

LOCAL SPACES

UBC Department of Mathematics

Summer 2004

Message from the Head



Since I arrived at UBC two years ago, I have heard much about the beauties and wonders of British Columbia, but have had little time to experience these things firsthand -- until this summer. Now, I know that the BC license plate motto "Beautiful British Columbia" does not lie. From the Okanagon in the Interior to Salt Spring Island in the Georgia Straits, it is hard to imagine a more interesting and beautiful place.

My family and I have had a wonderful time: hiking, canoeing, camping, swimming and simply marveling at the rugged wilderness. Closer to home, we have also enjoyed the many fun and interesting things to do and see in the long days and evenings of summer. I hope that newcomers to the Department will soon have a chance to spend some time getting to know Vancouver and BC.

I also had a chance to think and learn about great mathematics by traveling to stimulating conferences. But for great mathematics, there was really no need to travel any distance at all from UBC. With support from PIMS, MSRI, UBC and the Math Department, we had an unusually stimulating summer of mathematical activities right here. Elsewhere in this newsletter (pages 2 and 4), you will find accounts of the summer schools in Probability and Knot Theory. Also, UBC was the site of major conferences in diverse areas such as Category Theory, Combinatorics, and Inverse problems. I was able to taste a small sample of these activities. I am grateful to the organizers of these activities for their dedicated efforts.

As the new academic year begins, I know that I will have less time for sightseeing and conference travel. But I am looking forward to the continuation of our full program of research and education activities. With an offering of more than 30 graduate courses, weekly departmental and IAM colloquia, weekly seminars covering a wide spectrum of mathematics, and numerous PIMS activities, the only problem is that we may have a bit too much to choose from. And don't forget the department soccer match (Sept. 13), beach barbeque (Sept. 18) and holiday dinner (Dec. 2).

We have experienced a remarkable period of growth, with the hire of 25 new faculty, including several Canada Research Chairs, in the past 4 years. We now have roughly 60 faculty members, 90 graduate students and 25 postdoctoral fellows, covering broad areas of mathematical research, pure and applied. But our growth is not merely in numbers: the listing of recent awards in this newsletter attests to our excellence in research and education.

I hope that you will take the opportunity to participate in many of our academic activities and enjoy informal interactions. I wish you all the best for a great academic year.

Brian Marcus
Head, Department of Mathematics

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## Summer School in Probability

By Ed Perkins

The first Summer School in Probability was held at PIMS from May 25-June 26, 2004. Over 40 participants attended courses on Random Walks and the Geometry of Graphs given by Professor Martin Barlow (UBC), and the Schramm-Loewner evolution and other conformally invariant processes in the plane by Professor Greg Lawler (Cornell University).

This was part of the PIMS-sponsored CRG in Probability and Statistical Mechanics which runs from 2004 to 2006. The credit-courses were taken by local graduate students but also attended by graduate students from across Canada, USA and France. Their home institutions included the University of Toronto, McGill University, University of Alberta, Ohio State University, University of Illinois, New York University, University of Washington, and Ecole Normale Superieure.

Twenty-five of the visiting graduate students and post-doctorates stayed in shared apartments at Gage thanks to funding from PIMS. The Math Department provided important support as well. A number of senior visitors also attended the lectures. The attending students expressed great enthusiasm for the courses and also Vancouver. A number of hikes were organized to Anvil Island and Stawamus Chief.

“The atmosphere inside and outside the classroom was excellent. The pace of the lectures (5 in a week) was perfect to have time to understand the notions. I do not think that it should be shortened. The instructors have been of course the main reason why I enjoyed this summer school. I personally really enjoyed the pace, the ideas and the manner of professor Barlow's lecture. It is also going to be very useful for me in my research,” says Mathieu Merle, a student visiting from France.

It is hoped that these series will greatly increase awareness in the international graduate community of the opportunities for graduate studies in probability and statistical mechanics at UBC. The summer school dates for next year are June 6--July 1, 2005 when the speakers will be Yuval Peres, University of California, Berkeley and Gordon Slade, UBC.



UBC-PIMS hosted students from various universities at this year's Probability Summer School. (Photo by David Brydges)

## Curiosities

By Zinovy Reichstein

I learned this Math puzzle by word of mouth about 10 years ago. Apparently, it came from an old Moscow high school olympiad but I haven't been able to track down an exact reference.

I like to use this problem to illustrate how mathematical induction works; it also offers some mathematical insights into such notions as self-interest, cooperation, and democracy.

