accepted.

The new faculty members are: **Douglas Bowman** and **Sergei Ivanov** as assistant professors; **Alexander Tumanov**, associate professor, and **Igor Nikolaev**, professor (see page 3).

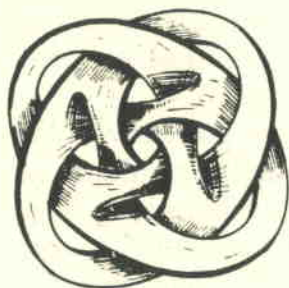
We are pleased that these outstanding mathematicians have decided to join our department and are sure that they will make important contributions.

Gerald Janusz, Chair

# Mathematicians Right, Physicist Wrong

Former department head Emeritus Professor **Paul T. Bateman** has received a letter from **Ivan Niven** in regard to the article in the last *Math Times* on Carmichael numbers. Niven shared an office with **R.D. Carmichael** while he was an instructor here in 1939-1942. We reprint the letter in part.

"Although Robert D. Carmichael is thought of primarily as a number theorist, he had broad intellectual interests, for example in the theory of relativity. According to Carmichael he 'delivered at Indiana in 1912 (but not without trepidation) what appears to have been the first course of lectures on relativity on the American continent.' The reason for the trepidation was that around 1912 'many people ridiculed the idea of relativity.' Note the timing: Einstein's theory was published in 1905, but his general theory did not



*Altgeld Hall*

appear until 1915."

"The quotations from Carmichael are on page 2 of a book 'A Debate on the Theory of Relativity,' Open Court Publishing Company, Chicago and London, 1927. The debate was held at Indiana University on May 21 and 22, 1926." Speaking in favor of the theory were mathematicians Carmichael and Harold T. E. Davis of Indiana University. In opposition were astronomer William D. MacMillan, University of Chicago, and physicist Mason Hufford, Indiana U.

"In his closing sentence Carmichael remarked that 'The theory of relativity has done much to loosen the shackles of the human spirit.' As we know today, Carmichael was right. The two mathematicians were on the side of the angels in the 1926 debate, whereas the astronomer and the physicist were on the wrong side."

*Philosophy ... is written in the language of mathematics, and its characters are triangles, circles, and other geometrical figures, without which it is humanly impossible to understand a single word of it; without these, one is wandering about in a dark labyrinth.*

Galileo Gallilei.

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| Editor      | Margot Jerrard |
| Photographs | Hiram Paley    |
| Calligraphy | Pat Martin     |
| Drawings    | George Francis |

## From Novosibirsk to Urbana

"It is important for a mathematician to teach," says Igor Nikolaev. "Teaching helps you to understand the subject better, to learn more"

Nikolaev, who has been a visiting professor at UIUC this year will become a permanent faculty member in August. He received his doctorate in 1980 at the Institute of Mathematics in Novosibirsk in USSR and was then asked to join the Institute where he did research in geometry. After a few years he decided that, in addition, he would take a part time teaching position at the University, even though the payment for teaching was minuscule.

He feels that it is necessary for a mathematician to connect with students, to be a teacher, to invent examples, as long as there is a reasonable balance between time spent teaching and in research.

The university at Novosibirsk was highly competitive, with students who came from all over Siberia competing for places. Once accepted they had their tuition, housing, and health care provided. The courses they took were decided for them, with no choice, according to the curriculum they entered. As in America, he says, some of the students like

to work, some don't. Each year every Novosibirsk student must pass a difficult oral exam given by the professor. If the exam is not passed the student cannot remain the university.

Nikolaev left Siberia in August, saddened to leave his colleagues and students and hopes to visit them from time to time. There is now tremendous inflation in Russia, he says, and many wild rumors about what is going to happen, but despite this uncertainty the Novosibirsk mathematicians are producing excellent work. And, although he cannot explain it, the students he taught last summer in Novosibirsk were some of the best he has ever had.

Here at UIUC, Nikolaev says, the library must be the best in the world. He is also enthusiastic about the equipment, the copying machines, the computers which help to make his life easier.

His wife Tanya is a linguist, specializing in Altaic, a Siberian language, and she is delighted with the books she has found in her field in the Slavic library. They have a five year old daughter Dasha. He says there is so much music and theatre at Krannert, so many libraries, museums, and parks that there

is not enough time to do all the family would like to do.

