

CMS

NOTES

de la SMC

Volume 31

No. 3

April / avril 1999

*In this issue / Dans ce numéro*

<b>Editorial</b> .....	2
<b>Book Review by A. John Coleman</b> .....	3
<b>Du bureau du président</b> .....	6
<b>Pouliot Prize – Note of thanks</b> .....	8
<b>Education Notes</b> .....	9
<b>Awards / Prix</b> .....	10
<b>Research Notes</b> .....	11
<b>CORS Update</b> .....	13
<b>Camel Bytes</b> .....	14
<b>CMS 1999 Summer Meeting Réunion d'été 1999 de la SMC</b> .....	16
<b>Schedule / Horaire</b> .....	18
<b>CMS Committee Annual Reports</b> .....	22
<b>Call for Nominations / Appel de Candidatures</b> .....	25
<b>Calendar of events / Calendrier des événements</b> .....	30

## FROM THE PRESIDENT'S DESK



*Richard Kane*

*(voir la page 6 pour la version française)*

This article, my Annual Report for the year 1998, is an outline of some of the year's highlights for the CMS. It will also convey some of my impressions about the CMS after one year as CMS President. A number of annual committee reports will also be appearing in the April and May issues of the NOTES which will provide fuller details about the accomplishments of our members.

Before dealing with all these matters, however, I would remind everyone that our Summer meeting will be taking place during May 29-June 1 at St John's, hosted by Memorial University. I am very much looking forward to this meeting. The program involves nine different sessions (Perspectives in Ring Theory, Harmonic Analysis, Representation Theory, Education -What Mathematical Competitions do for Mathematics, Combinatorics and its Applications, Nonlinear Analysis, Surveys

in Mathematics, Graduate Student Session, and Contributed Papers) on a diversified range of topics. St John's is one of Canada's most distinctive cities and will provide a very attractive meeting site for our (largely landlocked) members. I hope to see you there in May.

The past year was certainly a very successful one for all of Canadian Mathematics. At the international level, 1998 witnessed the elevation of Canadian Mathematics to Group V, the highest ranking, in the International Mathematical Union (IMU). At the national level, the 1998 NSERC Reallocation process recognized the effectiveness of all the mathematical sciences, including Mathematics. It also provided significant new funding for the Mathematical Institutes. As a consequence, the configuration of Mathematical Institutes continued to evolve, with the Pacific Institute joining the Centre de recherches mathématiques and the Fields Institute as a third permanent Institute. Most recently, the successfully funded "Mathematics of Information Technology and Complex Systems" (MITACS) project, which was organized by the Institutes, offers the opportunity for a large group of Canadian mathematicians to build research bridges with the private sector. The above successes are the culmination of four years of effort and initiatives by Canadian mathematicians in response to their situation after the 1994 NSERC Reallocation process.

*(continued on page 5)*

*CMS NOTES*  
*NOTES DE LA SMC*

Les *Notes de la SMC* sont publiées par la Société mathématique du Canada (SMC) huit fois l'an (février, mars, avril, mai, septembre, octobre, novembre et décembre).

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**ISSN : 1193-9273**

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1999

**EDITORIAL**



*S. Swaminathan*

In an earlier editorial (Nov.1998) I wrote about the difficulties in explaining the work of Fields' medallists even to persons with some mathematical background and pointed out the need for good expository accounts accessible to advanced undergraduate students. Since then I had a chance to go through the little book 'Modern Mathematics in the Light of the Fields Medals' by Michael Monastyrsky (A.K.Peters Ltd., Wellesley, MA, 1998). A review of this book was published in our issue of May 1998. Here I would like to point out some other interesting features of the book.

It gives a good, brief account of the work of all Fields' medallists since the first one in 1936. The work appeared first as an article in Russian and was later expanded into a book in 1991. A Foreword by Freeman Dyson compares the usefulness of the book to both a road map and the human genome project.

The book begins with a brief biography of John Charles Fields and history of the Fields' medals, including a complete list of Fields Committee members. The achievements of the winners of the medal are surveyed in a chapter entitled 'Mathematical Progress'. These are discussed according to areas: topology, complex analysis, algebraic geometry, number theory, algebra, miscellany and mathematical logic. A succinct overview is

given of the background to the results of each medallist where necessary. There are two appendices which describe the work of the 1990 and 1994 medallists. Thus in about a hundred pages the author has surveyed the remarkable progress achieved in mathematics largely due to the work of the Fields' medallists. One cannot, of course, expect to understand and assimilate every result described in the book. However, there is enough to whet the intellectual appetite of the reader, who can explore further using the sources indicated in the bibliography at the end of the book. The concluding sentence of Freeman Dyson's Foreword says: "The mathematical tourist can enjoy the human drama of John Fields and his medals without understanding the difference between a foliation and a functor, just as the spectator at the Winter Olympic Games can enjoy the triumph of Oksana Baiul in the figure-skating competition without understanding the difference between a triple lutz and a triple axel."

Dans mon éditorial de novembre 1998, j'ai discuté de la difficulté d'expliquer le travail des lauréats de la médaille Fields même à des personnes qui possèdent quelques connaissances mathématiques, et j'ai souligné la nécessité de rédiger des exposés descriptifs à la portée des étudiants avancés de premier cycle. J'ai depuis eu l'occasion de feuilleter un livret de Michael Monastyrsky intitulé *Modern Mathematics in the Light of the Fields Medals* (A.K.Peters Ltd., Wellesley, MA, 1998), dont nous avons publié une critique dans les *NOTES* de mai 1998. Je profite de l'occasion pour signaler quelques autres aspects intéressants de cet ouvrage.

Le lecteur y trouvera un bon résumé du travail de tous les médaillés Fields depuis la première remise, en 1936. Le texte est d'abord paru en russe, sous

*(continued on page 5)*

## MATHEMATICS WITHOUT BORDERS

*Book Review by A. John Coleman, Queen's University*

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### Olli Lehto, *Mathematics Without Borders*

1998 Springer-Verlag New York  
Berlin Heidelberg  
ISBN 0-387-98358-9

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*Olli Lehto*

You might well think that only a somewhat gaga elderly former President of the CMS would find much of interest in the history of the IMU.

In fact, as told by the Finnish mathematician, Olli Lehto, it is a fascinating tale of which the *protagonist* is the ideal of *mathematics as transcending all national and geographic boundaries*. It is a tortured tale as that ideal meets the intensity of the French-German hatred in 1918–1928 after World War I; confronts the onslaught of competing national prides; faces antisemitism in the USSR; and is caught in the struggle between Beijing and Taipei. For a mathematician, it is an inspiring tale as patron saints, such as Picard, de la Vallée Poussin, Poincaré, Fields, Cartan, Weyl, Heinz Hopf, Aleksandrov, Nevanlinna, Mumford, Stone and Arnold come onto the scene, valiantly

striving to keep the IMU alive. It is a tale that should intrigue a political junkie interested in understanding the subtleties of international affairs.

Lehto traces the beginnings of international cooperation among mathematicians to the World Congress in Chicago, 1893, attended by 45 mathematicians, of whom 4 were from Europe and at which Felix Klein gave the opening address about “the state of mathematics”. His concluding peroration is summarized by Lehto as roughly “Mathematicians of the world, unite!” . Concurrently, George Cantor was calling for a congress of mathematicians and in August 9 - 11, 1897, the first formal *International Congress of Mathematicians* convened in Zurich, involving 208 mathematicians from sixteen countries including 12 from Russia and 7 from the USA. Only 4 were women! The Organizing Committee, presided over by C.F. Geiser consisted of several Swiss together with 7 from other countries among whom were Cremona, Klein, Poincaré, Mittag-Leffer, Markov - names still well-known to us.

The experience of meeting together and sharing ideas was so satisfying that those present at Zurich decided that regular International Congresses of Mathematicians (ICMs) should become a fixture. The second ICM occurred in Paris in August 6-12, 1900 with Poincaré as President. Attendance rose to 253. This was the occasion of the famous speech in which Hilbert announced the set of problems which had such a profound effect on the development of mathematics during this century. At present, mathematical societies are plotting how to pull off a similar trick in the year 2000!

A pattern of ICM's every 4 years was adopted, so congresses followed in 1904 in Heidelberg, 1908 in Rome, 1912 in Cambridge by which time at-

tendance had risen to 574 of whom 82 were from outside Europe. The Rome Congress was notable because of proposals 1) to create an International Commission on the Teaching of Mathematics (ICTM), and 2) that an international association of mathematicians be established.

The first of these proposals was quickly acted on, largely because of the energy and administrative skill of Felix Klein. Beginning in September 1911 in Milan a succession of international congresses about mathematics teaching were held under the auspices of the ICTM and since 1952 under the auspices of a sub-commission of the IMU renamed as the International Commission for Mathematical Instruction (ICMI). These are now called “International Congress for Mathematical Education” (ICME) and occur every four years between the meetings of the ICM's. This pattern was established by the first Chair of the ICMI, Hans Freudenthal, apparently without the knowledge or consent of the Executive of the IMU! The seventh ICME was held in Quebec in 1992.

Getting the IMU underway was a much more difficult problem than holding Congresses which, like the Olympic Games, many nations are eager to host. What Lehto calls “The Old IMU” had a very sticky beginning in 1920 with statutes which excluded participation by mathematics associations of Germany and the other Central Powers. G.H. Hardy, de la Vallée Poussin, Mittag-Leffer and others opposed this discrimination arguing that mathematics should be totally above politics. But the initial President, Emile Picard, and the Secretary, Gabriel Koenigs, both from France, were adamant. The ICM in 1924 was supposed to be held in New York but the AMS withdrew the invitation because of the discriminatory

statute of the IMU. At the last moment, although he did not agree with this statute, Fields arranged the Congress in Toronto in order to avoid having no congress. This is a bit of murky Canadian history that I did not previously know which explains how Canada, - at that time far from a major mathematical power - had the dubious honour of hosting the ICM.

Congresses were held in Bologna in 1928 and Zurich in 1932 the organizers of which largely ignored Koenigs. The IMU was officially "suspended" in 1932 at the September meeting of the Assembly because of the dissension over its discriminatory statute. Independently of the IMU, a Congress was held in Oslo in 1936 where a decision was taken to hold the next one at Harvard in 1940. War intervened and it was not until 1950 that the ICM actually met at Harvard - notable, in my mind, for Chevalley's talk which aroused my interest in the Betti numbers of simple compact Lie groups! The Harvard meeting was a great success. Oswald Veblen presided over the 1700 regular members of whom 290 were from beyond North America. Unfortunately, no mathematicians from the USSR or the Socialist block attended, but the President of the USSR Academy of Science in a very friendly cable sent warm greetings to the meeting and regrets on behalf of Soviet mathematicians that they were unable to attend. Of course he did not say so, but everyone knew that this was because they were not given exit visas from the USSR. The Cold War had begun! Obtaining visas to enter the USA was even more difficult at that period than it is now but as a result of valiant efforts by the American mathematicians few, if any, foreigners who wished to attend were refused by the U.S. State Department.

The discussions which began in 1932 about reviving the moribund IMU got into high-gear in 1946. The *new* IMU, which came into existence in 1951, convened a General Assembly in Rome in 1952 where M. H.

Stone (USA) was elected as President and Enrico Bompiani (Italy) as Secretary. Since revenue raised by fees from member national associations, was very limited the IMU was able to operate by establishing its office in the country of its Secretary and sponging off his Department for secretarial services. Its greatest asset has been the prestige which the Officers have enjoyed. The revenue of the IMU has steadily increased from US\$14,000 in 1953 to \$210,000 in 1993. Its influence has grown steadily through organizing or sponsoring meetings and colloquia to which its name adds a certain cachet. Many such activities were financed by attracting funds from other organizations such as UNESCO.

The IMU created a Commission for Exchange of Mathematicians in 1959 which unfortunately had very little funding available with which to promote its worthwhile objective. As Chair of this Commission, after the Vancouver ICM in which I was involved as President of the CMS, I had the good fortune to persuade CIDA to help finance a conference in Rabat, Morocco, in 1976, at which the African Mathematical Union was founded. In 1978, the name of the Commission was changed to "Commission on Development and Exchange" (CDE) and appropriately had an African and then an Indian mathematician as Chair. In recent years the funds at the disposal of the CDE have increased markedly largely as the result of a Special Development Fund to which all mathematicians are encouraged to contribute and to which American mathematicians have been especially generous.

Another visible and worthwhile activity of the IMU has been to assure the production of the World Directory of Mathematicians. As recounted by Lehto the production of the first edition in 1958 was an heroic epic accomplished by the number theorist K. Chandrasekharan. During the period 1955 to 1978, as a member of the Executive Committee, as Secretary, President

and Past President, he played a decisive role in firming up the administration, establishing effective control by the Executive Committee and enhancing the prestige of the IMU. The first edition of the WDM in 1958 contained the names of 3,500 mathematicians; the 1998 edition, 53,911!

Two major difficult issues faced by the IMU since 1952 were relations with Soviet mathematicians and the admission of China into the Union. Of the 41 invited speakers from the Soviet Union for the Vancouver Congress in 1974 only 20 actually arrived. The IMU insisted that the choice of Fields medalists was the prerogative of the Executive of the IMU and that the choice of speakers at the ICM was completely in the hands of the organizing committee approved by the IMU for each Congress. The Soviet representatives, such as Pontryagin and Jablonski, insisted that no Soviet mathematician should be awarded a medal or selected as a speaker without the approval of the National Committee of the USSR. It is my opinion that they had two reasons for this, one reasonable and one not exactly admirable. The first is that the National Committee had a better idea than an outsider as to who was unlikely to be granted an exit visa so embarrassing situations such as that which occurred in Vancouver or at Helsinki when the Fields medalist, G. A. Margulis, had not been granted an exit permit by the Soviet government, could be avoided. Secondly, the old senior Academicians who controlled the National Committee "knew" that all truly great young Soviet mathematicians would have studied with one of them so clearly they were in the best possible position to chose those worthy of international recognition!

The difficult and delicate problem of China was that of reconciling the adherence of Committees representing mathematicians in mainland China and those in Taiwan with Beijing's "one-China" policy. This took about 20 years and required removing the word "na-

tional" from the statutes of the IMU!

We should be deeply grateful for the careful detailed account that Olli Lehto has provided us in his book of the intricate history of the IMU which he treats with subtlety and fairness. Since he was a main organizer of the Helsinki ICM and a member or Secretary of the Executive Committee of the IMU for 16 years, it is hard to imagine that anyone

else could be better equipped for this task. In this review, I have been able to present only a few salient elements of the story omitting even the dramatic interchange between Chandrasekharan and Pontryagin in Paris. The inclusion of a wonderful collection of portraits of famous mathematicians, from Hilbert to Mumford, who have been part of the story of the IMU is unparalleled in my

experience and greatly enlivens the presentation.

I commend this book to every Canadian mathematician interested in understanding the complex role of mathematics in the modern world and some of the subtleties of international diplomacy. Perhaps mathematicians should chair all peace negotiations!