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Ten pirates (numbered from 1 to 10, in order of seniority) found 100 gold pieces. To divide them up among themselves, they use the following procedure. Pirate number 1 makes a proposal as to how many pieces each of them should get.

Then all ten pirates vote on this proposal (no abstentions allowed). If five or more vote in favor, then the proposal passes and the treasure is divided accordingly. If not, pirate no. 1 is thrown overboard, and the same procedure is repeated with the remaining nine pirates. (Pirate no. 2 proposes a distribution, the remaining nine pirates vote on it, etc.) The money is eventually distributed in accordance with the first plan that gets at least 50% of the remaining votes. (Exactly 50% is OK.)

Assuming that each pirate is motivated exclusively by logic and his own self-interest, how will the money be distributed? Note that the pirates don't trust one another, so that there is no cooperation.

Hint: What happens if there are only two pirates instead of ten? Three pirates? Now use induction.

IMPORTANT DATES

September 2 – Graduate Student Orientation
New Teacher Orientation

September 6 – Labour Day (Statutory holiday) UBC closed.

September 7 – Term 1 classes begin
(except for first-year classes)

September 9 – Department Meeting

September 11 – Qualifying Exams

September 13 – Soccer Match (Grad Students vs Faculty)

September 18 – Department Barbeque at Jericho Beach

October 8 – Deadline for final submission of master's and doctoral theses to Graduate studies for Fall Graduation

October 11 – Thanksgiving (Statutory holiday) UBC closed.

December 2 – Department Holiday Dinner

Recent Award Winners

Michael Bennett has won the Ribenboim Prize of the Canadian Number Theory Association for his distinguished research in number theory. The prize is normally awarded every four years in conjunction with a CNTA meeting. The winner will receive a certificate and medal and will give a plenary talk at the associated CNTA meeting.

James Carrell has won the Faculty of Science Achievement Award for dedicated service to the Mathematics Department and the Canadian mathematical community.

Mary-Margaret Daisley has won the Faculty of Science Achievement Award for dedicated service to the faculty, staff and students of the UBC Mathematics Department.

Adriana Dawes was a recent co-owner of the joint CMS/CAIMS poster award. Prizes for the poster session were donated by Maplesoft and Springer.

Joel Feldman won the 2003-2004 Faculty of Science Achievement Award for Teaching.

Nassif Ghoussoub was awarded a “Doctorat Honoris Causa” from the University of Paris, June, 2004. This is in recognition of Nassif’s research accomplishments in mathematics and for his many contributions to the discipline worldwide, through his role in the founding of PIMS, MITACS and BIRS.

Alexander Holroyd is the co-winner with Itai Benjamin of the Weizmann Institute Rehovot of the 2004 Rollo Davidson Prize. This prize is awarded annually by Cambridge University to an outstanding young probabilist. Alexander was cited for his novel contributions to different areas of probability including percolations in its many forms.

Izabella Laba is the winner of the Canadian Mathematical Society’s Coxeter-James Prize for 2003. This award recognizes outstanding young mathematicians who are

either Canadian or work in Canada. The citation refers to work on the Kakeya conjecture on Hausdorff and Minkowski dimension of Besicovitch sets with Nets Katz and Terence Tao, which surmounts a natural barrier to improving earlier lower bounds by Thomas Wolff and Jean Bourgain.

Gordon Slade is the co-winner of the Prix de “Institut Henri Poincaré (IHP) 2003 with Remco van der Hofstad of the Stieltjes Institute for Mathematics, Delft University, for the paper *Convergence of Critical Oriented Percolation to Super-Brownian Motion Above 4 + 1 Dimensions*.

Stephanie van Willigenburg won an Early Career Progress Award from the Peter Wall Institute for Advanced Studies. The Early Career Scholars program was introduced for the 2000-2001 academic year. For the Assistant and Associate Professors cohorts, there are a total of 16 to 20 recipients each year. The objective for the program is to bring outstanding early career researchers together to share ideas and research approaches.

Michael Ward won the 2003-2004 Faculty Killam Award for outstanding contributions made in teaching. The prize is awarded annually by the Faculty of Science.

Liam Watson was one of ten winners of the UBC Graduate Teaching Assistant Award. He is recognized for his excellence in teaching and his efforts in facilitating the Math 180 workshop.

This year’s University Graduate Fellowship (UGF) winners are **Florica Coman, Amin Gholampour, Yujin Guo** and **Mark Holmes**. The Faculty of Graduate Studies offers approximately 300 UGFs each year and they are made on the basis of academic excellence.