Nikolaev finds that the United States is not as different as some Russians believe before they come here. Both at Novosibirsk and at UIUC the campuses are separate from the towns with many researchers and students. Here, too, he says many people look so similar that he is often surprised when they start to speak and he hears English, not Russian.



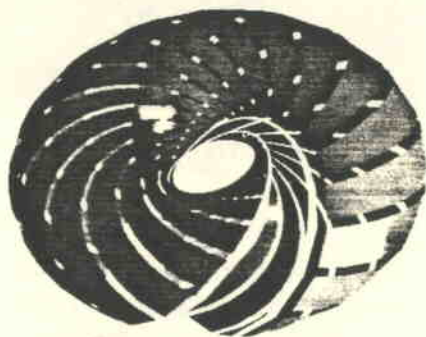
*Igor Nikolaev*

*Two and two the mathematician continues to make four, in spite of the amateur for three, or the critic for five.*

James McNeill Whistler

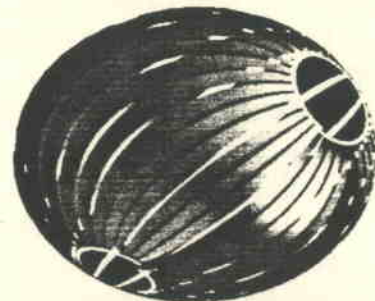
# Software for CAVE Animation

George Francis, who is on sabbatical leave this spring, has visited knot theory workshops at the Geometry Center, University of Minnesota, where he showed his latest video "Air on the strings of Dirac," a collaboration with Lou Kauffman, UIC mathematics Department, and Dan Sandin, of the UIC Electronic Visualization Laboratory. Two UIUC graduate students, Chris Hartman and Glen Chappell, were among those who contributed to making this video. After the showing Francis gave a live demonstration of the software written for the animation sequences. He also spoke at Madison, Wisconsin.



Francis is directing the implementation of Thurston's geometry in the CAVE Project, beginning with hyperbolic and elliptic space. CAVE is a joint effort by the Electronic Visualization Lab and the National Center for Supercomputing Applications to develop a total-surround type of virtual reality environment. EVL's prototype was shown at last summer's Siggraph meetings where so many people wanted to experience it that they waited in lines for an hour before they could get in.

Visitors to CAVE wear a set of remotely controlled glasses which switch eyes 120 times a second in synchrony with computer generated images on four screens, which are in front of them, to the left, to the right, and on the floor. Very fast IRIS machines, one for each screen and one to synchronize them so that the corners of the CAVE are invisible in the scene, run real-time interactive computer animations. The head position of one of the visitors, the "guide," is tracked so the scene is always in perfect stereographic perspective from the guides position in the



CAVE. Other visitors see the rest of the scene in somewhat distorted perspective but still in stereo. This gives the participants the illusion that there are objects present both outside and inside the CAVE space. Next fall students in Francis's course at the IRIS lab at the Beckman institute will learn the geometry of 3-manifolds while they experiment with programming virtual reality.

During June Francis will use a one-screen CAVE virtual reality environment at the NCSA. High school math teachers, attending the summer workshop under the direction of Tony Peressini, will be able to experience it.

## Alumni News

**Marc E. Low** (1965, Bateman) who went to Wright State University in Dayton, Ohio, in 1964 is now dean of the College of Science and Mathematics there.

**Ralph Edwin Showalter** (1968, Ting) was recently awarded the Cook Professorship in mathematics at the University of Texas at Austin. He is the author of over 50 research articles, one research monograph with UIUC faculty member **R. W. Carroll**, a graduate text, and has also edited one book. Among Showalter's research interests are singular or degenerate nonlinear evolution equations and partial differential equations, related variational inequalities and free-boundary problems, and applications to initial boundary value problems of mechanics and diffusion.

**Franz Tanner** (1988, Albrecht) has been working for Swiss Federal Aircraft in Lucerne on computational fluid dynamics. As the future of the European space agency's Hermes project is so uncertain, he is looking for a job in North America.

## Faculty Notes

**John D'Angelo** gave the analysis seminar at Washington University, St. Louis, early this term.

**Peter Braunfeld** has been in Washington, DC, on leave since January 1992 where he is working as a program director in the Teacher Enrichment Program at the National Science Foundation, helping K-12 teachers find better ways to teach mathematics to students. This is an exciting time, he writes, as whole states, such as California, as well as large and small school districts throughout the country, are making reforms in mathematics teaching. With these changes, he says, hopefully the next generation of U of I freshmen will be better prepared than ever before.

