

# Math Times

University of Illinois at Urbana-Champaign

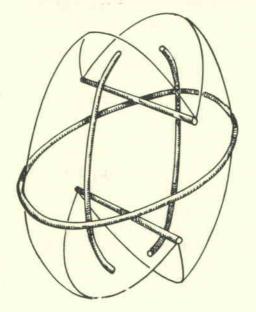
Fall, 1997

#### Letter from the Chair

Dear Colleagues and Friends, We began the new academic year with four new tenure-track assistant professors Richard Laugesen, Renming Song, John Sullivan and Susan Jolman, two new J. L. Doob Research Assistant Professors Tibor Szabo and Tadashi Tokieda, three visiting professors in various ranks Jurgen Bliedtner, Thomas Geisser and David Pierce, and nineteen visiting scholars from many parts of the world who are coming to do their research at the UIUC for one or two semesters during this academic year. We also welcomed 27 new graduate students (12 from this country, 15 from other parts of the world), all sparkling with the desire to learn and do mathematics in this fantastic research environment for the mathematical sciences.

In my discussions with ampus authorities and

colleagues across the campus and country, I emphasize time and again that our department pays attention to all three principal roles of mathematics: mathematics as an autonomous discipline, mathematics as a springboard for the sciences, and mathematics as a central part of general education. Mathematics is undoubtedly one of the greatest achievements of civilization. It



sets the standard for objective truth for all intellectual endeavors. But mathematics is also a gateway skill for success in today's world. As increasingly, experimental design gets supplanted by computer aided design, everywhere there is a shift towards more theoretical understanding. This is why the role of mathematics is bound to increase over time.

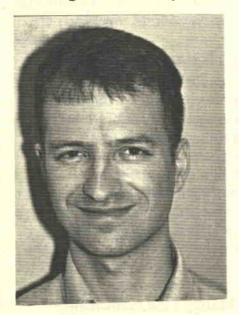
Many of the mathematics faculty at the UIUC have played key roles and made critically important contributions to the spectacular advances of mathematics in the past. A remarkable crop of mathematical talent is currently on our mathematics faculty and carries the promise of fundamental contributions to mathematics into the future.

Yours, Philippe Tondeur

# New Faculty

Four new tenure track faculty started teaching this fall at the UIUC campus.

A native of New Zealand, where he received his undergraduate degree, Richard Laugesen first came to the midwest when he went to Washington University in St.



Richard Laugesen

Louis for graduate work. He earned his Ph.D. there under the supervision of Albert Baernstein. Recently he was at Johns Hopkins University where he was an assistant professor.

professor.

He is described as an outstanding analyst who is interested in applied mathematics and mathematical physics. Professor Laugesen has worked on extremal problems in complex analysis

and potential theory. Earlier he came to the UIUC campus when he gave a talk here and became acquainted with the department. He likes the fact that at UIUC there is interaction between mathematicians and engineers and finds lots of interesting problems to work on and people to talk to.

Now that he and his wife, who is a graduate student in music at Columbia, are living in the midwest, in their free time they are learning to ice skate.

After earning his Ph.D. at the University of Florida, under the direction of Joseph Glover, Renming Song until last spring was an assistant professor at the University of Michigan in Ann Arbor. Professor Song grew up in northern China in a rural area where his family had lived for many generations, and received his bachelor's and master's degrees in China. He finds the countryside around Champaign-Urbana not too different from the area where he lived in China, although his home town was much smaller, with a population of 1500.

One of seven children in his family, he was the only one who became an academic although he has a younger brother who moved to the city where he works in business. He said the older ones never had a chance.

When he was only a boy



Renming Song
Professor Song knew he wanted
to escape from the rural village.
He studied mathematics,
physics and chemistry, and
went to the university where the
faculty recommended he
continue his studies. As he had
already corresponded with
probabilists in Florida, who
were doing work he was
interested in, with their
recommendations he went to
the University of Florida.

