IMU-Net 91: September 2018
A Bimonthly Email Newsletter from the International Mathematical Union
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1. EDITORIAL

Welcome to IMU-Net! I am Carlos Kenig, President elect of the IMU. I would like to introduce myself. I was born and raised in Buenos Aires, Argentina, where I received my early education. I obtained my PhD from the University of Chicago, in 1978. I returned to the University of Chicago as professor in 1985, and I have remained there ever since. My research is in harmonic analysis and partial differential equations. Besides doing research and teaching, I have been, over the years, fortunate to serve the mathematical community in several capacities. My approach to all of these activities has always been collaborative.

I was extremely surprised when I learned that I had been nominated for the presidency of the IMU. This was a great honor and will be a huge responsibility. I will approach the IMU's work collaboratively, with the help of the Secretary General, Helge Holden, the very capable and dedicated staff at the IMU's permanent office in Berlin, the newly elected Executive Committee (EC) and with the always generous help from the world's mathematical community. To smooth the transition for the new administration of the IMU, the current one generously invited me to participate in the last two EC meetings, which was extremely helpful. Also, during the ICM in Rio there was a meeting of the incoming and outgoing EC's, in which we could begin to learn about the pressing issues and the functioning of the IMU. I am very thankful for these opportunities.

At the General Assembly in Sao Paulo, many important decisions were taken, which will have a great influence on the future of the IMU. A very important decision was to make permanent the IMU's office in Berlin, housed at the Weierstrass Institute (WIAS) in Berlin. This was made possible through the generous support of the German Government and the State of Berlin. The permanent office has already greatly extended the scope of activities the IMU is capable of undertaking. That being said, the staff is now at maximum capacity and to continue further expansion of the activities of the IMU will require new, creative administrative structures, a challenge moving forward.

Rio's ICM18 was the first Congress to be held in the southern hemisphere. It was a great success thanks to the tireless work of the Organising Committee chaired by Marcelo Viana and the Program Committee chaired by Janos Kollar. During the Congress we had the chance to celebrate

extraordinary achievements in the mathematical sciences, through the IMU prizes, and to learn about the latest developments in the many interesting lectures. One of the important decisions made at the General Assembly (GA) in Sao Paulo was the creation of a Structure Committee for future ICM's. This committee will be responsible for the general scientific structure of the ICM, that is, the size and description of the sections, and all related issues. This will alleviate the huge workload of the Program Committee that was previously tasked with this as well as the selection of all invited and plenary speakers (I chaired the Program committee for ICM14, and I am thus keenly aware of the difficulty of this task). The Structure Committee will be a forum in which to constantly update the scientific structure of the ICM, reflecting the changes in mathematics and its applications. The first chair of the Structure Committee will be L. Lovasz, past president of the IMU.

Another important decision taken at the GA in Sao Paulo, was that ICM22 will take place in St Petersburg, Russia. We are all greatly looking forward to this! It is my pleasure to announce here that Martin Hairer, Imperial College, has agreed to chair the Program Committee for ICM22.

The work of the IMU is very complex, involving a number of components, some of which take the form of committees and commissions. The year 2014 marked two watershed moments: a woman was president of the IMU for the first time and the first woman was chosen as a recipient of the Fields medal. In 2015, the EC approved the creation of the Committee for Women in Mathematics (CWM), to promote international contacts between national and regional organisations for women and mathematics. The Committee has been extraordinarily active and successful, putting forward a number of initiatives and always supporting the ideal of gender equality in the mathematical sciences (and in all sciences). While some progress has been achieved in this direction, much work remains to be done. As President of the IMU I will actively promote progress in this direction.

Having been born and raised in the developing world, I am keenly aware of its needs and challenges. The great progress in information technology has facilitated the task of conducting research in mathematics in the developing world. However, much remains to be done. The IMU participates in this effort through the Commission for Developing Countries (CDC), which, with very limited resources, manages to have a disproportionately high impact. As President of the IMU I will work to help further progress in this, to help unleash the full potential of the developing world in the mathematical sciences, with the help of the world mathematical community. An encouraging development is that the new Executive Committee, elected at the GA in Sao Paulo, has members from all continents (excluding Antarctica). In particular, it will be the first time in IMU's history, that an African mathematician (Loyiso Nongxa, vice-president elect of the IMU) will be a member of the EC.