**Donald Burkholder** has been invited to give the M. Riviere Memorial lecture at the University of Minnesota this term.

**Julian Palmore**, who attended the Western Simulation MultiConference of the Society for Computer Simulation in January in San Diego, also visited RAND corporation. In February and March at the United States

Army Corps of Engineering Cold Regions Research Laboratory in Hanover, NH, Palmore discussed verification, validation and accreditation of a major simulation study, and then visited two Boston area firms regarding this project, which will require extensive research for several years.

Professor Palmore presented two papers on verification and validation at the Eastern Simulation MultiConference of SCS, Arlington, VA in March and also gave a presentation at headquarters of the United States Army Training and Doctrine Command, Fort Monroe, VA. He has been invited to serve as a judge on as AMSD panel for the International Science and Engineering in Gulfport, MS., in May.

**Doug West** gave one of the principal lectures at the meetings of the Midwest Graph Theory meeting at Miami University March 27.

*There are no whole truths; all truths are half truths. It is trying to treat them as whole truths that plays the devil.*

A. N. Whitehead

# New Ways of Teaching Math

## Calculus&Mathematica

"When my dentist asked me what class I liked best and I told him calculus he was stunned," says a freshman. She works five hours a week as an assistant in the Calculus&Mathematica laboratory directed by Professors Jerry Uhl and Horatio Porta and says, "The program is fun. It lets you learn at your own speed. You can change numbers and play around with it."

Another lab assistant, a sophomore, agrees. "It's as if you are actually discovering principles for yourself. It makes me feel like Pythagoras," he says. "You can visualize what you are doing and test your knowledge."

The first student said when she heard at freshman orientation that in this class calculus was taught by computers she thought, why not?

"It's a great way to learn," says the sophomore. "You don't have to crunch numbers or worry about little things but can learn math as it should be taught."

They are in the Laboratory in Illini Hall where the students taking Calculus&Mathematica work at their computer terminals. In addition to the laboratory assistants, graduate

teaching assistants are also in the room to help out any student who needs it.

Calculus&Mathematica courses are given for three semesters of calculus and one of differential equations. But even though they learn on computers each student must take a pencil and paper quiz once a week.

Next fall the math department will offer between 12 and 14 *Mathematica* calculus sections, says Uhl. He says that students who know *Mathematica* have all done very well at finding jobs. Among them he names former graduate students **Elias Saab**, **Paulette Saab**, and **Dana Weston**, at the University of Missouri; **William Emerson**, Metro State University in Denver; **Robert Beezer**, University of Puget Sound; **Barry Turett**, Oakland University in Michigan; and **Enid Steinbart** and **Lou Lefton**, both at the University of New Orleans.

Professor **Tony Peressini** is heading a high school Calculus&Mathematica program in which students at several rural Illinois high schools that do not offer calculus are taught by computer and turn in their work via a network run by the National Center for Supercomputer Applications.

## Merit Workshop

**Paul McCreary**, director of the calculus Merit Workshop Program announces that when the fall 1992 averages of calculus students were compared, the workshop students had a higher number of A and B grades than the calculus students as a whole. The Merit Workshop Program was set up in 1987 to help minority students, students from small high schools, and women students, all groups of students who formerly had poorer grades than average in calculus, and higher dropout rates.

The students in the program attend the same lectures, complete the same homework, and take the same exams as other students in first semester calculus. But they must be willing to spend an additional four hours a week working in small groups in class on difficult calculus problems.

Before they started calculus they had made lower scores on the standardized ACT tests, but after they participated in the Merit Workshop program 56% of these students earned either A or B, compared to 46% to the total of 1,146 students in all the lecture sections of first semester calculus who received A or B.

They also had a much lower

## Notices

**Josephine Chanler**  
(1906-1992)

**Josephine Chanler**, an emerita professor, died December 23, 1992, of natural causes in Urbana.

Born April 7, 1906, in St. Louis, she graduated from Kentucky State University, then entered graduate school at UIUC where she was a student of A.B. Coble. After receiving her Ph.D. in 1933 she joined the faculty and remained on the staff until she retired in 1971. After her retirement she devoted much time to tutoring students.