His research interests are in stochastic analysis and related problems in hard mathematical analysis and mathematical physics. His work on directed polymers in random environments has been described as establishing the best results in a a field studied extensively by many physicists.

John Sullivan is no stranger to our campus, having taught here for the fall semester in 1996. When he first visited UIUC in the winter the climate seemed quite balmy after icy Minnesota, where he spent several years working as an assistant professor. He received his Ph.D. from Princeton University under the supervision of Fred Almgren and is recognized as an expert in experimental mathematics and visualization. He does theoretical research in close combination with numerical experimentation, an area which equires skills from different

John Sullivan

areas of mathematics and computer science. He says his work involves a lot of isualization and that he thinks in pictures, as the blackboard in

his office, which is full of mathematical drawings, demonstrates. One problem he is working on now involves tieing knots, seeing how long the string or rope must be.

A keen musician, Professor Sullivan sings in the Oratorio Society. Recently he returned from Berlin where he presented three papers.



Susan Tolman

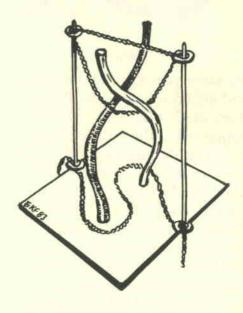
Susan Tolman earned her Ph.D. at Harvard in 1993 under the supervision of Raoul Bott, and spent a total of eight years in Boston, "a wonderful city." At the Massachusetts Institute of Technology she was a a CLE Moore Instructor and also won an NSF Postdoctoral Fellowship. Last year she was an assistant professor at Princeton.

She loves teaching and is excited about teaching a graduate course. Here in

Urbana she is an enthusiastic biker and runner and tries to bicycle an hour at least four days a week. She usually bicycles north or south of the city and has found slightly hilly country west of Champaign, about ten miles away. She also is active in the university Oratorio Society.

Growing up in the east, in Delaware, she decided to become a mathematician when she was an undergraduate at the University of Chicago.

Her research interests are Hamiltonian group actions, symplectic geometry and the geometry of moduli spaces. She is known as an outstanding teacher.



A beautiful idea has a much better chance of being correct than an ugly one.

Roger Penrose

## Postdoctoral Appointments

Two new J.L. Doob Research Assistant professors have started on campus this fall. They are Dr. Tibor Szabo and Dr. Tadashi Tokieda. The Doob assistant professorships



Tibor Szabo

are three-year visiting positions and are non-renewable. Two more mathematicians will be appointed to the postdoctoral positions this spring for the next academic year and two more will be named in 1999, for the following academic year. There will then be six such positions permanently funded in the mathematics department.

Professor Tibor Szabo received a 1990 Diploma with distinction from Eotvos Lorand University in Budapest in Hungary, then in 1991 came to the United States to Ohio State University where he received his Ph.D. in 1996 under the supervision of Professor Akos Seress. In 1996-97 he was a member of the Institute for Advanced Study in Princeton. This spring he will go to the Institute where he will again be a member.

His research interest is extremal combinatorics. He received a number of awards in Hungary for his mathematical work, including a Fellowship of the Hungarian Science Foundation, and in 1995 in this country he received a Presidential Fellowship at Ohio State.

The year after he finished his undergraduate work in Hungary he was drafted into the Hungarian army, as all young men are. There, he said. he didn't use his brain for a year and instead tried to make himself as invisible as possible. For some reason about 20 percent of the draftees at this base, the farthest point from his home in Budapest, were also science students, probably all trying to make themselves unnoticeable.

Now that he is here he is using the opportunity to meet new people and enjoys all the mathematical activity. He is teaching discrete mathematics

and says the education system is so different from Hungry that he cannot generalize about the students, but as he has already taught at Ohio State, he finds that Ohio and Illinois are similar in many ways.

Professor Tadashi Tokieda has a 1996 Ph.D. degree from Princeton which he earned under the supervision of William Browder. In 1996-97 he was a postdoctoral fellow and lecturer at McGill University in Montreal.