*(continued from page 2)*

forme d'article, que l'on a ensuite amplifié pour en faire un livre en 1991. En avant-propos, Freeman Dyson compare l'utilité du livre à une carte routière et au projet génome humain.

Le livre s'ouvre sur une brève biographie de John Charles Fields et sur l'histoire des médailles Fields, où l'auteur dresse la liste exhaustive des membres du comité d'attribution des médailles Fields. Dans un chapitre intitulé «Mathematical Progress», il aborde les réalisations des médaillés, qu'il classe par domaine : topologie, analyse complexe, géométrie algébrique, théorie des nombres, algèbre, divers et logique mathématique. Au besoin, l'auteur ajoute un bref aperçu de l'historique des résultats obtenus par les médaillés. Le livre contient aussi deux annexes où sont décrits les travaux des médaillés de 1990 et de 1994. Ainsi, dans une centaine de

pages, l'auteur brosse un tableau des grands progrès réalisés dans le domaine des mathématiques grâce, en grande partie, à l'oeuvre des lauréats de la médaille Fields. Évidemment, il est impossible de comprendre et d'assimiler tous les résultats décrits dans cet ouvrage, mais le lecteur y trouvera suffisamment de matière pour stimuler sa curiosité intellectuelle et l'amener à fouiller dans certaines des sources listées dans la bibliographie, à la fin du livre. Freeman Dyson conclut son avant-propos à peu près en ces mots (traduction libre) : «Le "touriste mathématique" peut apprécier le drame humain de John Fields et des médailles qui portent son nom même s'il ne comprend pas la différence entre une foliation et un foncteur, tout comme le spectateur aux jeux olympiques peut apprécier le triomphe d'Oksana Baiul en patinage artistique sans connaître la différence entre un triple lutz et un triple axel».

*S. Swaminathan*

*(continued from page 1)*

Our professional society also had a very successful year. Before summarizing some of those achievements, I want to first mention several general features about the CMS which have struck me during my first year as President. These qualities manifest themselves in almost every activity that I will mention. One very striking pattern of the CMS is the very high level of membership involvement. The CMS has an outstanding record of accomplishment in its many areas of activity. The primary reason for this success is our large group of dedicated volunteers and staff. With a membership of 950, over 200 are actively involved, helping to run CMS activities. The CMS has achieved its present position by the work of these individuals. A second quality which has considerably impressed me about the CMS is its pervasive pattern of growth and change. We have a very flexible organization with a great capacity to renew itself. This represents a real strength of our organization. One clearly emerging pattern of change is the way in which the CMS is attempting to reach out. This

is happening at many levels: students, other professional societies, the private sector, the Mathematical Institutes. Such contact is strongly supported and can only be for the good of our organization and for Canadian mathematics.

When one looks at the CMS for 1998, the most striking new development was the establishment of the Endowment Grants Program. This is the culmination of years of effort in building up the Endowment Fund and will provide roughly \$60K in funding per year to partly support a variety of mathematics projects across Canada. In general, much of what happened within the CMS could be described as a continued evolution in which existing trends were reinforced and planning was also underway for future developments. Perhaps our most crucial decision of the year, the reappointment of Graham Wright as Executive Director for a further term (July 1, 1999 to June 30, 2002), is representative of both these trends. This is not a new decision in that we have done this many times (and are happy to have done it again). But we are planning to partly refocus the position of Executive Director by removing the task of Managing Editor from Graham's respon-

sibilities and have him spend more time on fundraising and promotional activities. These changes are connected with the emerging issue of the future directions of the CMS and how we will eventually structure the Executive Director's position, notably whether we will need to move to a full time Executive Director. The future of the CMS will certainly be a major topic in the CMS during 1999. The Strategic Planning document was approved in 1998 and resulted in four task forces being established which are scheduled to report in 1999. Planning for the future of a different sort is also underway, namely for the World Math Year 2000 (WMY 2000). Besides celebrate WMY 2000 by funding a number of projects, the CMS is also actively involved in planning a major joint meeting to be held at McMaster in June 2000. Current participating societies, besides the CMS, are: the Canadian Applied and Industrial Mathematics Society (CAIMS), the Canadian Operational Research Society (CORS), the Canadian Symposium on Fluid Dynamics (CSFD), the Canadian Society for the History and Philosophy of Mathematics (CSHPM) and the Canadian Undergraduate Mathematics Conference (CUMC).

All the major areas of CMS activity witnessed significant accomplishments in 1998. The following is an effort to pick out several which were particularly striking or indicative of future change. Our two semi-annual meetings held in 1998 were very successful with large attendance and a very broad range of sessions. They represent models for our evolving meeting format designed to encourage participation. One particular new arrangement, which we hope will further strengthen our meetings, is one being worked out with the three Mathematical Institutes whereby each will participate in a semi-annual meeting by organizing some sessions. The Mathematical Olympiads Committee continued to expand its already impressive high school enrichment program. The core of the program is its hierarchy of competitions (Open, CMO, IMO). The Open, now in its third year, is evolving into a significant national competition, despite experiencing difficulties due to labour disruptions in various provincial high school systems. The CMS also continues to expand its high school resource material via its new ATOM book series. And the Society has begun to develop a system of regional and national math camps. The Education Committee finalized the format for its outreach activities via a program for Grants to Promote Public Appreciation of Mathematics.

The CMS has continued to expand its electronic pres-

ence. The Publications Committee and Electronic Services Committees collaborated in providing online publication of the Journal, the Bulletin, CRUX with MAYHEM, as well as the NOTES. In general the CMS website, Camel, is proving an increasingly valuable window on the world. An ad-hoc Committee established in 1998 will, hopefully, tell us how to best utilize it and our ever expanding electronic services, and how best to fund them. The NOTES are providing increasingly broad coverage of mathematical activity in Canada.

The organizational structure of the CMS is continuing to evolve. Fundraising has been re-organized and a new format has been developed for the pursuit of corporate sponsors. This has met with considerable initial success. It will be another year before we can make a realistic appraisal of this initiative. This is an important initiative. It seems fair to say that the ability of the CMS to sponsor a wider range of activities is contingent on our ability to access new funding. Our current budget is fully committed. The renewal and expansion of membership also remains a goal and concern. It is hoped that our new membership reciprocity agreement with the AMS, to take effect in 2000, will be helpful here.

CMS financial operations, while perhaps less visible than other activities, are crucial and we continue to make significant changes. Notably, 1998 was the first year in which we used the calendar year as our budget year. After extensive discussion, the Finance Committee adapted a "passive investment" policy regarding our, now extensive, segregated Investment Funds (Endowment Fund and Mathematical Olympiads Fund). The articulation of an investment policy is a considerable achievement and one which has taken a long time to evolve.

The growing involvement of students in the CMS has been a major trend of the past few years. The above mentioned CUMC, while independent of the CMS, has been developing closer links. For the next two years it will be held in conjunction with the CMS Summer Meeting, and we hope that this pattern will continue. A new student committee, in part to serve as a liaison between students and the CMS, is now being organized. At the graduate level, a growing emphasis on industrial training is emerging. The first CMS "Job Fair" is being planned for the 1999 Winter Meeting in Montreal and it is hoped that, with the collaboration of the Institutes and MITACS, this will become a regular event.

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## DU BUREAU DU PRÉSIDENT

*(see page 1 for the English version)*

Cet article, qui constitue mon rapport annuel de l'année 1998, trace les grandes lignes des événements qui ont marqué l'année à la SMC. Je vous ferai également part de mes

réflexions sur la SMC après ma première année à la présidence. Dans les numéros d'avril et de mai des NOTES, nous publierons aussi un certain nombre de rapports annuels de comités qui vous renseigneront davantage sur les réalisations

de nos membres.

Avant d'aborder ces sujets, toutefois, j'aimerais vous rappeler que notre réunion d'été se tiendra du 29 mai au 1er juin 1999 à St John's, et que nous y serons accueillis par l'Université Memorial. J'attends cette Réunion avec grande impatience. Neuf séances portant sur des sujets variés sont au programme : Perspectives de la théorie des anneaux, Analyse harmonique, Théorie des représentations, Éducation - Qu'apportent les concours mathématiques à notre discipline?, La combinatoire et ses applications, Analyse non linéaire, Sondages en mathématiques, Séance pour étudiants diplômés et Communications libres. St John's, l'une des villes les plus pittoresques du Canada, sera un lieu de rencontre fort apprécié de nos membres, dont la plupart vivent à l'intérieur des terres. Au plaisir de vous y voir en mai!

La dernière année en fut assurément une des plus fructueuses pour le milieu des mathématiques au Canada. À l'échelle internationale, 1998 a été témoin de l'admission du Canada au sein du groupe cinq de l'Union mathématique internationale (UMI), soit le groupe de tête. Sur la scène nationale, le processus de réallocation du CRSNG 1998 a reconnu le caractère utile et l'efficacité de toutes les sciences mathématiques, y compris les mathématiques, en plus d'attribuer une somme considérable de nouveaux fonds aux instituts mathématiques. Par conséquent, la scène des instituts mathématiques a continué à changer : l'Institut Pacific s'est joint au Centre de recherches mathématiques, et l'Institut Fields est devenu le troisième institut permanent. Depuis peu, le Réseau de centres d'excellence (RCE) en mathématiques des technologies de l'information et des systèmes complexes (MITACS), projet ayant reçu une importante subvention et monté par les instituts, offre à un grand nombre de mathématiciens canadiens l'occasion de créer des liens avec le secteur privé au niveau de la recherche. Ces succès sont l'aboutissement de quatre années de travail et d'initiatives de la part des mathématiciens canadiens en réponse à leur situation depuis l'exercice de réallocation du CRSNG de 1994.

Notre société professionnelle a aussi connu une année remarquable. Avant de résumer quelques-unes de ces réalisations, je voudrais d'abord mentionner plusieurs caractéristiques générales de la SMC qui m'ont frappé pendant la première année de mon mandat de président. Ces qualités se manifestent dans presque toutes les activités que je mentionnerai. L'une des caractéristiques les plus frappantes de la SMC est sans contredit le fort taux de participation des membres. La liste des réalisations de la SMC dans ses nombreux secteurs d'activité est impressionnante. Ce succès, nous le devons en grande partie à nos nombreux bénévoles et employés dévoués. Nous comptons un total de 950 membres, dont plus de 200 participent activement, qui donnent un coup de main au déroulement des activités de la SMC. Si la SMC en est où elle est maintenant, c'est grâce au travail de ces personnes. Une autre caractéristique de la SMC qui ne cesse

de m'impressionner est l'atmosphère omniprésente de croissance et de changement qui y règne. Notre organisme est très flexible et démontre une grande capacité de renouvellement, ce qui constitue l'une de ses grandes forces. L'un des plans sur lesquels la SMC est clairement en train de changer est la manière dont la SMC s'efforce de tisser des liens, notamment avec les élèves et les étudiants, les autres sociétés professionnelles, le secteur privé et les instituts mathématiques. De tels liens sont fortement encouragés et ne peuvent qu'avoir des retombées positives sur notre société et les mathématiques au Canada.

L'événement le plus marquant de l'année 1998 est sans doute la création du programme de bourses du fonds de dotation. Ce programme, résultat de maintes années d'efforts consacrés à l'enrichissement du fonds, nous procurera environ 60 000 \$ par année pour appuyer des projets mathématiques de toutes sortes au quatre coins du pays. De façon générale, on peut considérer qu'une large part de ce qui s'est passé à la SMC est le fruit d'une évolution continue, que les tendances en place ont été accentuées et que la planification a produit des résultats. La décision probablement la plus cruciale de l'année, soit le renouvellement du mandat de Graham Wright au poste de directeur administratif (du 1er juillet 1999 au 30 juin 2002), est à l'image de ces deux tendances. Il ne s'agit pas d'une nouvelle décision, car nous l'avons prise bien des fois (et nous étions heureux de le refaire), mais nous sommes en voie de redéfinir, en partie du moins, le poste de directeur administratif, en soulageant Graham de la tâche de rédacteur-gérant de manière à ce qu'il puisse se consacrer davantage à la collecte de fonds et aux activités promotionnelles. Ces changements sont liés au dossier de l'avenir de la SMC et à la manière dont nous envisageons de restructurer le poste de directeur administratif, car nous nous demandons s'il n'y aurait pas lieu de doter la SMC d'un directeur à plein temps. L'avenir de la SMC sera sans doute sur toutes nos lèvres en 1999. Le document de planification stratégique approuvé en 1998 a donné lieu à la création de quatre groupes de travail, qui remettront leur rapport en 1999. Un autre genre de planification est aussi en cours, cette fois en ce qui a trait à l'an 2000, année internationale des mathématiques. En plus de participer à la célébration de cette année internationale en finançant un certain nombre de projets, la SMC participe aussi activement à la planification d'une importante réunion conjointe qui aura lieu à l'Université McMaster en juin 2000. À l'heure actuelle, les autres sociétés qui y prendront part sont : la Société canadienne de mathématiques appliquées et industrielles (SCMAI), la Société canadienne de recherche opérationnelle (SCRO), le symposium canadien sur la dynamique des fluides (SCDF), la Société canadienne d'histoire et de philosophie des mathématiques (SCHPM) et le Congrès canadien des étudiants en mathématiques (CCEM).

Des réalisations considérables ont marqué tous les secteurs d'activité importants de la SMC en 1998. Les para-

graphes qui suivent se veulent une description de plusieurs d'entre elles, parmi celles qui m'ont paru les plus marquantes ou annonciatrices de changements. Nos deux réunions semestrielles tenues en 1998 ont connu un énorme succès, de par le nombre élevé de participants et le très vaste éventail de séances. Elles sont des modèles à suivre quant au format, qui favorise une forte participation. Nous étudions en ce moment la possibilité de conclure une nouvelle entente qui devrait donner encore plus de poids à nos réunions; dans le cadre de cette entente, les instituts mathématiques participeront tour à tour à l'une de nos réunions semestrielles en organisant quelques séances. Le Comité des olympiades mathématiques a encore amélioré son impressionnant programme d'enrichissement dans les écoles secondaires. Ce programme est centré sur des concours, organisés de façon hiérarchique (le Défi, l'OMC et l'OIM). Le Défi, qui en est maintenant à sa troisième année, devient un concours national d'envergure, malgré certaines difficultés causées par des conflits de travail dans certaines commissions scolaires provinciales. La SMC continue aussi d'enrichir ses ressources à l'intention des écoles secondaires, notamment par l'entremise des livrets de la nouvelle collection ATOM. Elle a de plus commencé à mettre au point un réseau de camps de mathématiques régionaux et nationaux. Le Comité d'éducation a mis la touche finale au format de ses activités de sensibilisation via un programme de financement des initiatives de promotion des mathématiques.

La SMC continue à accroître sa présence «électronique». Le Comité des publications et le Comité des services électroniques ont collaboré à la publication en ligne du Journal, du Bulletin, du CRUX with MAYHEM et des NOTES. De façon générale, le site Web de la SMC (Camel) constitue une ouverture de plus en plus précieuse sur le monde. Un comité spécial créé en 1998 nous indiquera, nous l'espérons, comment en tirer le meilleur parti possible, comment profiter de tous les services électroniques qui s'offrent à nous et quelle serait la meilleure façon de les financer. Par ailleurs, les NOTES fournissent un éventail d'information de plus en plus vaste sur les activités mathématiques au Canada.