At the GA in Sao Paulo, I had the pleasure of meeting the leadership of the International Commission on Mathematical Education (ICMI), the Committee on Electronic Information and Communication (CEIC) and of the International Commission on the History of Mathematics (ICHM), all committees and commissions of the IMU. I look forward to furthering my education on their activities, and working together with them.

The next four years will be very busy, but hopefully, very productive! I look forward to working on these challenges with the whole mathematical community.

Carlos Kenig

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2. IMU GENERAL ASSEMBLY IN SÃO PAULO: IMPORTANT DECISIONS

The 18th meeting of the IMU General Assembly (GA) took place in São Paulo, Brazil, July 29-30. Some of the most important decisions were reported in IMU-Net 90: July 2018. These include the results of various elections and the decision regarding the host for the ICM 2022.

However, many other issues were discussed, including the ones described below. A complete list of Resolutions can be found on the IMU website. The minutes from the General Assembly, once completed, will be forwarded to the Adhering Organisations.

1. The IMU Secretariat has been based in Berlin, Germany since 2011. We are generously supported by Germany, and hosted by the Weierstrass Institute for Applied Analysis and Stochastics (WIAS). The annual financial support from Germany exceeds the membership dues from all IMU members. The initial agreement was made for a 10-year period, and the future of this agreement was on the agenda of the GA. The General Assembly decided unanimously to extend the agreement with WIAS indefinitely. Therefore, the IMU Secretariat will remain in Berlin. The GA also expressed its gratitude to Germany and WIAS for their generous support.

2. Regarding the Rolf Nevanlinna Prize, the GA passed the following Resolution.
"The General Assembly requests the 2019-2022 IMU Executive Committee, giving due consideration to all the issues involved, to determine and set up statutes for a prize continuing and with the same purpose and scope as the Nevanlinna Prize but with a new name and appropriate funding to be secured. The statutes of the new prize will be sent to the Adhering Organisations for approval by a postal ballot."
The Executive Committee will discuss this issue at its first meeting in 2019.

3. The scientific structure of the ICMs. The sectioning of contemporary mathematics into sub-disciplines at the ICM has been the responsibility of the Program Committee. In addition, the Program Committee has the responsibility to select the speakers at the ICM, based on recommendations from its panels. Since the Program Committee has to appoint these panels, work in full confidentiality, and complete its task within two years, its responsibilities have been considerable. To improve the situation, the GA decided to create an ICM Structure Committee to formulate the structure of future ICMs, while the responsibility to select all speakers will reside with the Program Committee. The Executive Committee has begun to consider the composition of the Structure Committee, which will be chaired by László Lovácz.

4. Kyrgyzstan was admitted as a new member of the IMU in Group I. Furthermore, the classification of Chile and Portugal was changed from Group II to Group III.

Helge Holden
Secretary General of the IMU

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3. A BRIEF REPORT ON ICM 2018

ICMs have become very big and complex enterprises. From August 1 to 9 this year, over 10,000 people (including the 3,018 registered participants) visited the Riocentro convention center in Rio de Janeiro to enjoy 21 plenary lectures, 176 invited section lectures, 18 prize or special lectures, 5 public lectures, 408

short communications, 240 posters, the opening and closing ceremonies, the social dinner and a wide range of social occasions. Half of those were students and teachers from local schools, attending the public lectures and visiting the many attractions offered in the exhibition area.

About 41% of the registered participants came from South America, 20% from Europe, 17% from Asia, 14% from North America, 6% from Africa, and 2% from Oceania. The Open Arms program, funded by IMPA and the Brazilian Mathematical Society with a generous contribution from the IMU, provided travel support to 880 mathematicians from the developing world, 33% of whom were women.