When he was only a fourteen year old school boy he left his native Japan for the first time



Tadashi Tokieda

and went to France where he attended a French high school and was plunged into a French speaking world. He knew then that he would sink unless he

#### Allerton Conference

"It is amazing to see how many applications of arithmetic geometry are invading the business world through coding theory and cryptography," said **Nigel Boston** after the 35th annual Allerton Conference. It

learned to speak French, and became fascinated by languages. He became so interested that now, in addition to French, Japanese, and English, he knows Greek, Latin, classical Chinese, Finnish, Spanish, and Russian, but he says, "I speak every single one with a strong accent."

Professor Tokieda is a 1989 classics graduate from Jochi University in Tokyo, has a 1991 bachelors degree from Oxford University in mathematics, (where he studied as a Fellow of the British Council) and has a 1992 master's degree from Princeton, in addition to his doctorate.

He finds Champaign-Urbana a beautiful place. One thing he likes is the big sky, particularly at night. An amateur sky gazer, one night in late September he counted 300 stars. After living between the lights of New York and Philadelphia he finds the Urbana-Champaign night sky plear and beautiful.

was held by the communications group of the College of Engineering to bring together researchers in pure mathematics and engineering, to see if they could understand each other's language.

Professor Boston and former graduate student Judy Walker (1996, Boston) organized a session on algebraic geometry and coding theory for the September 29 through October 1 conference, which was held at Allerton Park.

Speakers were invited from around the world, including Noam Elkies from Harvard who also lectured at a department colloquium. Other coding theory sessions were organized by Richard Blahut and Alex Vardy.

As part of the conference, a time capsule was buried which will be dug up in 2032. Participants were invited to make predictions as to what would occur in the intervening 35 years. The prize will be a bottle of port buried in the capsule.

On September 27 and 28, a surprise conference was held at the Computer Science Building to celebrate coding theorist Richard Blahut's 60th birthday. This began when about 60 people appeared in his office with a birthday cake.

## Midwest Topology

The Midwest Topology Seminar, which meets three times a year, met in the department's new colloquium space, the enlarged Room 245 Altgeld, for the first time. Including graduate students and faculty members, 60 mathematicians attended from midwest universities, among them the University of Chicago, Northwestern, UIUC, Purdue, Indiana, and Michigan, reported Daniel Grayson, who with **Randy McCarthy** organized the seminar.

The program included the following talks, "On Spaces of Embeddings," given by Thomas Goodwillie of Brown University; "Graph Mappings and Poincare Duality," by Eric Friedlander, Northwestern; "On the Cohomology of the MacPhersonian," by James Davis, Indiana University; and "Pulling 2-spheres apart in 4-space," by Peter Teichner, University of California San Diego.

Mathematical truth is obvious and imposing; its practical applications...obtrude thamselves on the dullest imagination.

G. H. Hardy

### Faculty News

C. Ward Henson and Lou Van den Dries gave invited lectures at the Analysis and Logic meeting held this past August at the University of Mons, Belgium. Professor van den Dries is among the organizers of a special semester on the Model Theory of Fields that will be held from January to June, 1998 at the Mathematical and Sciences Research Institute, Berkeley, California.

Joseph Rotman gave a talk in June in St. Petersburg, Russia, at an algebra conference in memory of Fadeev. When he was ready to leave the country, Professor Rotman found that his visa had expired several hours earlier, and because of the Russian bureaucracy he had to spend an extra day at the Moscow airport before he could leave. Professor Rotman's book, Journey into Mathematics, was published by Prentice-Hall in August and is now being used as a text in several UIUC sections of Math 247.

George Francis and John Sullivan recently returned from Berlin-Dahlem, Germany, where they presented papers at the International Workshop on Visualization and Mathematics '97. Professor Sullivan spoke on optimal geometries and presented a real-time interactive demo of the Minimax Triversion of the Sphere, which was produced by an illiView team consisting of Sullivan, Francis and Chris Hartman (1997, West) a former graduate student who is a new assistant professor at the University of Alaska, Fairbanks.