La structure organisationnelle de la SMC évolue toujours. Nous avons réorganisé les activités de collecte de fonds et

élaboré une nouvelle stratégie de recrutement de commanditaires du secteur privé. À ce jour, ces initiatives ont connu un grand succès. Il faudra cependant attendre un an avant de pouvoir mesurer l'impact réel de cette importante initiative. Il semble juste d'affirmer que la capacité de la SMC de commander une plus vaste gamme d'activités est liée à sa capacité d'obtenir des fonds supplémentaires, car le budget actuel ne laisse aucun jeu. Le renouvellement et l'accroissement de notre bassin de membres demeure à la fois un objectif et une source d'inquiétude. Nous espérons que la nouvelle entente de réciprocité conclue avec l'AMS, qui entrera en vigueur en 2000, nous sera profitable à cet égard.

Les activités financières de la SMC, même si elles sont peut-être moins visibles que les autres, sont toutefois d'une grande importance, et nous y apportons constamment des changements considérables. Signalons entre autres que 1998 a été notre premier exercice financier correspondant à l'année civile. Après maintes discussions, le Comité des finances a adopté une politique d'«investissement passif» relativement à nos fonds d'investissement (fonds de dotation et fond pour les olympiades mathématiques), désormais considérables et distincts. L'élaboration d'une politique d'investissement est une entreprise d'envergure, et celle-ci a mis beaucoup de temps à voir le jour.

La participation accrue des étudiants aux activités de la SMC est certes une tendance marquée des quelques dernières années. Bien qu'indépendant de la SMC, le CCEM, dont il a été question plus haut, entretient des relations de plus en plus étroites avec notre société. Au cours des deux prochaines années, le colloque du CCEM se tiendra en même temps que la réunion d'été de la SMC, et nous espérons pouvoir conserver cette formule par la suite. Un comité d'étudiants, qui servira notamment à faire le lien entre les étudiants et la SMC, est en voie de création. Du côté des étudiants de second et de troisième cycle, il semble que l'on souhaite mettre davantage l'accent sur la formation industrielle. La SMC compte organiser son premier «salon de l'emploi» à l'occasion de la réunion d'hiver de 1999, à Montréal, et nous espérons que cette activité, en collaboration avec les instituts et le Réseau MITACS, deviendra une activité permanente.

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## MOT DE REMERCIEMENT À L'OCCASION DE LA REMISE DU PRIX ADRIEN-POULIOT 1998

Bernard R. Hodgson, Université Laval

Je tiens à vous dire combien je suis profondément touché, en recevant le prix Adrien-Pouliot, de l'estime que me témoignent mes pairs de la Société mathématique du Canada. C'est en effet un très grand honneur pour moi de voir mes activités en éducation mathématique être ainsi soulignées par mes collègues mathématiciens.

Je tiens d'abord à exprimer ma reconnaissance à tous ceux qui, au fil des ans, m'ont accompagné dans ma démarche en tant que mathématicien accomplissant une partie importante de ses activités professionnelles du côté de l'éducation mathématique. Je pense ici en particulier aux collègues que j'ai côtoyés au sein du Comité d'éducation de la Société mathéma-



tique du Canada ainsi que dans le Groupe canadien d'étude en didactique des mathématiques. (Permettez-moi de souligner au passage combien nous sommes choyés au Canada d'avoir un organisme tel le GCEDM/CMESG fournissant un lieu d'échanges directs entre mathématiciens et didacticiens des mathématiques.) Il me serait difficile d'énumérer les noms de tous ceux qui ont influencé mon cheminement ; je retiendrai seulement ici ceux d'Ed Barbeau, qui ne cesse de nous étonner par son exceptionnelle productivité en éducation mathématique, et d'Éric Muller, dont l'enthousiasme, la clairvoyance et l'amitié m'ont été si précieux au cours des années.

Part of the honor of receiving this award is linked to the truly exceptional person after whom it is named. I do not wish to comment here on Adrien Pouliot as a public man (as you might know, one of the founders of CMS, its second president, governor of Radio-Canada, cultural ambassador, even polemist) or on the fascinating legend that surrounds him (for instance, forgetting his wife on a visit to Montréal). These aspects have already been presented in the CMS Notes (see the March 1996 issue), when the Adrien-Pouliot Award was created, and are amply documented in his biography written by Danielle Ouellette and published in 1986. But I would like to say a few words about personal contacts I had with him.

Among the Pouliot awardees up to now, I satisfy what most probably turns out to be a uniqueness condition: I had the good fortune of having him as a teacher in my student days. And should it be necessary, I even satisfy a stronger uniqueness condition: the desk in my office at Université Laval is the very one Pouliot used for many years.

Adrien Pouliot was 73 when he taught me. It was the introductory analysis course, given to a group of 125 math students at Laval. Quite a shock for beginning math students: the course started with a review of logic through selected chapters of Russell & Whitehead's *Principia Mathematica*, followed by set theory and the construction of number sys-

tems à la Landau. And then came differential and integral calculus of real functions, all this ending with a glimpse of topology.

The course was heavily packed with a lot of content and we had to buy at the beginning of the year a huge set of hand-written notes produced on alcohol stencils – there were no photocopiers in those days – most of these written by Pouliot himself. But for almost each lecture Pouliot would come to the classroom with tens of new sheets we had to insert into the pack – new material with pages numbered bis, ter, quatre, etc. – or improved replacement pages. It was often quite clear that many of these pages had been completed and duplicated hastily just before the beginning of the lecture, as Pouliot's clothing was all stained with the blue ink of the stencils. This was the case, I recall well, one day when he brought us many pages developing the equations for the motion of a satellite around the earth – a new Gemini capsule had been launched just the day before.

One might wonder, is Pouliot the best teacher I had? I will avoid answering in these terms, considering the fact that some of the teachers I had at Laval had truly outstanding pedagogical skills. But quite clearly in my mind Pouliot is the most enthusiastic teacher I ever had – and here I hasten to add, as a matter of comparison on the "enthusiasm scale", that I also had Walter Hengartner as a teacher, a rather remarkable case of an enthusiastic and dedicated teacher, if there ever was one. Pouliot's enthusiasm was contagious; it could clearly be detected in his sparkling eyes, in the tone and flow of his voice, in his running from one end of the blackboard to the other, as in a *perpetuum mobile*, disseminating hordes of red epsilons and blue deltas – or maybe it was blue epsilons and red deltas, I am not sure. Most evidently, he was younger at heart than many of the students facing him in the classroom.

Adrien Pouliot is definitely a teacher one cannot forget. Merci, Monsieur Pouliot!

## EDUCATION NOTES

Ed Barbeau, University of Toronto

### Informing the public about education

Our ability to effect curricular change depends on what happens, not only in the classroom, but in the public arena as well. The extent to which people realize that understanding and judgment as well as skills are among our goals will govern their tolerance for a more open-ended and liberal classroom regime.

The British Columbia Association of Mathematics Teachers has produced a foldover pamphlet on numeracy to "provide our association's position on the issues of numeracy, which is as important as literacy. The heart of numeracy is the

mathematics needed to function in everyday life, in the home, workplace and community". Aspects of numeracy, pedagogical goals of BC teachers and examples of innumeracy are discussed. The Association calls for listing of specific numeracy standards for high school graduation, outlining minimum goals for grades 4, 7 and 10, using multiple forms of assessment and inculcating a foundation of understanding. These pamphlets are obtainable from BCTF, 100 - 550 West 6th Avenue, Vancouver, BC V5Z 4P2.

For many years, the Toronto Board of Education has pursued a program of "Family Math", in which teachers work with parents to give them a direct experience of the math-

ematics their children are learning. Supporting this is a mathematical calendar with games of strategy, puzzles and exercises along with suggested mathematics-related readings from the children's literature. An appendix gives advice for parents and quite an extensive bibliography. Information about distribution and costs can be had from the Bookstore, Toronto District School Board, fax 416-393-9952, email brand8@interlog.com.

### Impact Math

The Middle School period is a critical one for making sure that teachers of mathematics are adequately supported. I share an undergraduate course for prospective elementary teachers with Brendan Kelly, and so have seen some of the nice units that he has prepared for use at this level. Brendan got a doctorate in number theory under John Chalk about thirty years ago, but decided to go into secondary teaching. After a period as mathematics coordinator for Halton County, he obtained his doctorate in education from the Ontario Institute

for Studies in Education, where he is currently a professor. He operates his own publishing company with the goal of providing mathematically sound and practical material for the classroom.

Most recently, under contract with the Ontario Ministry of Education, he is producing a soft-covered series of  $8\frac{1}{2}'' \times 11''$  volumes to help teachers of grades 7 and 8 implement the new Ontario curriculum. Written by Brendan with the collaboration of a team of OISE colleagues, the modules were field tested during the past year. The four volumes available, *Data Management & Probability, Measurement, Geometry & Spatial Sense, Patterning & Algebra*, follow closely the Ontario "expectations". A typical module begins with a discussion to establish the context, followed by lesson suggestions, pages that can be photocopied for class, answers to exercises and evaluated samples of students' work. The series is published by the Ontario Ministry of Education and Technology, Queen's Park, Mowat Block, Toronto, ON M7A 1L2.

## AWARDS / PRIX

### 1998 Canada Wide Science Fair - CMS Awards

The CMS sponsored a set of four Special Awards at the 1998 Canada Wide Science Fair. Below are the project descriptions of the four prize-winning entries. The 1999 CWSF will be held in Edmonton, Alberta May 15-22.



Back row: Sylvain Hallé, Graham Nishikawa, Isaac Holloway; Front row: Jeremiah McCarthy, Katherine Heinrich (YSF Board), Keith Vanderlinde.

*Le savoir, et ses "dérivées"*  
**1st place – Sylvain Hallé (Québec)**

Par un raisonnement analogique, j'ai découvert dans mon travail une application inusitée du *calcul différentiel* dans

le contexte de l'intelligence artificielle. J'ai donc réalisé une application informatique, NEWTON, appliquant mes découvertes dans le domaine de la correction d'erreurs dans les bases de données. Ce programme pourrait s'avérer un important outil pour tout chercheur scientifique.

*Exploring Computer Cryptography*  
**2nd place (Group) – Isaac Holloway and Graham Nishikawa (Yukon)**

Our project is a study and demonstration of the major types of data encryption schemes that are in use today. We studied the history of cryptography and its importance in the modern world. We wrote several different demonstration programs that showed the basic concepts, strengths and weaknesses of each encoding system that we studied.

*Computer Aided Optical Design*  
**2nd place – Keith Vanderlinde (New Brunswick)**

I have written a Windows 95/NT 4.0 program which can be used both as a teaching tool and for designing optical systems. It traces the paths of several rays of light as they traverse a user configurable optical system made up of lenses, mirrors and prisms.

*Playing God with 3D Immersion***2nd place – Jeremiah McCarthy (Newfoundland)**

The 3D Immersion program is a very powerful tool that can simulate anything that the mind can imagine. For ex-

ample, in one world a rendering of space with a planetary body with a mass of 4,000,000,000 kg is shown with satellites with masses of 400 kg following an elliptical orbit around the planet according to Kepler's law.

**RESEARCH NOTES**

Noriko Yui and James Lewis

**Two Interdisciplinary Mathematicians  
Win NSERC Awards**

Norman C. Beaulieu, P. Eng, and Troy Day, both from Queen's University, have won NSERC Prizes in Research this year. Norman C. Beaulieu has received a prestigious E.W.R. Steacie Memorial Fellowship. Troy Day has received a Doctoral Prize in Natural Sciences.



*Norman Beaulieu*



*Troy Day*

Norman C. Beaulieu, professor in the Department of Electrical and Computer Engineering who is cross-appointed in the Department of Mathematics and Statistics, is a world authority on wireless communication theory.

Born in New Westminster, British Columbia, Beaulieu earned Bachelor and Master degrees in Applied Sciences, as well as a Ph.D. from University of British Columbia. He came to Queen's in 1986 as a Queen's National Scholar and was appointed assistant professor. In 1988 he was appointed associate professor before becoming a full professor in 1993.

In 1995 he was cross-appointed to the Department of Mathematics and Statistics. Beaulieu says "I appreciate the overlap that exists at Queen's between the Engineering and Mathematics departments. What is nice about Queen's is cross-appointment, a valuable thing to me. I had the opportunity to participate in the two departments". The Department of Mathematics and Statistics has a strong group of researchers in Communication Theory. The research group includes Fady Alajaji, Norm Beaulieu, Lorne Campbell, Jon Davis, Tamás Linder and Glen Takahara.

Outside Queen's, Beaulieu was a project leader in the Telecommunications Research Institute of Ontario (TRIO) for four years and is currently a project leader in Communications

and Information Technology Ontario (CITO).

Beaulieu's research work is both timely and potentially pivotal in a field where he is an acknowledged leader. Beaulieu says that most of his work has dealt with how well cellular telephone systems work. He said "The field is currently experiencing dramatic growth. By 2000, more than half of all telecommunications traffic in North American is predicted to be wireless, creating an immense demand for the development of new technology to accommodate increasing numbers of users. More and more people want the services. The issue is there is only a finite number of radio channels. There has to be new technology or you would not be able to provide the services".

Troy Day completed his Ph.D. thesis "Dynamic evolutionary games between relatives" at Queen's under the supervision of Peter Taylor, professor in the Department of Mathematics and Statistics.

Troy Day earned his B.Sc. and M.Sc. in Biology from the University of British Columbia in 1990 and 1994, respectively. In 1994 he switched to mathematics, and obtained his Ph.D from Queen's in 1998 under Peter Taylor. In the spring of 1998, Day received both an NSERC Postdoctoral Fellowship and a Killam Postdoctoral Fellowship. Currently Day is a Killam Postdoctoral Fellow at the Department of Zoology, University of British Columbia, and will be an Assistant Professor at the Department of Zoology at the University of Toronto from May 1999.

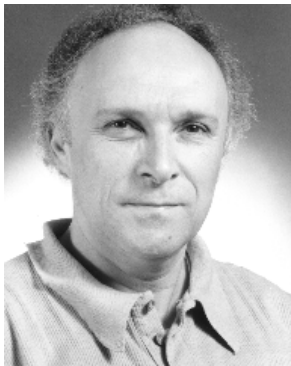
Troy Day's research is interdisciplinary. He has a thorough grasp of both mathematics and biology and a remarkable ability to bring them together. Peter Taylor commented on his former student: "Troy started life as a biologist, and so he naturally speaks that language. He arrived here at Queen's with little formal mathematical training, and attained a rapid mastery of graduate mathematics. So as a teacher and a researcher he was completely at home in both worlds. That is rare, and it was a real privilege to have such a student. I would talk to him about any of my problems, mathematics, biology, education. A remarkable aspect of Troy's Ph.D work is that it is just about entirely his own, not only the elaboration and construction for the theorems, but even the formulation of the important questions and their organization into a new piece of theory". Peter Taylor further commented on Troy's mathematical abilities:

"Over the past two decades, theoretical biologists have realized that they have to master the basic ideas of stability to understand the persistence of behavioral as well as ecological configurations. But many of these biologists have difficulty getting their minds around dynamic optimization, the case in which the object whose stability we want to examine is itself a trajectory. This is a whole order of sophistication higher, and at this point they leave things to the mathematician. Troy has a genuine mastery of these ideas."