The organisation occupied a total 37,800 m^2 and involved 1,529 professionals, including 224 artists who performed at the opening ceremony and the social dinner. During those days, 3.9 million beverages and 2.4 million food units were served at the ICM venue. The visibility of the Congress was much enhanced by the presence of 154 journalists from 9 different countries, and by the vigorous work of our press team: the ICM 2018 social networks reached 2.36 million users, the website (www.icm2018.org) had 416,000 page views and the mobile app was downloaded by nearly 2,000 people.

A few unpredictable incidents made our lives as organisers a whole lot more interesting during that period. The fire that ruined the main pavilion just two days before the opening, and the rush to set a new one in time. The theft of Caucher Birkar's Fields medal (which, according to Caucher himself, made him – and the medal – a lot more famous!), and the successful effort to have it replaced during the Congress. And a few other incidents the participants didn't even realize happened.

We are especially happy and proud that we were able to hold the award ceremony for the Brazilian Mathematical Olympiad (OBMEP) at the venue during the ICM. The presence of the 576 gold medalists, wearing distinctive blue jerseys, was a highlight of the Congress opening ceremony, and a strong assertion that this ICM in Brazil has always been about the future.

Feedback from the participants has been invariably very positive, often outright enthusiastic, and that is most gratifying. We worked hard to make this ICM a memorable event for everyone, and it feels good to be told we achieved our goal. The praise extends to the high quality and careful preparation of the lectures, for which the credit belongs to the Program Committee and, especially, the speakers themselves.

Now that everyone has left, a few important tasks remain. To finish volume 1 of the proceedings, to which all the prize winners and plenary speakers have contributed; the papers of the overwhelming majority of invited speakers appeared already in volumes 2 to 4. To organise the photos and videos of the lectures and post them on the website and YouTube. To produce all the certificates and the unavoidable financial reports. Most of it should be done by the end of this year.

And then it will be time for us to start thinking about ICM 2022 in Saint Petersburg!

Marcelo Viana

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4. ICM 2018: PANEL REPORTS

ICM 2018 hosted five IMU Discussion Panels. Very brief reports on these panels are collected below:

The panel *The gender gap in mathematical and natural sciences from a historical perspective*, organised by the IMU Committee for Women in Mathematics (CWM), took place on August 2 at ICM2018. It attracted a broad audience of around 200 people, with about 1/4 of men among the attendees. The panel, chaired by Caroline Series (Warwick University, UK, LMS President), had three panellists. Marie-Francoise Roy, (Univ. Rennes, France, CWM Chair) presented the initiatives of CWM, focusing mainly on

the interdisciplinary Gender Gap in Science Project https://gender-gap-in-science.org/ funded by ICS that IMU is leading. June Barrow-Green (Open University, UK, chair of the Committee on the History of Mathematics) talked about the historical context of the gender gap in mathematics and Silvina Ponce-Dawson (Univ. Buenos Aires, Argentina, IUPAP vice-chair and Gender Champion) described the International Union of Pure and Applied Physics Working Group on Women in Physics; its initiatives and perspectives. A lively discussion and a reception followed. The report on the Panel will be part of the ICM proceedings.

The panel *How can mathematicians contribute to planetary challenges?* took place on August 7 at ICM2018. Intended to a broad audience it attracted, in addition to applied mathematicians, several pure mathematicians and young researchers eager to learn more about the role that mathematics can play in global change and sustainability issues. The panel, chaired by Hans Engler, addressed the fact that the planetary challenges offer interesting research opportunities: indeed, the issues are essentially multidisciplinary with physical, biological and life science or economic components, and even social and political ones. The panelists, Amit Apte, Maria Esteban, Edward Lungu, Pedro Leite da Silva Dias and Maria Sagastizábal described the needs for mathematical modelling in many domains from weather and climate in different regions of the world to energy, wildlife and agriculture resource management, and they illustrated their message with success stories. More details at: http://www.icm2018.org/wp/2018/08/07/can-mathematicians-contribute-to-planetary-challenges/

Three further panels were organised by IMU (which is very grateful to Ingrid Daubechies for her efforts) on the afternoon of Tuesday 7th August at ICM 2018:

Machine-Assisted Proofs by Luís Cruz-Filipe, Harald Helfgott, James Maynard, Bjorn Poonen and Pham Huu Tiep, moderated by James Davenport. The panel reflected on their uses of machine-assisted proofs and how the current scientific infrastructure did, or did not, support these. The full minutes are at http://arxiv.org/abs/1809.08062 . It is hoped that this will be a living document as the panellists and others reflect more on the subject.