Professor Francis presented a geometrical puppetshow consisting of real-time interactive animations by students in his courses last year. One was produced by last year's German Fulbright graduate student visitor Birgit Bluemer, and another, the CAVE Gladiator game, by freshman honors student Kevin Vlack. The latter is being used to conduct psychometric experiments in the CAVE at the NCSA by Francis and others.

Derek Robinson visited
South Africa for the first two
weeks of June this year where
he gave lectures at the
University of Witwatersrand in
Johannesburg and the
University of Natal in
Pietermaritzburg. While there
he was told that the
traditionally white universities
are now under financial
pressure because of the
reallocation of resources to the
black universities.

He and his family spent three days in the Royal Natal

National Park in the
Drakensburg Mountains,
several days at a resort on the
coast near Durban, and in a
game park in Kwazulu-Natal.
His impression was of a
beautiful, wealthy country
struggling with serious
problems at a time of transition
to democracy.

In August Julian Palmore visited the RAND Corporation in Santa Monica and gave a seminar at the Naval Postgraduate School in Monterey. He chaired a national meeting on warfare analysis and complexity held at Johns Hopkins University in September and is giving a presentation at the US Air Force Academy in November.

This past summer Peter Loeb visited Frankfurt University for a month where he gave talks and, also in Germany, spoke at Tübingen. He visited Sweden for a week and gave a talk at the Chalmer's Institute there. This fall Professor Loeb gave a talk at a special session on potential theory at the AMS meeting in Montreal and also presented a talk at a special session on applications of model theory at the AMS meeting in Milwaukee.

Robert Jerrard attended a conference in July at Oberwolfach where he gave a talk. He then went to Istanbul

for a week to work with a colleague.

In June Renming Song attended the 24th conference on Stochastic Processes and their Applications held in Vina del Mar, Chile, where he presented a talk. After that, from June 23 to August 8, Professor Song participated in the Probability Summer Internship program at the University of Wisconsin. The topic this summer was "Financial Mathematics and Stochastic Control."

Zhong-Jin Ruan coorganized an International
Conference in Operator
Algebras and Operator Theory
in Shanghai, China, in June.
Uring his trip to Asia, he was
invited to give talks at Tokyo
University, Nankai University
in Tianjin, and a series of
lectures in a workshop at the
East China Normal University
in Shanghai. He also gave an
invited talk at a workshop on
"Operator Spaces" at Texas
A&M University in August.

Douglas West is giving an invited one hour talk at the 12th Midwestern Conference on Combinatorics, Cryptography and Computing in Terre Haute, IN.

Several faculty members and former and current graduate students participated in the Regional Meeting a of the American Mathematical Society

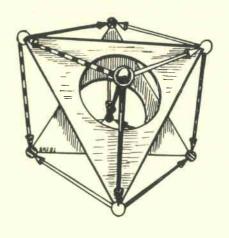
at Milwaukee October 24 and 25. Peter Loeb and C. Ward **Henson** spoke at the special session on applications of model theory to analysis and topology. Daniel Grayson organized a special session on K-theory and Motives. Other UIUC professors who spoke included Carl Jockusch, Randy McCarthy, James Glazebrook and the following former graduate students: Jose. N. Iovino (1994, Henson), Chris Miller (1994, van den Dries), Patrick D. Speissegger (1996, van den Dries), and Mark Walker, (1995, Grayson). Graduate students Miriam Ruth Kantorovitz and B. J. Schaeffer also presented papers at the meeting, as did former UIUC visitor Renling

Last November Anand Pillay gave the Britton lectures, a distinguished series of four lectures at McMaster University on model theory, algebra and number theory. During the fall, he also gave a series of lectures on differential fields at the Fields Institute, Toronto, and in January organized the workshop there in geometric model theory.