Congratulations to both!

### Two Mathematicians Win Killam Fellowships from the Canada Council

Pierre Milman of the University of Toronto has been awarded a Killam Fellowship in 1999 for his research project *Geometric Resolution of Singularities*. Last year, Ram Murty of Queen's University won a Killam Fellowship for his research project *Applications of Sieve Methods* and the award has been renewed for the second year.



*Pierre Milman*

Milman, professor in the Department of Mathematics, University of Toronto, is a world authority on singularity theory. His algorithm (in collaboration with Bierstone) for canonical resolution of singularities is a remarkable recent achievement.

Born in Russia in 1947, Milman earned his Bachelor's degree from University of Moscow in 1967, and his Ph.D. from University of Tel-Aviv in 1975. He came to Canada in 1975, and since then he has been affiliated with the Department of Mathematics, University of Toronto. He was an NSERC University Research Fellow from 1980 to 1985, and in 1987, he was promoted to a full professor at that institution. He was elected to the Royal Society of Canada in 1997. In recent years, he was invited to lecture at several institutions in Israel, Spain, Brazil, Australia, France and USA.

Milman's research endeavors center around desingularization and its applications. Geometry studies shapes and forms while singularities express their irregularities in many branches of mathematics and its applications. The important

features of geometric structures are often concentrated at singularities (even on smooth manifolds singularities appear as a result of compactification). Under the Killam Fellowship, he proposes to find a closer link between the information encoded in the geometry and analysis in the vicinity of singularities and desingularization. The existence of desingularization was established by H. Hironaka in his famous paper of 1964, but Hironaka's proof is not constructive and even the status of certain aspects of the theorem, e.g. 'canonicity' has been unclear.

Milman has developed a relatively elementary construction of a canonical resolution of singularities, which helps to reveal the hidden features of a singular object and, at the same time, opens a previously inaccessible subject to a large group of researchers and students in the mathematical sciences. His recent result in subanalytic geometry and singularities solves the Hironaka semicoherence and Thom-Glaser composition conjectures. It isolates a class of subanalytic sets on which one can do classical local analysis: it asserts the equivalence of natural differential, algebro-geometric and metric properties of closed subanalytic sets to a formal semi-coherence property. In analysis he extends the classical Sobolev-Nirenberg type inequalities to subanalytic domains, where a new parameter,  $s \geq 1$ , reflects the singularities at the boundary. The classical case ( $s = 1$ ) fails for domains with outward pointing cusps. Milman derives explicit upper bounds on  $s$  in terms of desingularization of the domain in question. In geometry he applies desingularization to obtain a natural and explicit construction of Kähler metrics on singular spaces. The complete Saper type Kähler metric constructed by Milman is naturally associated to the incomplete metric that induces desingularization. Milman describes his longer range research goal to be a *geometric desingularization*, that is, a reconstruction of the entire desingularization process in terms of geometry and/or analysis.



*Ram Murty*

M. Ram P. Murty, professor in the Department of Mathematics and Statistics of Queen's University, is a world

renowned number theorist, especially, on analytic number theory.

Born in India in 1953, he earned his Bachelor's degree from Carleton University in 1976 and Ph.D from Massachusetts Institute of Technology in 1980. He spent nearly 16 years at the Department of Mathematics at McGill University until 1996, holding an NSERC University Research Fellow from 1982 to 1992. In 1996, Murty moved to Queen's University as a Queen's National Scholar and professor of mathematics. Murty was chosen a Coxeter–James Prize lecturer of the CMS in 1988; he was elected to a Fellow of the Royal Society in 1990 and was awarded a Steacie Fellowship in 1991. The other numerous awards include J.H.H. Nesbitt Lecturer in 1992 and Ferran Sunyer i Balaguer Prize (jointly with V. Kumar Murty) in 1996.

The research problems that Murty proposes to investigate under his Killam Fellowship have the singular theme: the application of sieve methods.

One of the outstanding questions in number theory today is the ABC conjecture, which states that given any three coprime integers  $A, B, C$  such that  $A + B = C$ , the largest of the three is essentially less than the product of the prime divisors dividing  $ABC$ . For example, consider  $A = 2, B = 25$ , and  $C = 27$  so that  $2 + 5^2 = 3^3$ . Observe that  $3^3 = \max(2, 5^2, 3^3) \leq 2 \cdot 3 \cdot 5 = 30$ . The precise conjecture is that, for any  $\epsilon > 0$ , there is a constant  $\kappa(\epsilon)$  such that  $\max(|A|, |B|, |C|) \leq \kappa(\epsilon) \left( \prod_{p|ABC} p \right)^{1+\epsilon}$  whenever  $A + B = C$ . In a recent paper, Murty has shown that the ABC conjecture is equivalent to obtaining estimates of degrees of minimal modular parametrizations of elliptic curves. (The existence of these modular parametrizations is at the center of the recent work of Wiles and his school that led to the proof of Fermat's Last Theorem.) The first phase of Murty's project centers around the ABC conjecture. A famous conjecture of Cohen and Lenstra predicts that there is a positive proportion of imaginary quadratic fields with class number divisible by a given natural number  $g$ . Using the ABC conjecture, Murty recently showed that the number of such fields whose discriminant is less than  $X$  and whose class number is

divisible by  $g$  is at least  $X^{1/g}$ . He proposes to prove in fact a stronger result, namely  $X^{1/2}$  *without the ABC conjecture*. The new technique can be described as a sieve technique applied to polynomials of two variables. Closely related are the function field analogue of the Cohen-Lenstra conjecture and the Lang-Trotter conjecture. Murty recently observed that the function field analogue of the Lang-Trotter conjecture on primitive points is a 'mod  $p$ ' version of the classical conjecture of Gauss predicting the infinitude of real quadratic fields with class number one.

An old conjecture of Artin asserts that 2 (or more generally any integer which is  $\neq \pm 1$  or a perfect square) is a primitive root mod  $p$  for infinitely many primes  $p$ . This is still unresolved. As culmination of work initiated by Murty (jointly with Rajiv Gupta), it is now known that at least one of 2, 3 or 5 is a primitive root mod  $p$  for infinitely many primes  $p$ . Improving this result or even proving Artin's conjecture will have important consequences in number theory, computational complexity and coding theory. In this context, there is a genus of related questions which is accessible to sieve methods and which can be tackled. These questions are analogues of Artin's conjecture formulated by Serre, Lang and Trotter for elliptic curves. Much progress has been made towards these conjectures by Murty and Rajiv Gupta. These problems form the second phase of Murty's project.

The third phase (which would be completed during the second year of the fellowship) is the writing of the book *Applications of Sieve Methods*. Results obtained during the first year of the project will form a part of this book. At present, there is no book that describes how one may apply sieve theory to questions such as the ones described above and others arising from arithmetical algebraic geometry. Such a book is urgently needed by both researchers and graduate students in the field. Indeed, the first draft of the book will soon be available at his web page: [www.mast.queensu.ca/~murty](http://www.mast.queensu.ca/~murty). The book *Problems in Algebraic Number Theory*, by R. Murty and J. Esmonde, was published earlier this year by Springer-Verlag (GTM160) and is ideal for self-instruction.

Congratulations to both!

## From the Canadian Operational Research Society (CORS)

Richard J. Caron, CORS President, 1998-99

Earlier this year Richard Kane, CMS President, contacted me to initiate a discussion on ways in which the Canadian Operational Research Society (CORS) and the Canadian Mathematical Society (CMS) can jointly celebrate 2000 as the World Year of Mathematics. As a result, CORS and CMS have agreed to sponsor sessions in each other's conferences, have linked to each other's web sites (ours is [www.cors.ca](http://www.cors.ca)), and will contribute to each other's newsletters. As this is the

first contribution from CORS, I will use it to introduce you to the Society. Future contributions will highlight Canadian OR activities.

The Canadian Operational Research Society was born on April 14, 1958 from a union between the Operations Research (OR) Society of Toronto and very active OR research groups in Montreal and at the Defense Research Board in Ottawa. Dr. Omond Solandt was elected the first President. This union

was, in large part, due to the creation, in 1957, of the International Federation of Operational Research Societies (IFORS). Sir Charles Goodeve, the first IFORS Secretary and a Canadian prominent in war time OR in Britain, was concerned that Canada had no national society that could join IFORS, and it was he that encouraged Dr. Solandt to form CORS. Currently, CORS has about 500 members and 14 local sections across the country. Our peer-reviewed journal, *INFOR*, and our newsletter, the *Bulletin*, appear quarterly, and we hold an annual national Conference. The 1999 conference is in Windsor, ON from June 7-9 ([www.cors.ca/windsor](http://www.cors.ca/windsor)); and our Year 2000 conference will be in Edmonton, AB from May 29-31 (<http://www.bus.ualberta.ca/eerkut/cors2000/default.htm>).

What is Operational Research? I like to think of OR as the mathematics of decision making; but it is much more! OR provides systematic and general approaches to problem solving and decision-making, regardless of the nature of the system, product, or service. The approaches and tools used in OR are solidly based on one or more of the mathematical

methods such as optimization, statistics, applied probability, simulation, logical reasoning, etc. OR originated in Great Britain during World War II to bring mathematical or quantitative approaches to bear on military operations. Since then OR has evolved to be applicable to the management of all aspects of a system, product, or service, and hence is often referred to as Systems Science, Management Science, or Industrial Engineering. It has now become recognized as an important input to decision-making in a wide variety of applications in business, industry, and government. In Canada, OR applications can be found in manufacturing, distribution and retail companies in the mining, energy, transportation and construction industries, in services such as banking, and in many departments of government.

What should be taken from this article is the dependence of OR on mathematics; and the richness of OR applications as a source of interesting mathematical problems. Because of this, I am sure that a collaboration between our Societies will be mutually beneficial.

## CAMEL BYTES

Loki Jørgenson, Simon Fraser University

Camel is on the move, making new inroads into digital publishing!! Building on the success of its on-line publications, CJM, CMB, Notes of the CMS, and CRUX with MAYHEM, work is underway to offer enhanced access for readers and subscribers. In addition the “cool math site of the week” site is up for an overhaul.



As you know, the Internet offers more possibilities than just the on-line distribution of hardcopy journals. Taking more advantage of the medium, a new interactive meeting place called “Digital After\*Math” has been launched:

<http://camel.math.ca/CMS/Aftermath/>

The goal of this site is to support the interaction of readers of Crux Mathematicorum with Mathematical Mayhem. Initially, Digital After\*Math includes two main features: a bulletin board and an e-mail list.

The bulletin board works a little like a private newsgroup where subscribers can post problems, tips, solutions, etc. The area is divided into different forums that span a range of interests. It is also possible to use standard HTML in messages, which facilitates the direct exchange of images and hyperlinks. The e-mail list offers direct e-mail access to all the CRUX with MAYHEM members for sharing relevant information.


As the site matures, you can expect to see more innovative services added to it. Camel is dedicated to making the latest Web technology available to the mathematical community. Readers are strongly encouraged to make suggestions for Digital After\*Math.

On another front, a complete overhaul of the very popular Knot a Braid of Links “cool math site of the week” page (<http://camel.math.ca/Recreation/kabol>) is under way. Over the last two years, a large number of links have been collected, and it is time to reorganize them in a more useful way. A fresh design and a search engine makes KaBoL more practical and certainly more “cool”. And please continue to send your suggestions for great math web sites to

[linkmaster@camel.math.ca](mailto:linkmaster@camel.math.ca).

## AMERICAN MATHEMATICAL SOCIETY

### Conference Proceedings, Canadian Mathematical Society



This series is published for the Canadian Mathematical Society by the AMS. It consists of the proceedings of internationally attended conferences on pure and applied mathematics sponsored by the CMS. CMS members may order at the AMS member prices. (ISSN 0731-1036) Softcover.

#### Geometric Control and Non-holonomic Mechanics

**V. Jurdjevic and R. W. Sharpe**, *University of Toronto, ON, Canada*, Editors

Control theory, a synthesis of geometric theory of differential equations enriched with variational principles and the associated symplectic geometry, emerges as a new mathematical subject of interest to engineers, mathematicians, and physicists. This collection focuses on several distinctive research directions having origins in mechanics and differential geometry, but driven by modern control theory.

The first of these directions deals with the singularities of small balls for problems of sub-Riemannian geometry and provides a generic classification of singularities for two-dimensional distributions of contact type in a three-dimensional ambient space.

The second direction deals with invariant optimal problems on Lie groups exemplified through the problem of Dubins extended to symmetric spaces, the elastic problem of Kirchhoff and its relation to the heavy top. The results described in the book are explicit and demonstrate convincingly the power of geometric formalism.

The remaining directions deal with the geometric nature of feedback analyzed through the language of fiber bundles, and the connections of geometric control to non-holonomic problems in mechanics, as exemplified through the motions of a sphere on surfaces of revolution.

This book provides quick access to new research directions and also demonstrates the effectiveness of new insights and methods that control theory brings to mechanics and geometry.

**Conference Proceedings, Canadian Mathematical Society.**  
Volume 25, 1998, 239 pages, Softcover, ISBN 0-8218-0793-1, List \$49; Individual member \$29; Order code CMSAMS/25CM599

#### Algebras and Modules I

**Idun Reiten, Sverre O. Smalø, and Øyvind Solberg**, *Norwegian University of Science and Technology, Trondheim*, Editors

This volume contains recent results on geometric aspects of representations of algebras, a thorough treatment of the theory of quantified algebras, new developments on infinite dimensional representations of finite dimensional algebras, a bridge between representation of algebraic groups and representation theory of finite dimensional algebras, and recent discoveries on modular representation theory. In addition, the volume contains two papers devoted to some of Maurice Auslander's many contributions both in the representation theory of finite dimensional algebras and in commutative ring theory.

A general background in noncommutative algebra including rings, modules and homological algebra is required. Given that parts of this volume would be suitable as a textbook for an advanced graduate course in algebra.

Volume 23, 1998, 199 pages, Softcover, ISBN 0-8218-0650-6, List \$29; Individual member \$23; Order code CMSAMS/23CM599

#### Algebras and Modules II

**Idun Reiten, Sverre O. Smalø, and Øyvind Solberg**, *Norwegian University of Science and Technology, Trondheim*, Editors

This volume contains 43 research papers based on results presented at the Eighth International Conference on Representations of Algebras (ICRA VIII) held in Geiranger, Norway. The papers, written by experts in the field, cover the most recent developments in the representation theory of artin algebras and related topics.