Memorial contributions may be made to UIF/Mathematics Instructional Award.

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**Annamali Ramanathan**  
(1946-1993)

**Professor Annamali Ramanathan** died March 12, 1993. Ramanathan, who joined the UIUC department this year as a visiting professor, was a Professor at the Tata Institute in Bombay, India. In 1991 he received the Bhatnagar Prize, the Indian national presidential award for mathematical achievement. He specialized in algebraic geometry and pure geometry, and was known for his work on moduli of principal

**Pierce W. Ketchum**  
(1903-1993)

**Professor Emeritus Pierce W. Ketchum** died February 24 in Champaign at the age of 89. Professor Ketchum, a graduate of the University of Utah, received his Ph.D. in physics from the University of Illinois and joined our faculty in 1926. He retired in 1969.

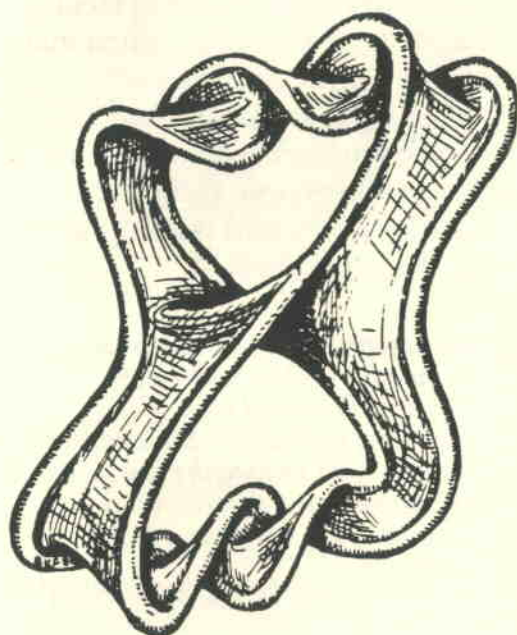
He was a fellow at the Institute for Advanced Study 1936-38, and during World War II he did research for the Army Air Corps. After the war he investigated computers and made recommendations that led to the University of Illinois being one of the first to establish programs in the research, design, and use of computers.

Memorial contributions may be made to the UIF/Mathematics Library Fund, the UIF/Instructional Awards in Mathematics, or the Wesley Foundation.

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bundles, gauge theory, and Frobenius splitting.

He is survived by his wife, three daughters, his mother, and a brother. The funeral was held in India.



rate of failure. Three Merit Workshop students earned Ds and none of them got Es, compared to 18% Ds and Es for all students in the course and 30% Ds and Es for students from minority backgrounds taking the first semester course who were not in the program.

Of all the students taking first semester calculus over 20% dropped out; only one Merit Workshop student dropped out, less than 3% of their total.

Both Caterpillar, Inc. of Peoria and the Wyatt Company of Chicago are supporting the program by paying for five undergraduate tutors. These tutors are former participants in the program and they help maintain the excellent academic atmosphere and the collaborative effort.

## Two Excellent Teaching Awards

Two members of the department are being rewarded for excellence in teaching this semester. Professor **Stephanie Alexander** and graduate student **Catherine Cavagnaro** are winners of the campus-wide Harriet and Charles Luckman Distinguished Teaching Award. Earlier this spring they each won a College of Liberal Arts and Sciences award for superior teaching.

Every year the highly competitive Luckman award is given to the top five faculty members and six TAs whose teaching is the best on the UIUC

campus. The names of the two math department members were first sent to LAS where they were judged against other nominees from the college; after they won there, they were put in competition against others from all units on the campus.

At a banquet May 4 the winning faculty members are awarded \$5,000. They also receive an annual recurring salary increase of \$3,000. The winning TAs are awarded \$3,500 in cash and, as long as they remain at the UIUC, \$1,000 is added to their salary each

year. In addition \$2,500 is deposited in a department account for the winning faculty member to use for instructional materials, and \$2,000 for teaching materials for the TA.

The winners each receive an engraved plaque and their names are incised on the plaque in the main library.

*All the mathematical sciences are founded on relations between physical laws and laws of numbers, so that the aim of exact science is to reduce the problems of nature to the determination of quantities by operations with numbers.*

James Clerk Maxwell

DEPT. OF MATHEMATICS  
UNIVERSITY OF ILLINOIS  
1409 W. GREEN ST.  
URBANA, IL 61801

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