In April Professor Pillay gave a colloquium talk at Vanderbilt University on model theory and number-theory, and in May he gave a talk in the logic seminar

at Oxford University in England, titled "Effective bounds on the number of generic points on curves in tori." In July Professor Pillay spent four weeks at the CIRM in Barcelona where he gave one lecture on automorphic groups and compact groups and a series of talks on simple theories. He also gave a colloquium at University Madrid on model theory and number theory, and in October he gave a logic seminar at UIC on hyperimaginaries, canonical bases and compact groups.

Professor Emeritus Tony
Peressini has been notified that
the Math Teacher Link Website
at: http//wwwcm.math.uiuc.edu/MathLink/
was selected by the Eisenhower
National Clearinghouse for one
of its Digital Dozen best
websites for teachers of math
and science. Debra Woods also
worked on the website.



#### One of Ten

Robert E. Megginson, (1984, Mahlon Day) associate professor of mathematics at the University of Michigan, was honored at a White House ceremony for his work in mentoring students from underrepresented minority groups. He was one of ten college educators chosen to receive the 1997 Presidential Award for excellence in Science, Mathematics, and Engineering Mentoring.

The work for which Megginson was cited includes the establishment of summer programs for middle school and high school students on the Turtle Mountain Chippewa Indian Reservation in North Dakota. In addition, Megginson has helped develop mathematics curricula for programs of the American Indian Science and Engineering Society (AISES), the largest professional organization for American Indians in mathematics, science and engineering. Megginson is a Sequoyah Fellow of the AISES.

Megginson has emphasized cultural relevance in his programs for American Indians, showing the students how a knowledge of mathematics and science is not

## grafiXlab

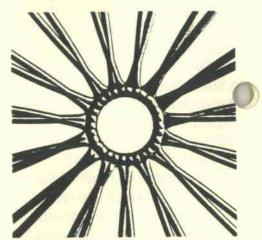
The grafiXlab is a collaboration between the department and the National Center for Supercomputing Applications directed by George Francis. It provides support for teaching and for student research projects as well as faculty research. Recently the NCSA donated ten Indigo Elan graphics workstations to the lab; they are now installed in Altgeld Hall.

During the past summer the UIMATH.grafiXlab hosted a series of talks and student projects, sponsored by the NCSA. Among the speakers in June and July were Professor Emeritus Felix Albrecht whose topic was "Limit cycles of planar polynomial vector fields," and Professor Emeritus Richard Bishop who spoke on

only compatible with their cultural values as American Indians, but in fact is a traditional part of those values. He often has elders open his programs with traditional activities such as pipe ceremonies, so that the students and their parents know that the programs and their goals have the blessing and support of community leaders.

"Topology of Riemannian manifolds with boundary having cut locus of low degree." Also from the UIUC Math department Professor John Sullivan spoke on "Ropelength of knots."

Speaking on Summer Projects
Potpourri were Birgit Bluemer,
John Estabrook, Ulises
Cervantes, Chris Hartman,
Matthew Siak, and Professor
George Francis.



The first example known of a complete (almost) embedded constant mean curvature surface with finite total curvature - by John Sullivan

The most beautiful thing we can experience is the mysterious. It is the source of all true art and science.

Albert Einstein

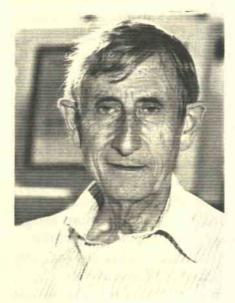
#### Freeman Dyson Lectures

Freeman Dyson, professor at the Institute for Advanced Study in Princeton, delivered this fall's **Arthur B. Coble** Memorial Lectures on the topic of Life in the Universe to large crowds October 6, 7 and 8 at Krannert Center. A mathematical physicist, and an astrophysicist, he has reached a wide audience through his philosophical and scientific writings on many topics.