**Features:**

- a unique source for the developments in the representation theory of finite dimensional and artin algebras and related topics
- a wide variety of important papers by leading researchers in the field, with references to earlier developments in the field

Volume 24, 1998, 569 pages, Softcover, ISBN 0-8218-0756-6, List \$99; Individual member \$59; Order code CMSAMS/24CM599

#### Trends in Ring Theory

**Vlastimil Dlab**, *Carleton University, Ottawa, ON*, and **László Márki**, *Hungarian Academy of Sciences, Budapest*, Editors

The Ring Theory Conference (University of Miskolc, Hungary) successfully accomplished its two goals: 1) to reflect contemporary trends in the subject area and 2) to offer a meeting place for a large number of Eastern European algebraists and their colleagues from around the world. Particular emphasis was placed on recent developments in the following four areas: representation theory, group algebras, PI algebras, and general ring theory. This book presents 13 of the invited lectures.

Volume 22, 1998, 239 pages, Softcover, ISBN 0-8218-0649-4, List \$49; Individual member \$29; Order code CMSAMS/22CM599


#### Harmonic Analysis and Number Theory Papers in Honour of Carl S. Herz

**S. W. Drury**, *McGill University, Montreal, PQ*, and **M. Ram Murty**, *Queen's University, Kingston, ON*, Editors

This volume presents the proceedings of a conference held at McGill University (Montreal). The papers are dedicated to the memory of Carl Herz, who had deep interests in both harmonic analysis and number theory. These two disciplines have a symbiotic relationship that is reflected in the papers in this book.

Volume 21, 1997, 227 pages, Softcover, ISBN 0-8218-0794-0, List \$49; Individual member \$29; Order code CMSAMS/21CM599

All prices subject to change. Charges for delivery are \$3.00 per order. For optional air delivery outside of the continental U. S., please include \$6.30 per item. Payment required. Order from: American Mathematical Society, P. O. Box 9904, Boston, MA 02208-9904, USA. For credit card orders, fax 1-801-455-4046 or call toll free 1-800-321-4AMS (4267) in the U. S. and Canada, 1-801-455-4000 worldwide. Or place your order through the AMS bookstore at [www.ams.org/bookstore/](http://www.ams.org/bookstore/). Residents of Canada, please include 7% GST.



**AMS**  
AMERICAN MATHEMATICAL SOCIETY

## NOTICE

The CMS Executive Office will be closed for two weeks this summer from **August 2nd to the 13th inclusive**.

## AVIS

Le Bureau d'administration de la SMC sera fermé pour deux semaines cette été du **2 au 13 août**.

**Summer Meeting**  
**Memorial University of Newfoundland**  
**St. John's, Newfoundland**  
**May 29-June 1, 1999**

**Fourth Announcement**

Please refer to the Second Announcement in the February issue of the *CMS Notes* for more complete information on the scientific, education and social programmes. This announcement features a preliminary timetable and any changes to the programmes previously announced. The most up-to-date information concerning the programme, including scheduling, is available at the following world wide web address:

<http://www.camel.math.ca/CMS/Events/>

Meeting registration forms and abstract forms for contributed papers may be found in the February issue of the *CMS Notes*.

### Programme Updates

**Graduate Student Session:** In this session, graduate students will have an opportunity to present contributed papers on their research. Abstracts should be prepared as specified in the February issue of the *CMS Notes*. A limited fund will be available to pay part of the costs of travel for student speakers (last year this was about \$3,500 at a payment of approximately \$500 per speaker). Please contact the Meeting Directors for details on funding.

**Combinatorics and its applications:** Lynn Batten (Manitoba) and Vaclav Linek (Winnipeg) will also speak.

**Nonlinear analysis and its applications:** Raffaele Chiapinelli (Siena), Hanuman P. Dikshit (M.P. Bhoj), Jinlu Li, (Shawnee State U.) and Aslam Noor (Dalhousie) will also speak.

**Surveys in Mathematics:** confirmed speakers to date include: Jacques Hurtubise (McGill), Niky Kamran (McGill), James Lewis (Alberta), Neal Madras (York), Heydar Radjavi (Dalhousie), Damien Roy (Ottawa), Dana Schlomiuk

(Montreal), Nicole Tomcjak-Jaegerman (Alberta), Ravi Vakil (MIT).

### Acknowledgements

The CMS and the Meeting Committee wish to extend their thanks to the Centre de recherches mathématiques, the Fields Institute, the Faculty of Science of Memorial University of Newfoundland along with its Vice-President (Academic) and Vice-President (Research), and the members of the Department of Mathematics and Statistics, for their financial support of the scientific sessions at this meeting.

The CMS wishes to acknowledge the contribution of the Meeting Committee in presenting these scientific, educational, and social programs.

### Meeting Committee

*Meeting Director:* Hermann Brunner (MUN), *Local Organizing Committee:* Richard Charron (MUN), *Ring Theory:* Eric Jespers (Brussels) and Edgar Goodaire (MUN), *Harmonic Analysis:* Kathryn Hare (Waterloo), *Representation Theory:* Abraham Broer (McGill), *Combinatorics:* Nabil Shalaby (MUN) and Douglas Stinson (Waterloo), *Nonlinear Analysis:* Sankatha Singh (MUN) and Bruce Watson (MUN), *Surveys in Mathematics:* Kumar Murty (Toronto) and Niky Kamran (McGill), *Education:* Bruce Shawyer (MUN) and Ed Williams (MUN), Monique Bouchard (CMS), Graham Wright (CMS), Rosalind English (MUN), Wanda Heath (MUN).

### Items also published with this announcement

List of speakers  
 Timetable - schedule

### In the next issue of the *CMS Notes*

Fifth Announcement  
 Updated Timetable - block schedule

**Réunion d'été**  
**Université Memorial de Terre-Neuve**  
**St. John's, Terre-Neuve**  
**du 29 mai au 1<sup>er</sup> juin, 1999**  
**Quatrième annonce**

Veuillez consulter la deuxième annonce dans le numéro de février des *Notes de la SMC* pour obtenir de l'informa-

tion détaillée sur les programmes scientifique et pédagogique, et les activités sociales. La présente annonce contient l'horaire et tous les changements aux programmes annoncés précédemment. Vous trouverez l'information la plus récente sur les programmes, y compris les horaires, à l'adresse Web suivante:

<http://www.camel.math.ca/CMS/Events/>

Un formulaire d'inscription et un formulaire de résumé pour



communications libres étaient inclus dans le numéro de février des *Notes de la SMC*.

## Changements au programme

**Séance pour étudiants diplômés :** au cours de cette séance, les étudiants diplômés sont invités à présenter des communications libres sur leurs recherches. Les résumés doivent être préparés selon les instructions publiées dans le numéro de février des *Notes*. Un crédit limité sera disponible pour contribuer aux frais de déplacement des conférenciers étudiants (l'année dernière, ce crédit s'élevait à 3 500 \$, à raison de 500 \$ environ par conférencier). Pour de plus amples informations, veuillez communiquer avec le directeur de la Réunion.

**Combinatoire et applications:** Lynn Batten (Manitoba) and Vaclav Linek (Winnipeg) prendront également la parole.

**Analyse non linéaire et applications:** Raffaele Chiappinelli (Siena), Hanuman P. Dikshit (M.P. Bhoj), Jinlu Li (Shawnee State U.) et Aslam Noor (Dalhousie) prendront également la parole.

**Études en mathématiques:** les conférenciers qui ont confirmé leur participation à date sont: Jacques Hurtubise (McGill), Niky Kamran (McGill), James Lewis (Alberta), Neal Madras (York), Heydar Radjavi (Dalhousie), Damien Roy (Ottawa), Dana Schlomiuk (Montreal), Nicole Tomcjak-Jaegerman (Alberta), Ravi Vakil (MIT).

## Remerciements

Le comité organisationnel et la SMC tient à remercier le Centre de recherches mathématiques de l'Université de Montréal, l'Institut Fields, la Faculté des Sciences de l'Université Memorial ainsi que son Vice-Président (Académique) et

son Vice-Président (Recherches) pour leurs contributions financières aux séances scientifiques de la Réunion. Nous remercions également le département de mathématiques et statistique pour son support dans l'organisation de la Réunion.

La SMC tient à remercier le comité des Réunions qui a contribué à l'organisation des activités scientifiques et éducatives, ainsi que les activités sociales.

## Comité des Réunions

*Directeur de la réunion :* Hermann Brunner (MUN), *Président du comité local :* Richard Charron (MUN), *Théorie des anneaux :* Eric Jaspers (Bruxelles) et Edgar Goodaire (MUN), *Analyse harmonique :* Kathryn Hare (Waterloo), *Théorie des représentations:* Abraham Broer (McGill), *Combinatoire:* Nabil Shalaby (MUN) et Douglas Stinson (Waterloo), *Analyse non linéaire:* Sankatha Singh (MUN) et Bruce Watson (MUN), *Éducation:* Bruce Shawyer (MUN) et Ed Williams (MUN), *Études en mathématiques:* Kumar Murty (Toronto) et Niky Kamran (McGill), Monique Bouchard (SMC), Graham Wright (SMC), Rosalind English (MUN), Wanda Heath (MUN).

## Documents publiés avec cette annonce

Liste des conférenciers  
Horaire et programme

## Dans le prochain numéro des *Notes de la SMC* :

Cinquième annonce du congrès  
Horaire et programme à jour

### Important Dates!

The following are some important dates for the CMS Summer 1999 Meeting. Full details can be found in the February *Notes*.

**Reduced fee registration May 15**  
**Hotel Reservations May 1**

### Dates d'importance!

Les suivantes sont les dates d'importance pour la Réunion d'été 1999. Pour plus de détails voyez les le numéro de février des *Notes*.

**Inscription avec tarifs réduits 15 mai**  
**Réservations d'hôtel 1 mai**

**CMS SUMMER MEETING 1999 RÉUNION D'ÉTÉ DE LA SMC**  
**SCHEDULE - HORAIRE**  
**MEMORIAL UNIVERSITY OF NEWFOUNDLAND - UNIVERSITÉ MEMORIAL DE TERRE-NEUVE**  
**ST. JOHN'S, NEWFOUNDLAND**

Time Heure	Thursday / jeudi May 27 mai	Friday / vendredi May 28 mai	Saturday / samedi May 29 mai	Sunday / dimanche May 30 mai	Monday / lundi May 31 mai	Tuesday / mardi June 1 juin
8:00			Registration open from 8:00 a.m. to 5:00 p.m. Bureau d'inscription ouvert de 8:00 à 17:00 Coffee will be available in the Exhibit area / Le café sera servi dans l'aire d'exposition			
8:30			8:00 to 17:00 Exhibits - Expositions	8:00 to 17:00 Exhibits - Expositions	8:00 to 17:00 Exhibits / Expositions	
9:00			8:30 - 9:00 Opening Remarks Mots de bienvenue			
9:00			9:00 - 10:00 ED BARBEAU	9:00 - 10:00 TOM KORNER	9:00 - 10:00 LUC VINET	9:00 - 10:00 MICHAEL van den BERGH
10:00	9:00 - 16:00 Executive Committee Meeting Réunion du Comité exécutif		10:00 - 10:15 COFFEE BREAK/PAUSE CAFÉ			
10:15	Columbus Suite Hotel Newfoundland		10:15 - 11:45 SESSIONS 1,2,3,4,5,7	10:15 - 12:15 SESSIONS 1,2,3,4,5,6	10:15 - 12:15 SESSIONS 1,2,4,5,6	10:15 - 12:15 SESSIONS 1,2,5
11:00		11:00 - 13:00 CMS Development Group Groupe de développement				
12:00		Columbus Suite Hotel Newfoundland	12:00 - 14:00 DELEGATES LUNCHEON	12:15 - 14:00 LUNCH / DÉJEUNER	12:15 - 14:00 LUNCH / DÉJEUNER	12:15 - 14:00 LUNCH / DÉJEUNER
12:15			LUNCH DES PARTICIPANTS			
13:00						
13:30		13:30 - 18:30 Board of Directors Meeting Réunion du Conseil d'administration				
14:00		Salon Battery Hotel Newfoundland	14:00 - 15:00 JEFFERY-WILLIAMS LECTURE JOHN FRIEDLANDER	14:00 - 15:00 DOUGLAS STINSON	14:00 - 15:00 KRIEGER NELSON LECTURE NICOLE TOMCZAK- JAEGERMANN	14:00 - 15:00 RANEE BRYLINSKI

Time Heure	Thursday / jeudi May 27 mai	Friday / vendredi May 28 mai	Saturday / samedi May 29 mai	Sunday / dimanche May 30 mai	Monday / lundi May 31 mai	Tuesday / mardi June 1 juin
15:00	9:00 - 16:00 Executive Committee Meeting Réunion du Comité exécutif  Columbus Suite Hotel Newfoundland	13:30 - 18:30 Board of Directors Meeting Réunion du Conseil d'administration  Salon Battery Hotel Newfoundland	15:00 - 17:30 SESSIONS 1,2,3,6,7	15:00 - 17:00 General Meeting Assemblée Générale	15:00 - 17:00 SESSIONS 1,3,5,8,9	15:00 - 17:00 SESSIONS 1,3,8,9
16:00						
17:00						
17:30						
Evening		19:00 - 22:00 Reception Cash-bar and Evening Registration Réception (bar payant) et inscription  Court Garden Salon Hotel Newfoundland	20:00 - 21:00 PUBLIC LECTURE	19:30 - 23:00 Conference Dinner  <i>Newfoundland Kitchen Party</i>  The Marine Institute		

1. Perspectives in Ring Theory / Perspectives de la théorie des anneaux
2. Harmonic Analysis / Analyse harmonique
3. Representation Theory / Théorie des représentations
4. Combinatorics and its Applications / Combinatoire et applications
5. Nonlinear Analysis and its Applications / Analyse nonlinéaire et applications
6. Surveys in Mathematics / Études en mathématiques
7. Education / Éducation
8. Contributed Papers / Communications libres
9. Graduate Student Session / Séance pour étudiants diplômés

## SCHEDULED SPEAKERS / CONFÉRENCIERS PRÉVUS

Here is a list of the confirmed speakers. Abstracts for all talks may be found at the following world wide web page after May 1:

<http://www.camel.math.ca/CMS/Events/>

Voici les conférenciers prévus à date. Les résumés pour toutes les conférences seront disponibles à l'adresse Web suivante après le 1<sup>er</sup> mai :