NSERC winners for 2004-05 are **Vishaal Kapoor, Richard Kublik, Robert Noble, Elissa Ross** and **Omer Dushek**. The scholarship provides financial support to students who are engaged in master's or doctoral programs in the natural sciences or engineering.

Welcome To The Math Department!

(Faculty) Alejandro Adem, Neil Balmforth, Eric Cytrynbaum, Richard Kenyon, Ozgur Yilmaz

(Visitors) Omer Angel, Sandra Barsky, Richard Bass, Cedric Boutillier, Jeongwhan Choi, Codina Cotar, Ana Savu, Roger Fenn, Ed Green, Guangyue Han, Mirmosadegh Jamali, Friedrich Littmann, Keith Matthews, Tim Myers, Abbas Momeni, Temurchaolu, Nizar Touzi, Matthew Weston, Pengtao Yue

(Graduate Students) Shabnam Akhtari, Mohamed Alimi, Colleen Ball, Oleksandr Barannyk, Daniel Brox, Jose Cantarero-Lopez, Warren Code, Christopher Coulter, Ana Culibrk, Gustavo de Oliveira, Omer Dushek, Shilpa Ghadge, Jeffrey Hood, Vishaal Kapoor, Sandra Kliem, Natasha Li, Shreyas Mandre, Santiago Moreno, Andreas Putz, Elissa Ross, Terry Soo, Yi Fan Tian, Michael Tsiang, Grace Wang, Kelan Zhai

Topology Workshop

by Dale Rolfsen

"Knots in Vancouver" was a gathering of world experts in mathematical knot theory and 3-dimensional manifolds, taking place at UBC July 19-23, 2004. About 150 people attended this week-long workshop, which is in a tradition of annual summer workshops in knot theory, recently held in Poland, Korea, Greece and other international venues.

A special feature of this workshop is that it was preceded by a two-week Graduate Summer Course on the same subject. This course, sponsored by Math Sciences Research Institute in Berkeley but held at UBC, was the biggest summer course ever held by MSRI, with nearly 80 students. About 60 came from MSRI sponsoring institutions, another dozen from Canada (sponsored by PIMS) and there were a few students from as far away as Korea, Japan, Mexico and Spain. The course consisted of nearly 40 hours of lectures by 12 world leaders in the subject, with work sessions every evening. As a special treat, in the middle of the course the students had a day off for an excursion to Deep Cove, kayak lessons and a two-hour paddle.

The last two days of the course coincided with the first two days of the workshop, and consisted of several mini-courses given by world leaders in the field, and emphasizing connections of knot theory with other disciplines. Vladimir Turaev gave a course on "Virtual Strings," De Witt Sumners' minicourse was entitled "DNA topology; experiments and analysis." The team of Dan Silver and Susan Williams lectured on "Applications of symbolic and algebraic dynamics to knot theory." Most of the students stayed on for the more specialized lectures during the remainder of the workshop, which added to the excitement of the event.

Sponsored by PIMS, "Knots in Vancouver" was also generously supported by the UBC Mathematics Department, MSRI, the Canadian Natural Sciences and Engineering Research Council, and US National Science Foundation.

Facilities Update

by Lee Yupitun

There have been a number of renovations in the department over the summer. These improvements were necessary in order to accommodate the increasing number of faculty, visitors and graduate students coming to the Math department.

In May new solid core doors were installed in the Math Building to improve security. It is hoped that funding will become available in the upcoming fiscal year for the installation of doors in the Math Annex.

Due to deterioration, all the windows with broken sash cords, locks and cracks were repaired. Window films were added to minimize the heat, especially during the summer months. Sinks were replaced in the Janitorial rooms (Math 101 and Math Annex 1218) to enhance the working ergonomics for custodians. In addition, renovations are going on in Math 202 and 225 to improve the teaching environment for those classrooms.

A major renovation is taking place in Math 229 and Math 232 to construct six additional offices and a new server room. These offices will be used as faculty and visitor offices in the fall. Meanwhile, the staff lounge has been temporarily relocated to Math 118.

Yum Yum's is currently being renovated in order to create a Math Social Space. This area will be reserved for instructors' office hours and a study place for Math students. The estimated date of completion for this project is early September.

These projects would not have been possible without the strategic planning of our Facilities Committee and the funding received from the University.



Participants of the Topology Workshop gathered outside the Scarfe Building for a group photo.
(Photo by The Ha)