Professor Dyson's first lecture addressed the paradox of order and disorder in the universe and how both are increasing. The regular sequence of days and nights, and of the seasons, winter to summer, are examples of order, and the increase of entropy shows increasing disorder.

In his second lecture he spoke about space and man's place in it and foresaw the time when cheap space missions, both manned and unmanned will be possible. He believes that man will occupy other planets, and even the asteroid belts far out in the solar system. His third lecture was highly technical.

Freeman Dyson was educated at Cambridge University and holds honorary degrees from many institutions in the United States and abroad. He became famous very early through his



Freeman Dyson

work on the quantum theory of electromagnetic fields.

The lecture series honors the memory of Arthur B. Coble (1878-1966), professor of mathematics at UIUC from 1918 to 1947. Professor Coble was chairman of the Department of mathematics from 1933 to 1947 and president of the American Mathematical Society from 1933 to 1934. The late Professor Coble's family established a fund to endow a series of public lectures on mathematics to be delivered by outstanding mathematicians.

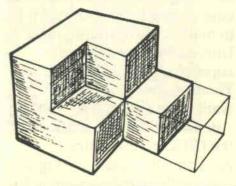


#### Hohn/Nash

This year the first
Hohn/Nash fellowship will be
made to a graduate student, as
a result of a generous
endowment by Gene Golub
(1959, Abe Taub), a former
student of mathematics
professor Franz Hohn, and
computer science professor J.P.
Nash.

The prize will be awarded at the end of this calendar year, but the award ceremony will take place March 3, 1998, in 314 Altgeld Hall at 4:00 p.m.

Hohn was a much admired teacher and long time member of our faculty. Many students benefited from his classes.



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## Tsuan Wu Ting

Tsuan Wu Ting, professor emeritus of mathematics, died August 16 at his home in Urbana, at the age of 74.

Professor Ting graduated from China National Central University in 1947 with a B.S. degree in mechanical engineering. He had entered that university in 1943; at that time the Japanese occupied eastern China and to get beyond the area controlled by Japan, Ting walked over 2,000 miles westward to the university.

In 1954 he came to the U.S. for graduate work. He received an M.S. degree in mechanical engineering in 1956 and a Ph.D. in mathematics from Indiana University in 1960, under the supervision of the late T. Y. Thomas, a member of the National Academy of Sciences.

Before joining the faculty of the UIUC mathematics department, Professor Ting was a research mathematician at the General Motors Research Laboratories in Michigan, an assistant professor of mathematics at the University of Texas, a visiting member of the Courant Institute of Mathematical Sciences, and an associate professor at North Carolina State University in Raleigh. He came to the UIUC in 1966 where he was a professor of mathematics until

he retired in 1992.

Ting published over 40 papers in various branches of applied mathematics, including, for example, problems dealing with elastic-plastic torsion. His research, based on a broad knowledge of mathematics and physics, in the words of T. Y. Thomas was "outstanding."

Ting supervised the doctoral dissertations of six graduate students, who now hold senior positions at various research universities and at A.T. & T. In the words of one of his students, William L. Perry, now dean of faculties at Texas A. & M. "Writing a thesis under Ting was a very maturing experience for me. He was very kind and generous with his time, but in return he expected hard work and dedication from me. When he raised the possibility of a certain method of attack on my research problem, he wanted to know within days how it had worked out in practice. He certainly taught me the value of sustained effort."

Tsuan Wu Ting was a shining example of a person who rose above the hardships of international political upheaval to become a noted scholar and mathematician. He was also a valued colleague and friend to many in the department.

He is survived by his wife Eutrice, his son Tom, his daughter Pauline and five

#### Putnam News

The Mathematics Department is entering a team in this year's William Lowell Putnam competition. This is the well-known mathematical problem contest for undergraduates, sponsored by the Mathematical Association of America, and is held simultaneously on university campuses in the United States and Canada, usually on the first Saturday in December.