<http://www.camel.math.ca/CMS/Events/>

### JEFFERY-WILLIAMS LECTURE CONFÉRENCE JEFFERY-WILLIAMS

**John Friedlander** (University of Toronto)

### KRIEGER NELSON LECTURE CONFÉRENCE KRIEGER NELSON

**Nicole Tomczak-Jaegermann** (University of Alberta)

### PLENARY SPEAKERS CONFÉRENCIERS PRINCIPAUX

**Ed Barbeau** (Toronto) *Delicious mathematics*

**Michael van den Bergh** (Belgium)

**Ranee Brylinski** (Pennsylvania State)

**Tom Korner** (Cambridge) *Does order matter?*

**Douglas Stinson** (Waterloo)

**Luc Vinet** (CRM)

### SPECIAL SESSIONS SÉANCES SPÉCIALES

#### COMBINATORICS AND ITS APPLICATIONS COMBINATOIRE ET APPLICATIONS (Org: Nabil Shalaby and Douglas Stinson)

**Lynn Batten** (Manitoba) *On Chen's construction of minimum five codes*

**Frank Bennett** (Mount St. Vincent) *Steiner pentagon packing and covering designs.*

**Jeff Dinitz** (Vermont)

**Katherine Heinrich** (SFU) *Uniform coverings of 2-paths.*

**Vaclav Linek** (Winnipeg) *Large Odd periodic and generalized Skolem sequences.*

**William Martin** (Winnipeg) *Ordered codes and ordered orthogonal arrays.*

**Eric Mendelsohn** (Toronto)

**Chris Rodger** (Auburn) *Maximal sets of Hamiltonian cycles.*

**Alexander Rosa** (McMaster) *Orthogonal double covers and symmetric graph designs.*

### EDUCATION / ÉDUCATION What Mathematical Competitions

do for Mathematics /

Ce que contribuent les

compétitions au domaine des mathématiques

(Org: Bruce Shawyer and Ed Williams)

**Ed Barbeau** (Toronto)

**Peter Crippen** (Waterloo)

**Ron Dunkley** (Waterloo)

**David Leeming** (Victoria)

**John Grant McLoughlin** (Memorial) *Popular distractors: one avenue into the mathematical thinking underlying errors in math contests.*

**Rita Jones** (NCTM Director, co-founder Newfoundland and Labrador Mathematics League)

**Tony Gardiner** (Birmingham) *What math competitions have done for the UK math community.*

**Shannon Sullivan** (MUN student) *Why I hated Achilles.*

#### GRADUATE STUDENT SEMINAR SÉANCE POUR ÉTUDIANTS DIPLÔMÉS

**Speakers:** TBA

#### HARMONIC ANALYSIS ANALYSE HARMONIQUE (Org: Kathryn Hare)

**J. Benedetto** (Maryland) *The role of tiling in sampling and wavelet theory.*

**M. Christ** (Berkeley)

**C. Finet** (Belgium) *Transfer principles in Orlicz spaces.*

**B. Forrest** (Waterloo)

**Jean-Paul Gabardo** (McMaster) *Determinacy in truncated trigonometric moment problems and the extension property.*

**E. Granirer** (UBC) *Some functional analytic properties of quotients of the Fourier algebra as reflected by some subsets of the real line.*

**H. Henig** (McMaster) *Modular inequalities for the Calderon operator.*

**Z. Hu** (Windsor)

**R. Kerman** (Brock) *Weighted inequalities for semigroups of operators and the norm convergence of the Abel means of certain eigenfunction expansions.*

**T. Lau** (Alberta) *On the centre of some Banach algebras associated to a locally compact group.*

**D. Oberlin** (Florida) *Convolution with affine arclength measures in the plane.*

**J.-O. Ronning** (Skode) *Generalized Perron trees – What and why.*

**G. Sinnamon** (UWO) *From Norlund matrices to Laplace representations.*

**S. Wainger** (Wisconsin) *Some discrete problems in harmonic analysis.*

#### NONLINEAR ANALYSIS AND ITS APPLICATIONS ANALYSE NONLINÉAIRE ET APPLICATIONS

(Org: S.P. Singh and Bruce Watson)

**Giampietro Allasia** (Torino) *Cardinal basis interpolation on multivariate scattered data*

**Tomas Benavides** (Sevilla)

**Jonathan Borwein** (SFU)

**Antonio Carbone** (Calabria)

**Raffaele Chiappinelli** (Siena) *Nonlinear solvability of eigenvalues of compact self-adjoint operators*

**Francesco DeBlasi** (Rome)

**Hanuman P. Dikshit** (M.P. Bhoj) *N & S conditions for Birkhoff interpolation on non-uniformly distributed points on the unit circle*

**Paul Gauthier** (Montreal) *Regular quasiregular mappings*

**Kaz Goebel** (Lublin)

**Farhad Jafari** (Wyoming)

**Jinlu Li** (Shawnee State U) *Ky Fan's Best Approximation in Banach spaces*

**Ivar Massabo** (Calabria)

**M. Aslam Noor** (Dalhousie) *Auxiliary principle techniques and variational inequalities*

**Pier Luigi Papini** (Bologna)

**George Phillips** (St. Andrew's)

**Luigi Rodino** (Torino) *Local solvability for nonlinear partial differential equations*

**Virendra Sehgal** (Wyoming)

**Wataru Takahashi** (Tokyo) *Approximating fixed points and applications*

**E. Tarafdar** (Australia)

**John Whitfield** (Lakehead)

#### PERSPECTIVES IN RING THEORY PERSPECTIVES DE LA THÉORIE DES ANNEAUX

(Org: Eric Jespers and Edgar Goodaire)

**Yuri Bahturin** (Moscow)

**Margaret Beattie** (Mount Allison)

**Howard Bell** (Brock)

**Michael van den Bergh** (Belgium)

**Hans Brungs** (Alberta)

**Gerald Cliff** (Alberta)

**Jairo Gonçalves** (Sao Paulo)

**Klaus Hoechsmann** (UBC)

**Stanley Juriaans** (Sao Paulo)

**Thomas Kucera** (Manitoba)

**Keith Nicholson** (Calgary)

**Jan Okninski** (Warsaw)

**Donald Passman** (Wisconsin)

**Mohan Putcha** (North Carolina State) *Monoids and Hecke Algebras*

**Robert Raphael** (Concordia)

**Lex Renner** (UWO)

**Akbar Rhemtulla** (Alberta)

**Sudarshan Sehgal** (Edmonton)

**Wataru Takahashi** (Tokyo)

**Paul Wauters** (Limburgs)

#### REPRESENTATION THEORY THÉORIE DES REPRÉSENTATIONS

(Org: Abraham Broer)

**Ranee K. Brylinski** (Pennsylvania State)

**Jon Brundan** (Oregon at Eugene)

**Clifton Cunningham** (Massachusetts)

**Sam R. Evens** (Arizona at Tucson)

**Loek Helminck** (North Carolina State)

**Markus Hunziker** (Brandeis)

**Alex S. Kleshchev** (Oregon at Eugene)

**Friedrich Knop** (Rutgers)

**V. Lakshmibai** (Northeastern)

**W. Monty McGovern** (Seattle)  
**George McNinch** (Notre Dame)  
**Fiona Murnaghan** (Toronto)  
**Monica Nevins** (Alberta)  
**Mark Reeder** (Boston College)  
**Yasmine Sanderson** (Rutgers)  
**Gordan Savin** (Utah)  
**Eric Sommers** (Harvard)  
**Peter Trapa** (Inst. for Advanced Studies)

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**SURVEYS IN MATHEMATICS**  
**ÉTUDES EN MATHÉMATIQUES**  
(Org: Kumar Murty and Niky Kamran)

**Jacques Hurtubise** (McGill)  
**Niky Kamran** (McGill) *Recent progress in the study of the Dirac operator in black hole geometries.*  
**James Lewis** (Alberta) *Algebraic cycles and Hodge theory.*

**Neal Madras** (York) *Some simple models of phase transitions.*  
**Heydar Radjavi** (Dalhousie) *Operator semigroups and reducibility questions.*  
**Damien Roy** (Ottawa) *Diophantine approximation and transcendental numbers.*  
**Dana Schlomiuk** (Montreal) *Analytic, geometric and algebraic methods, intertwined in the study of planar vector fields.*  
**Nicole Tomcjak-Jaegerman** (Alberta)  
**Ravi Vakil** (MIT) *Gromov-Witten invariants and algebraic geometry.*

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**CONTRIBUTED PAPERS**  
**COMMUNICATIONS LIBRES**  
(Org: Hermann Brunner and Bruce Watson)

**Speakers:** TBA

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*Editorial Note: The following are taken from the 1998 Annual Reports from the Society's Standing Committees. The remainder will be published in the May issue of the NOTES. The complete CMS Annual Report to Members will be available on the CMS website in due course.*

## COMMITTEE FOR WOMEN IN MATHEMATICS

**Shelly Wismath (Lethbridge) Chair**  
**Robert Corless (Western)**  
**Jennifer Hyndman (UNBC)**  
**Lisa Jeffrey (Toronto)**  
**June Lester (UNB)**  
**Angelo Mingarelli (Carleton)**  
**Richard Wood (Dalhousie)**

The Committee for Women in Mathematics (CWM) is charged with monitoring the status of women within the Canadian mathematical community and the Society, recommending actions to the Board which will ensure the equitable treatment of women there, and encouraging the participation of women at all levels of mathematics.

The main activity of the CWM in 1998 has been on-going work on the Directory of Canadian Women in the Mathematical Sciences. This project was initiated by former CWM chair Joan Geramita. Funding was obtained

in 1997 from Nancy's Very Own Foundation, and Joan along with committee member June Lester got the project off to a good start. Much programming and design assistance was provided by Nathalie Sinclair at Camel; Nathalie and more recently Fred Tessier handle the addition of new names to the Directory.

The Directory is an indexed collection of web pages of Canadian-connected women who are actively involved in some aspect of the mathematical sciences. Each web page (there are now 52) lists name, address, contact information and research interests for the woman mathematician; she may also provide links to her home page or curriculum vitae if she wishes. The Directory is searchable, for instance by geographical or research area, and should provide a valuable resource for

those searching the Web for information about Canadian women mathematicians. Check it out at <http://camel.math.ca/Women/WMpages/>

In Summer 1998 we set up an e-mail discussion list for those in the Directory. So far it has been used for announcements of conferences and requests for information or help with projects. We hope to increase use of this list, for things such as job announcements, mentoring of graduate students by more senior women, book reviews, and so on.

An important event for Canadian women mathematicians this year was the "Celebration of Women in Mathematics" (CWIM) conference held in Waterloo in May 98. This conference, which received some funding from the CMS, was attended by approximately 120 women (and some men). It fea-

tured three plenary talks, shorter talks in parallel sessions, a poster session, and three panel discussions on various aspects of careers in mathematics.

Our committee is working on a poster to celebrate the role of women in mathematics as part of the World Mathematics Year 2000. Jennifer Hyndman

is co-ordinating this project, which will feature short biographies of a number of prominent Canadian women mathematicians.

## GOVERNMENT POLICY COMMITTEE

**Michel Racine (Ottawa) Chair**  
**Kathryn Hare (Waterloo)**  
**Jacques Hurtubise (McGill)**  
**Kenneth Williams (Carleton)**  
**Graham P. Wright (Ottawa)**

The committee is responsible for representing the Society on the National Consortium of Scientific Societies and on PAGSE, two groups which lobby the federal government. In contacts with politicians and senior civil servants, these groups try to influence fed-

eral policy concerning research and related matters.

The 1995-96 Annual Survey of the Mathematics and Statistics Professions was analysed by the Queen's University Statistics Lab and the final version, prepared by Kathryn Hare, was published in the May 1998 issue of the CMS Notes. There have been some delays in obtaining, analysing and publishing the reports of some recent annual surveys but it is hoped to be back on schedule by the fall of 1999. If this is

achieved, the 1998-1999 Survey will be mailed in the fall 1999 with the results published at the beginning of 2000.

At this time there is discussion about abolishing the Committee. Should this happen, it is expected that the delegates to the National Consortium and to PAGSE will be appointed by the Executive and the Annual Survey conducted by the Executive Office under the supervision of an individual also appointed by the Executive.

## MATHEMATICAL OLYMPIADS COMMITTEE

**Patrick Stewart (Dalhousie) and Daryl Tingley (UNB) Co-Chairs**  
**Edward Barbeau (Toronto)**  
**Lynn Batten (Manitoba)**  
**Ronald Dunkley (Waterloo)**  
**Claude Laflamme (Calgary)**  
**Richard Nowakowski (Dalhousie)**  
**George Sands (Calgary)**  
**Bruce Shawyer (Memorial)**  
**Graham P. Wright (Ottawa)**

The Mathematical Olympiad Committee (MOC) of the CMS is responsible for overseeing activities associated with the Society's involvement in mathematics contests. Two contests, The Canadian Open Mathematics Challenge and the Canadian Mathematical Olympiad are sponsored and run by the Society. The MOC also oversees and sponsors Canada's participation in the Asian Pacific Mathematics Olympiad and the International Mathematical Olympiad. Other activities of MOC include the Mathematical

Olympiads' Correspondence Program, and Mathematics Camps.

These activities are time consuming, but very rewarding. Working with students who are able to perform at such a high level is something that any of us who teach can't help but enjoy. The MOC is always in need of more people willing to help. If you are interested in helping talented high school students learn to solve hard problems, consider becoming involved in one of MOC's activities.

The Canadian Open Mathematics Challenge (COMC) provides a mathematical enrichment activity for a large number of students and it serves as a qualifying paper for the Canadian Mathematical Olympiad. Plaques are awarded to both the students and schools for being a provincial or regional winner and Gold Medals are awarded to up to 9 other students in each province or region.

The COMC is going well. Provin-

cial governments seem to like the opportunity to see how their top students fare on a national basis. The Society's increased interest in students is reaping various rewards. For example, in 1998 eight provinces and territories donated to the CMS, up from four in 1997. The COMC was cited as an activity in which the provinces were interested and one of the reasons why they chose to support the CMS.

The 30th Canadian Mathematical Olympiad (CMO) took place on April 1, 1998; a detailed report appeared in the September 1998 issue of the NOTES.

The 1998 Asian Pacific Mathematics Olympiad was written in March by 29 Canadian students. These students performed very well, receiving 6 medals and three honourable mentions. Canada placed 5th amongst the 22 participating countries.

The 1998 International Mathematical Olympiad (IMO) was held in Taipei,

Taiwan, July 10-21. The Canadian team improved its standing (over 1997) to 20th out of the 76 competing countries. A full report appeared in the February 1999 issue of the NOTES.

The Mathematical Olympiads' Correspondence Program is a problems based correspondence program. It is intended for high school students with exceptional mathematical ability who wish to pursue mathematical problem solving at a high level and/or have ambitions to compete in mathematical olympiads. The coordinator is Ed Barbeau, University of Toronto. During 1997-98, 26 students participated and 21 students are registered for

the 1998-99 year.

The MOC has been discussing national and regional mathematics camps for several years. During June 21-25, 1998 the first CMS National Mathematics Camp took place in Waterloo. Twenty three students from across the country attended. The camp was organized by Ravi Vakil, Peter Crippen, and Tom Griffiths. Additional help, including some lectures, was provided by some Canadian IMO Team Alumni. The purpose of the Camp was to inspire enthusiasm in high level problem solving. The camp was highly successful, and a good time was had by all.

Next summer (1999), we hope that

some regional mathematics camps will take place. Thanks to the dedication and persistence of the CMS Executive Director, Graham Wright, we now have funding for regional camps. We hope to have several of these take place each summer. Bringing together students with superior mathematics skills is a great way to encourage them to pursue mathematics. The students work very hard at mathematics during the camp, and have a great deal of fun doing so. Those running the camps also have fun. Anyone who would consider running a camp sometime in the next few years should contact either the committee chair or Graham Wright.

## NOMINATING COMMITTEE

**Kenneth Davidson (Waterloo) Chair**  
**Edward Barbeau (Toronto)**  
**Katherine Heinrich (Simon Fraser)**  
**Richard Kane (Western)**  
**François Lalonde (UQAM)**  
**Anthony Lau (Alberta)**  
**Wendy MacCaul (SFXU)**

Radical new terms of reference for the Fund Raising Committee were established and the following regional representatives were nominated and approved by the Board:

David Leeming (Victoria)  
 Jon Thompson (UNB)  
 Joan Wick Pelletier  
 Georg Schmidt (McGill)

The dissolution of the Government Policy Committee has been recommended to the Board, with suggestions for distributing some of the duties. A new Student Committee has been proposed that will be run by and for the students, and will coordinate with other

CMS activities. Both of these will be considered by the executive in April.

Arthur Sherk was recommended to continue as Treasurer for 3 more years and this was approved by the Board.

Nominations were sought for the following committee positions which have now been approved by the Board:

### Education

Jennifer Hyndman (UNBC)  
 Andy Liu (Alberta)  
 John Grant McLoughlin (MUN)

### Electronic Services

Edgar Goodaire (MUN) Chair  
 Laurent Marcoux (Alberta)

### Finance

Michael Lamoureux (Calgary)

### Human Rights

Paul Gauthier (Montréal)  
 Zhiguo Hu (Windsor)

### International Affairs

Catherine Sulem (Toronto)

### Math Olympiads

Daryl Tingley (UNB) Chair

### Publications

Bradd Hart (McMaster)  
 Christine Soteris (Saskatchewan)

### Research

Niky Kamran (McGill) Chair  
 Ian Putnam (Victoria)

### Women

June Lester (UNB)  
 Frank Zorzitto (Waterloo)

The Nominating Committee welcomes Stephen Boyer (UQAM) as a new member, and David Bates (Aetna Insurance) was asked to join the Board as a non-academic member. We thank Jack Mosevich (Harris Investment Management) and Francois Lalonde for their useful service.

We have proposed a slate of Nominations for the 1999 CMS elections for the new Executive and Board positions. These names were announced in the February issue of the Notes, along with a call for other nominations.



## RESEARCH COMMITTEE

**Cameron Stewart (Waterloo) Chair**  
**Martin Barlow (UBC)**  
**Chris Godsil (Waterloo)**  
**Jacques Hurtubise (McGill)**  
**Eric Jespers (Memorial)**  
**V. Kumar Murty (Toronto)**  
**Dana Schlomiuk (Montréal)**

The 1998 CMS Summer Meeting was held in Saint John, New Brunswick and was hosted by the University of New Brunswick. There were seven research sessions, including sessions supported by CRM and the Fields Institute. The Jeffery-Williams Prize Lecturer at Saint John was George Elliott and the Krieger-Nelson Prize Lecturer was Catherine Sulem. At Saint John, the Research Committee started its planning for the Summer 2000 meeting at McMaster by selecting a list of possible core sessions for the meeting. Much work has been done since then to prepare for the meeting which is a joint

venture with CAIMS.

The 1998 CMS Winter Meeting was held in Kingston, Ontario and was hosted by Queen's University and RMC. There were a large number of research sessions, nine, again including sessions held with support from CRM and the Fields Institute. The CMS usually funds four core sessions at each of its meetings. The Research Committee is very anxious to encourage members of the Society to sponsor and organize sessions at the CMS annual meetings. The success of the meetings in Saint John and Kingston was due in large measure to the many self-supported sessions which were organized at these meetings.

There were two Prize Lectures at the 1998 Winter Meeting. The Coxeter-James Prize Lecture was given by H. Darmon and the Doctoral Prize Lecture was given by Y. Berest. The Krieger-Nelson, Jeffery-Williams and

Coxeter-James Prize Lecturers are selected by the Research Committee after a review of nominations. Files of nominated candidates remain open for two years for the Coxeter-James Prize and for three years for the other two prizes. The Doctoral Prize winner is selected by a jury chaired by a member of the Research Committee and including three other members. The jury in 1998 was chaired by D. Schlomiuk and included P. Fillmore, D. Jackson and R.V. Moody.

The coming meetings of the CMS will be held in St. John's in the Summer of 1999, Montreal in the Winter of 1999, Hamilton in the Summer of 2000 and Vancouver in the Winter of 2000. The Research Committee approved in Kingston a slate of host sites up to the Summer of 2006 and the president, Richard Kane, is in the process of contacting organizers at these sites.

## INTERNATIONAL AFFAIRS COMMITTEE

**Peter Fillmore (Dalhousie) Chair**  
**Henri Darmon (McGill)**  
**George Elliott (Toronto)**  
**Mohammad Hamdan (UNB)**  
**Katherine Heinrich (Simon Fraser)**  
**Richard Kane (Western)**  
**Robert Miura (UBC)**  
**Nicole Tomczak-Jaegermann (Alberta)**  
**Hong Wang (Memorial)**

The mandate of the committee includes providing information and recommendations on matters of an international nature which are of interest to the mathematical community, and serving as the Canadian National Committee for the International Mathematical Union (CNC/IMU). The latter responsibility is governed by a contract between NRC

(International Relations) and the CMS, which means in particular that the committee includes ex-officio representatives from CAIMS, SSC and CMESG. The committee provides annual reports to both NRC and the CMS.

Adherence to the IMU is possible at five levels, depending on the extent of mathematical activity. In 1997 the IMU encouraged us to apply for the highest level (with the US, UK, France, Germany, Russia, China and Japan). This involved preparing documentation about mathematics in Canada and obtaining the agreement of NRC, and was ultimately successful.

The committee appointed the following delegation to the 13th General Assembly of the IMU, which met

in Dresden in August: Donald Dawson, Peter Fillmore, Nassif Ghoussoub, Jacques Hurtubise, Nicole Tomczak-Jaegermann and George Elliott (alternate). We proposed to the CMS and subsequently organized, with the Canadian Embassy Office, a reception for Fields Medal recipients and distinguished guests at the International Congress in Berlin. This was very successful and should be repeated at future ICMs. Financial support was provided by Springer Verlag.

And, finally, we recommended that the \$1000 contributed by CMS members "to aid mathematicians in Sarajevo" be given to the Bosnian mathematical journal Radovi Matematicki.

## CALL FOR NOMINATIONS / APPEL DE CANDIDATURES

### Coxeter-James / Jeffery-Williams / Krieger-Nelson Prize Lectureships

### Prix de conférence Coxeter-James / Jeffery-Williams / Krieger-Nelson

The CMS Research Committee invites nominations for three prize lectureships.

The Coxeter-James Prize Lectureship recognizes outstanding young research mathematicians in Canada. The selected candidate will deliver the prize lecture at the Winter 2000 Meeting in Vancouver, British Columbia. Nomination letters should include at least three names of suggested referees. Nomination files will be kept for two years.

The Jeffery-Williams Prize Lectureship recognizes outstanding leaders in mathematics in a Canadian context. The prize lecture will be delivered at the Summer 2001 Meeting in Saskatoon, Saskatchewan. Nomination letters should include three names of suggested referees. Nomination files will be kept for three years.

The Krieger-Nelson Prize Lectureship recognizes outstanding female mathematicians. The prize lecture will be delivered at the Summer 2001 Meeting in Saskatoon, Saskatchewan. Nomination letters should include three names of suggested referees. Nomination files will be kept for three years.

The deadline for nominations is **September 1, 1999**. Letters of nomination should be sent to the address given below:

Le Comité de recherche de la SMC invite les mises en candidatures pour les trois prix de conférence de la Société, la

Conférence Coxeter-James, la Conférence Jeffery-Williams et la Conférence Krieger-Nelson.

Le prix Coxeter-James rend hommage à l'apport exceptionnel des jeunes mathématiciens au Canada. Le candidat choisi présentera sa conférence lors de la réunion d'hiver 2000 à Vancouver (Columbie britannique). Les lettres de mises en candidatures devraient inclure les noms d'au moins trois répondants possibles. Les dossiers des candidats seront conservés pendant deux ans.

Le prix Jeffery-Williams rend hommage à l'apport exceptionnel des mathématiciens d'expérience au Canada. La Conférence sera présentée lors de la réunion d'été 2001 à Saskatoon (Saskatchewan). Les lettres de mises en candidature devraient inclure les noms d'au moins trois répondants possibles. Les dossiers des candidats seront conservés pendant trois ans.

Le prix Krieger-Nelson rend hommage à l'apport exceptionnel des mathématiciennes au Canada. La Conférence sera présentée lors de la réunion d'été 2001 à Saskatoon (Saskatchewan). Les lettres de mises en candidatures devraient inclure les noms d'au moins trois répondants possibles. Les dossiers des candidats seront conservés pendant trois ans.

La date limite pour les mises en candidatures est le **1 septembre 1999**. Les lettres de mises en candidatures devraient être envoyées à :

**Martin Barlow**  
**CMS Research Committee / Comité de recherche de la SMC**  
**Department of Mathematics**  
**University of British Columbia**  
**121-1984 Mathematics Road**  
**Vancouver, British Columbia**  
**V6T 1Z2**

### NOTICE / AVIS

The following is a reminder of closing dates for nominations at the CMS. Full details can be found in the March *Notes*.

Les suivantes sont les dates limites des nominations de la SMC. Pour plus de détails voyez les *Notes* du mois du mars.

**Associate Editors—CJM and CMB Rédacteurs associés—JCM et BCM**    **April 15 avril**  
**1999 Adrien Pouliot Award/Prix Adrien-Pouliot 1999**                    **April 30 avril**

**UNIVERSITY OF SASKATCHEWAN  
DEPARTMENT OF MATHEMATICS  
ASSISTANT PROFESSOR**

The Department of Mathematics and Statistics at the University of Saskatchewan invites applications for a tenure-track position in Algebra at the rank of Assistant Professor to commence on July 1, 1999. Applicants must hold a Ph.D. degree, or equivalent, and have established excellence in both teaching and research. Applicants should send a curriculum vitae and arrange for three confidential letters of reference to be sent to:

**Dr. M. Bickis Head**  
**Department of Mathematics and Statistics**  
**University of Saskatchewan**  
**106 Wiggins Road**  
**Saskatoon, SK S7N 5E6**  
**Email: math@sask.usask.ca**

The deadline for applications is **April 30, 1999**.

The University of Saskatchewan is committed to Employment Equity. Members of Designated Groups (women, aboriginal people, people with disabilities and visible minorities) are encouraged to self-identify on their application. In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents in the first instance. However, this position has been cleared for advertising at the tier-two level. Applications are invited from qualified individuals, regardless of their immigration status.

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**UNIVERSITY OF SASKATCHEWAN  
DEPARTMENT OF MATHEMATICS**

The Department of Mathematics and Statistics at the University of Saskatchewan invites applications from candidates eligible for an NSERC University Faculty Award (UFA). This competition is open to female candidates who will have completed their Ph.D. requirements by the time of appointment, and do not have a tenurable faculty appointment. Candidates should show evidence of exceptional research potential and excellence in teaching. The successful candidate will be appointed to a tenure-track position, will receive an NSERC research grant, and will have a reduced teaching load to enable her to concentrate on research. Appointment will be conditional on receiving the award, and will be effective July 1, 2000. Applicants should send a curriculum vitae and arrange for three confidential letters of reference to be sent to:

**Dr. M. Bickis Head**  
**Department of Mathematics and Statistics**  
**University of Saskatchewan**  
**106 Wiggins Road**  
**Saskatoon, SK S7N 5E6**  
**Email: math@sask.usask.ca**

The deadline for applications is **June 30, 1999**.

The University of Saskatchewan is committed to Employment Equity. Members of Designated Groups (aboriginal people, people with disabilities and visible minorities) are encouraged to self-identify on their applications. This advertisement is directed to Canadian citizens and permanent residents of Canada.



## CENTRE DE RECHERCHES MATHÉMATIQUES

### Année thématique 1999-2000: Physique mathématique



#### ÉCOLES D'ÉTÉ

**9<sup>e</sup> école d'été du CRM**  
*La physique théorique à la fin du 20<sup>e</sup> siècle*  
 27 juin – 10 juillet 1999  
 (Banff, Alberta)  
**Organisateurs:** Yvan Saint-Aubin (Montréal and CRM) et Luc Vinet (Montréal and CRM)

**Séminaire de mathématiques supérieures**  
*Systèmes intégrables quantiques: des classiques aux quantiques*  
 Département de mathématiques et de statistique (DMS)  
 Université de Montréal  
 26 juillet – 6 août, 1999  
**Organisateurs:** Aubert Daigneault (Montréal), John Harnad (Concordia et CRM), Pavel Winternitz (Montréal et CRM)  
**Co-commanditaires:**  
 The Fields Institute, Pacific Institute for Mathematical Sciences (PIMS), CRSNG, NSF, DMS, Université de Montréal

#### CONFÉRENCES DE LA CHAIRE AISENSTADT

**Joel Feldman (UBC) :** août 1999 et avril 2000  
**Roman Jackiw (MIT) :** dates à déterminer  
**Duong H. Phong (Columbia) :** dates à déterminer

#### ATELIERS

**Atelier sur les méthodes théoriques pour les fermions fortement corrélés**  
 26-30 mai, 1999  
**Organisateurs :** André-Marie Tremblay (Sherbrooke) et Andrei Ruckenstein (Rutgers)

**Atelier sur les transformations de Bäcklund et de Darboux :**  
*La géométrie de la théorie des solitons*  
 4-8 juin 1999  
 (Halifax, Nouvelle-Écosse)  
**Co-commanditaire :**  
 AARMS  
**Organisateurs :** Mack I. Ablowitz (Colorado), Alan Coley (AARMS, Dalhousie), Athanasios S. Pokas (Imperial College), Decio Levi (Roma 3), Peter J. Olver (Minnesota), Colin Rogers (New South Wales), Pavel Winternitz (Montréal et CRM)

**Conférence sur la relativité générale, l'astrophysique et la cosmologie**  
 6-12 juin 1999  
 Cette conférence, constituée de deux ateliers majeurs, réunira des sujets intimement reliés mais rarement regroupés lors d'événements scientifiques.