Professors Harold Diamond and Adolf Hildebrand announced that they would hold weekly training sessions and offer several practice exams. Attendance so far has been very good, with some really talented students participating. They have also created a UIUC Math Contests Web Page at http://www.math.uiuc.edu

/~hildebr/contests.html, which contains more information about the Putnam and similar competitions, including historical data about the UIUC Putnam team's performance in the past.

grandchildren. Memorial contributions made out to the American Liver Foundation may be sent to Mrs. Ting at 403 E. Sherwin Drive, Urbana

# Altgeld Hall

"Altgeld Hall is the most important structure on campus," said David J. Garner, referring to its architecture and architectural history. Garner, of the university's Office of Facility Planning and Management, described the interior of the Mathematics Library as outstanding and said that the features "which have been 'lost' should be restored to the splendor they deserve." Altgeld Hall was designated a historic treasure and added to the National Register of Historic Buildings in 1970.

"When the university decided construct it, the intention was to build an edifice that would show the world that the University of Illinois was more than a cow college," said Chancellor Michael Aiken.

The impetus for the building came from governor John Peter Altgeld, a passionate supporter of higher education who liked the Tudor-Gothic style.

The Board of Trustees voted for a classical design for the building submitted by noted Chicago architect Daniel Burnham, but Governor Altgeld suggested that Illinois faculty members try to create a design acceptable to him instead.

Professor Nathan C. Ricker and James White designed the modern Romanesque' style building. The original interior designed by Nathan Wells, now the department library, is what is truly eye-catching, with its colonnaded arcades. portrait medallions, and murals in the lunettes below the domed ceiling. The original glass dome was covered during the 1920s, and one of the large main reading rooms was separated off during extensive remodeling in 1956.

The interior still is beautiful and much in use. It now has one of the best mathematics libraries in the world, contains

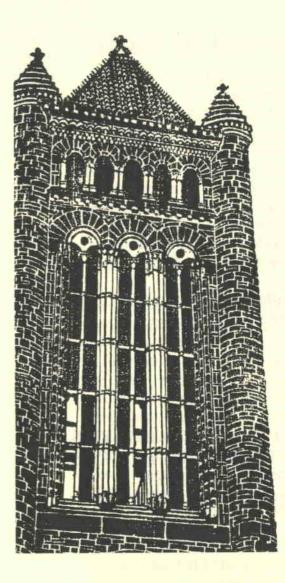
889,692 books and periodicals, and currently shelves 840 mathematical journals.

**Bells of Altgeld** 

In 1920 the university chime was installed in the 132-foot tower of Altgeld Hall, and the room just below the tower was converted to house the playing and practice consoles.

The scale of the fifteen bells in the chime ranges over one and a half octaves, with the exception of three notes. Because of these restrictions, much of the music currently played must be transposed and/or rearranged for the chime.

Retired chimesmaster Albert E. Marien has long wanted to convert the fifteen bell chime into a forty-eight bell carillon. A four octave key carillon would increase tremendously the musical selections that could be played on the Altgeld bells.



#### Award to Bartle

Professor Emeritus Robert G. Bartle received the Lester R. Ford award on August 2, 1997, at the Summer Mathfest in Atlanta. Established in 1964, the award consists of a citation and cash prize and is presented by The Mathematical Association of America for articles of expository excellence published in the American Mathematical Monthly.

Professor Bartle receives this prestigious award in

recognition for his article "Return to the Riemann Integral" (The American Mathematical Monthly, 103, October 1996). As noted in the citation: "Bartle shows that a generalized Riemann integral captures the advantages of both the Riemann integral and the Lebesque integral without incurring the major disadvantages of either of the two classical approaches. By the end of the paper, Bartle has presented a strong argument for replacing the Lebesque integral

with the generalized Riemann integral."

Professor Bartle taught here from 1956 until 1990, when he retired and took the position of Executive Editor of Math Reviews. He is now teaching at Eastern Michigan University.

The validity of a flash of inspiration ...is very closely bound up with its aesthetic qualities.

Roger Penrose

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