**Trous noirs II : Théorie et aspects mathématiques**  
 6-9 juin 1999  
 (Val Morin, Québec)  
**Co-commanditaires :**  
 Canadian Institute for Advanced Research (CIAR)  
 Canadian Institute for Theoretical Astrophysics (CITA)  
**Organisateurs :** Valeri Frolov (Alberta), Werner Ismael (Victoria), Robert Myers (McGill), Don Page (Alberta), Eric Poisson (Guelph)

**Huitième conférence canadienne de relativité générale et astrophysique relativiste**  
 10-12 juin 1999  
**Co-commanditaire :**  
 Canadian Institute for Theoretical Astrophysics (CITA)  
**Comité d'organisation :** C.P. Burgess (McGill), J. Gegenberg (New Brunswick), D. Hobill (Calgary), G. Kunstatter (Winnipeg), R.G. McLenaghan (Waterloo), R.C. Myers (McGill)

**Aux frontières de la physique mathématique :**  
*Atelier d'été " Particules, Champs et Cordes 99 "*  
 2-20 août 1999  
 (University of British Columbia, Vancouver)

**Co-commanditaires :**  
 Pacific Institute for Mathematical Sciences (PIMS)  
 Asia Pacific Center for Theoretical Physics (APCTP)  
**Organisateurs :** Taejin Lee (Kangwon National University), Yuri Makeenko (ITEP, Moscow & NBI, Copenhagen), John Ng (TRIUMF), Soonkeon Nam (APCTP, Seoul), Chaiho Rim (APCTP, Seoul), Alexander Rutherford (PIMS), Gordon Semenof (UBC), K.S. Viswanathan (Simon Fraser), Ariel Zhitnitsky (UBC)

**Atelier sur la dynamique non-linéaire et le groupe de renormalisation**  
 22-27 août, 1999  
**Organisateurs :** Catherine Sulem (Toronto) et Michael Sigal (Toronto)

**Atelier sur les aspects de la quantification**  
 23-28 septembre 1999  
**Organisateur :** Lisa Jeffrey (Toronto)

**Atelier sur l'informatique quantique**  
 5-11 décembre 1999  
**Organisateurs :** Gilles Brassard (Montréal) et Richard Cleve (Calgary)

**Atelier sur les cordes, la dualité et la géométrie**  
 mars 2000  
**Organisateur :** Eric D'Hoker (UCLA) et Duong H. Phong (Columbia)

**Atelier " Finance et physique mathématique "**  
 12-17 juin 2000  
**Organisateurs :** Luis Seco (Toronto) et Stathis Tompaids (Texas)

#### TRIMESTRE

**Intégrabilité quantique 2000**  
 2 avril – 11 juin 2000  
 Le CRM tiendra un trimestre de concentration avec plusieurs chercheurs en résidence. Le programme est constitué de deux périodes de quatre semaines et d'un atelier.  
**Organisateurs :** Philippe Di Francesco (North Carolina), André LeClair (Cornell), Nicolai Reshetikhin (Berkeley), Hubert Saleur (USC)

**Algèbres quantiques et intégrabilité**  
 2-30 avril 2000  
**Organisateurs :** André LeClair (Cornell) et Nicolai Reshetikhin (Berkeley)

**Atelier sur les déformations isomonodromiques et leurs applications en physique**  
 1-6 mai 2000  
**Organisateurs :** John Harnad (Concordia, CRM) et Alexander Its (IUPUI, Indianapolis)

**Modèles intégrables, matière condensée et phénomènes loin de l'équilibre**  
 14 mai – 11 juin, 2000  
**Organisateurs :** Philippe Di Francesco (North Carolina), André LeClair (Cornell), Hubert Saleur (USC)

#### COMITÉ ORGANISATEUR

Philippe Di Francesco (North Carolina), Lisa Jeffrey (Toronto), André LeClair (Cornell), Yvan Saint-Aubin (Montréal, CRM), Luc Vinet (Montréal, CRM)

**Tous ceux intéressés à participer à ces activités sont invités à écrire à :**

Année thématique 1999-2000, Centre de recherches mathématiques (CRM), Université de Montréal, C.P. 6128, Succ. Centre-ville, Montréal (Québec), CANADA H3C3J7  
**Adresse électronique:** ACTIVITES@CRM.UMontreal.CA  
**Internet:** http://www.CRM.UMontreal.CA/mathphys

	<b>CENTRE DE RECHERCHES MATHÉMATIQUES</b> Theme Year 1999-2000: Mathematical Physics	
<b>SUMMER SCHOOLS</b>		
<p><b>IXth CRM Summer School</b>  <i>Theoretical Physics at the End of the XXth Century</i>          June 27 – July 10, 1999          (Banff, Alberta)  <b>Organizers:</b> Yvan Saint-Aubin (Montréal and CRM) and Luc Vinet (Montréal and CRM)</p>		
<p><b>Séminaire de mathématiques supérieures</b>  <i>Integrable systems: from classical to quantum</i>          Department of Mathematics and Statistics (DMS)          University of Montréal          July 26 – August 6, 1999  <b>Organizers:</b> Aubert Daigneault (Montréal), John Harnad (Concordia and CRM), Pavel Winternitz (Montréal and CRM)</p>		
<p><b>Co-sponsors:</b>          The Fields Institute, Pacific Institute for Mathematical Sciences (PIMS), NSERC, NSF, DMS, University of Montréal</p>		
<b>AIKENSTADT CHAIR LECTURE SERIES</b>		
<p>Joel Feldman (UBC): August 1999 and April 2000          Roman Jackiw (MIT): dates to be determined          Duong H. Phong (Columbia): dates to be determined</p>		
<b>WORKSHOPS</b>		
<p><b>Workshop on Theoretical Methods for Strongly Correlated Fermions</b>          May 26-30, 1999  <b>Organizers:</b> André-Marie Tremblay (Sherbrooke) and Andrei Ruckenstein (Rutgers)</p>		
<p><b>Workshop on Bäcklund &amp; Darboux Transformations : The Geometry of Soliton Theory</b>          June 4-8, 1999          (Halifax, Nova Scotia)  <b>Co-sponsor:</b>          AARMS  <b>Organizers:</b> Mark J. Ablowitz (Colorado), Alan Coley (AARMS, Dalhousie), Athanassios S. Fokas (Imperial College), Decio Levi (Roma 3), Peter J. Olver (Minnesota), Colin Rogers (New South Wales) and Pavel Winternitz (Montréal and CRM)</p>		
<p><b>Conference on General Relativity, Astrophysics and Cosmology</b>          June 6-12, 1999          This large conference will group two major workshops covering closely related subjects that are usually isolated.</p>		
<p><b>Black Holes II : Theory and Mathematical Aspects</b>          June 6-9, 1999          (Val Morin, Québec)  <b>Co-sponsors:</b>          Canadian Institute for Advanced Research (CIAR)          Canadian Institute for Theoretical Astrophysics (CITA)  <b>Organizers:</b> Valeri Frolov (Alberta), Weener Israel (Victoria), Robert Myers (McGill), Don Page (Alberta), Eric Poisson (Guelph)</p>		
<p><b>Eighth Canadian Conference on General Relativity and Relativistic Astrophysics</b>          June 10-12, 1999  <b>Co-sponsor:</b>          Canadian Institute for Theoretical Astrophysics (CITA)  <b>Organizing Committee:</b> C.P. Burgess (McGill), J. Gegenberg (New Brunswick), D. Hobill (Calgary), G. Kunstatter (Winnipeg), R.G. McLenaghan (Waterloo), R.C. Myers (McGill)</p>		
<p><b>Frontiers of Mathematical Physics : Summer Workshop on Particles, Fields and Strings 99</b>          August 2-20, 1999          (University of British Columbia, Vancouver)</p>		
<p><b>Co-sponsors:</b>          Pacific Institute for Mathematical Sciences (PIMS)          Asia Pacific Center for Theoretical Physics (APCTP)  <b>Organizers:</b> Taehm Lee (Kangwon National University), Yuri Makeenko (ITEP, Moscow &amp; NBI, Copenhagen), John Ng (TRIUMF), Soonkeon Nam (APCTP, Seoul), Chaiho Rim (APCTP, Seoul), Alexander Rutherford (PIMS), Gordon Semenov (UBC), K.S. Viswanathan (Simon Fraser), Ariel Zhitnitsky (UBC)</p>		
<p><b>Workshop on Non-linear Dynamics and Renormalization Group</b>          August 22-27, 1999  <b>Organizers:</b> Catherine Sulem (Toronto) and Michael Sigal (Toronto)</p>		
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<p><b>Workshop on Mathematical Physicists in Finance and Industry</b>          June 12-17, 2000  <b>Organizers:</b> Luis Seco (Toronto) and Stathis Tompaidis (Texas)</p>		
<b>CONCENTRATION PERIOD</b>		
<p><b>Quantum Integrability 2000</b>          April 2 – June 11, 2000          The CRM will host a semester-long concentration period with several specialists in residence. The program is organized around two 4-week periods described below and a workshop.  <b>Organizers:</b> Philippe Di Francesco (North Carolina), André LeClair (Cornell), Nicolai Reshetikhin (Berkeley), Hubert Saleur (USC)</p>		
<p><b>Quantum Algebras and Integrability</b>          April 2-30, 2000  <b>Organizers:</b> André LeClair (Cornell) and Nicolai Reshetikhin (Berkeley)</p>		
<p><b>Workshop on Isomonodromic Deformations and Applications in Physics</b>          May 1-6, 2000  <b>Organizers:</b> John Harnad (Concordia, CRM) and Alexander Its (IUPUI, Indianapolis)</p>		
<p><b>Integrable Models in Condensed Matter and Non-Equilibrium Physics</b>          May 14 – June 11, 2000  <b>Organizers:</b> Philippe Di Francesco (North Carolina), André LeClair (Cornell), Hubert Saleur (USC)</p>		
<b>ORGANIZING COMMITTEE</b>		
<p>Philippe Di Francesco (North Carolina), Lisa Jeffrey (Toronto), André LeClair (Cornell), Yvan Saint-Aubin (Montréal, CRM), Luc Vinet (Montréal, CRM)</p>		
<p>Those wishing to participate in the above activities are invited to write to:</p>		
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## CALENDAR OF EVENTS / CALENDRIER DES ÉVÉNEMENTS

### APRIL 1999

**9–23** Numerical Methods and Stochastics (The Fields Institute, Toronto, Ontario) *probability@fields.utoronto.ca*; *www.fields.utoronto.ca*

### MAY 1999

**11–12** Coxeter Lecture Series, (The Fields Institute, Toronto, Ontario) *www.fields.utoronto.ca*

**16–23** 37th International Symposium on Functional Equations (Marshall University, Huntington, WV) *banks@marshall.edu*; *janos@aris.ss.uci.edu*

**18–21** Vision Interface (VI'99)/Quality Control By Artificial Vision (QCAV'99) (Hotel Delta, Trois-Rivières, Québec) *http://www.dmi.usherb.ca/conferences/*

**20–24** The Twenty-Seventh Canadian Operator Theory and Operator Algebras Symposium (University of Prince Edward Island, Charlottetown) *http://www.math-cs.upei.ca/people/gmacdon/cosy/*

**29–June 1** CMS Summer Meeting / Réunion d'été de la SMC (Memorial University of Newfoundland, St. John's) *http://cms.math.ca/CMS/Events/*

### JUNE 1999

**3–4** Mathematics Education at the Secondary and Tertiary levels (Brock University, St. Catherines, Ontario) *http://spartan.ac.brocku.ca/mathconf/default.html*

**4–8** Canadian Mathematics Education Study Group (Brock University, St. Catherines, Ontario) *http://spartan.ac.brocku.ca/mathconf/default.html*

**6–9** Annual Meeting of the Statistical Society of Canada (Regina, Saskatchewan)

**7–9** Canadian Operational Research Society National Conference. (Windsor, Ontario) *http://www.cors.ca/windsor/*  
*M. Hlynka hlynka@uwindsor.ca*

**13–17** Conference on the Mathematics of Public-Key Cryptography (Fields Institute for Mathematical Sciences, Toronto, Ontario)  
*Gary Walsh, Chair: gwalsh@mathstat.uottawa.ca*  
*http://fields.utoronto.ca/publickey.html*

**14–19** 14th Householder Symposium on Numerical Linear Algebra (Whistler, British Columbia) *varah@cs.ubc.ca*; *http://roadmap.ubc.ca/hholder/*

### AVRIL 1999

**20–24** The Sixth Conference of the Canadian Number Theory Association (CNTA'99) (University of Manitoba, Winnipeg) *P.N. Shivakumar (insmath@cc.umanitoba.ca)*  
*http://www.iims.umanitoba.ca*

### JULY 1999

**5–9** 4th International Congress on Industrial and Applied Mathematics (Edinburgh, Scotland) *geninfo.iciam@meetingmakers.co.uk*;  
*http://www.atjs.ed.ac.uk/conferences.iciam99/*

**10–22** 40th International Mathematical Olympiad (Romania)

**15–17** 2nd Joint Meeting of British Society for History of Mathematics and Canadian Society for History and Philosophy of Mathematics / Société canadienne d'histoire et de philosophie des mathématiques (IHPST, Toronto) *cfraser@chass.utoronto.ca*

**26–Aug 4** International Conference and Workshop on Valuation Theory (Saskatoon, Saskatchewan) *Franz-Viktor Kuhlmann (fvk@math.usask.ca) fvk@usask.ca*;  
*http://math.usask.ca/fvk/Valth.html*

### AUGUST 1999

**14–19** Mathematical Problems arising from Biology *probability@fields.utoronto.ca*; *www.fields.utoronto.ca*

**23–28** First 3 on 3 Canada-China Math Congress (Tsing Hua University, Beijing, China) *http://www.pims.math.ca*

### NOVEMBER 1999

**14–18** International Conference on Mathematics Education into the 21st Century (Cairo, Egypt) *A Rogerson (arogers@mgs.vic.edu.au)*

### DECEMBER 1999

**11–13** CMS Winter Meeting / Réunion d'hiver de la SMC (Université de Montréal) *http://cms.math.ca/CMS/Events/*

### JUNE 2000

Canadian Mathematics Education Study Group Meeting (UQAM, Montreal) *Dates to be announced*

**10–13** CMS Summer Meeting / Réunion d'été de la SMC (McMaster University, Hamilton, Ontario) *Monique Bouchard (meetings@cms.math.ca)*

### JUILLET 1999

### AOÛT 1999

### NOVEMBRE 1999

### DÉCEMBRE 1999

### JUIN 2000

4–7 Annual Meeting of the Statistical Society of Canada (Ottawa, Ontario) *adrsg@uottawa.ca*

12–15 Integral Methods in Science and Engineering (Banff, Alberta)  
*Peter.Schiavone@ualberta.ca*

**JULY 2000****JUILLET 2000**

11–24 41st International Mathematical Olympiad (Korea)

**SEPTEMBER 2000****SEPTEMBRE 2000**

22–24 American Mathematical Society Central Section Meetings (University of Toronto)  
*http://www.ams.org/meetings/*

**DECEMBER 2000****DÉCEMBRE 2000**

**CMS Winter Meeting / Réunion d'hiver de la SMC**  
**(University of British Columbia, Vancouver, B. C.)**  
*Monique Bouchard (meetings@cms.math.ca)*

**JUNE 2001****JUN 2001**

Canadian Mathematics Education Study Group Meeting  
(University of Alberta, Edmonton)

Annual Meeting of the Statistical Society of Canada  
(Vancouver, British Columbia)

**SUMMER 2002****ÉTÉ 2002**

25th Anniversary Canadian Mathematics Education Study Group Meeting (Queen's University, Kingston)

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