International Mathematical Knowledge Trust - IMKT: an Update on the Global Digital Mathematics Library by Thierry Bouche, Gadadhar Misra, Alf A. Onshuus, Stephen M. Watt, and Liu Zhen, moderated by Patrick D. F. Ion. The panel addressed the IMKT's recent developments in the area of the Global Digital Mathematical Library, and in particular its specific initiatives (see https://imkt.org/activities/initiatives/), and for the panel in general see https://imkt.org/resources/events/ICM2018/ . They also addressed various questions around the Open Access debate, making it clear that IMKT as such was not a copyright lobbying organisation (though IMU through CEIC might be).

The panel and poster session *Strengthening Mathematics in the Developing World*, organised by Mama Foupouagnigni, Lena Koch, Angel R. Pineda and Polly W. Sy of the IMU Commission for Developing Countries (CDC) took place on August 7 at ICM 2018. The objective was to share information about mathematical development activities with mathematicians at the ICM and to serve as a catalyst for interactions between mathematicians, organisations and funding agencies. It attracted a broad audience of about 400 people from around the world. The panel, chaired by Angel R. Pineda (Manhattan College, USA, IMU CDC member), had seven panellists: Jose Maria P. Balmaceda (University of the Philippines, Philippines, president of the Southeast Asian Mathematical Society), Nouzha El Yacoubi (Mohammed V University Rabat, Morocco, president of the African Mathematical Union), Alejandro Jofré (University of Chile, Chile, secretary of the Mathematical Union of Latin America and the Caribbean), Wandera Ogana (University of Nairobi, Kenya, president of the IMU CDC), Paulo Piccione

(University of São Paulo, Brazil, president of the Brazilian Mathematical Society) , Marie-Françoise Roy (University of Rennes 1, France, president of the IMU Committee for Women in Mathematics) and Yuri Tschinkel (Courant Institute of Mathematical Sciences, New York University, USA, director of the Mathematics and Physical Sciences Program of the Simons Foundation). The panellists presented multiple mechanisms for supporting mathematics in developing countries geared toward students, teachers, and researchers. The panel was followed by a poster session where 17 organisations supporting mathematics in the developing world were represented. More information about the panel, including the slides, photos and a video on the panel made by ICM TV can be found here: https://www.mathunion.org/cdc/icm/cdc-panel-discussion-and-poster-session-during-icm-2018

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5. FUNDING CALL FROM THE IMU COMMITTEE FOR WOMEN IN MATHEMATICS FOR 2019

The IMU Committee for Women in Mathematics (CWM) invites proposals for funding of up to €3000 for activities or initiatives taking place in 2019, aimed at either:

a) Establishing or supporting networks for women in mathematics, preferably at the continental or regional level, and with priority given to networks in developing or emerging countries. Help could include, for example, funding meetings, organising round-tables at mathematical regional events, or support in creating websites. Please note that CWM will normally not fund activities taking place in the same or nearby location as one that has already been funded in the period 2015-2018 (see www.mathunion.org/cwm/ for the list).

b) Organising a mathematical school open to all with all women speakers and mainly women organisers. This type of mathematical school, which should include a significant proportion of time devoted to background and introductory material, can be a very effective way of showcasing the contributions of women mathematicians and creating an opportunity for female students to be in touch with women leaders, without excluding male students. Expenses covered by CWM could include, for example, costs for speakers, women organisers, or for women participants.

c) Other ideas for researching and/or addressing issues encountered by women in mathematics may also be considered.

Note that funding for individual research projects is not available.

Proposers should write a short description (no more than two pages) explaining the nature of their activity and how it fulfils one of the above aims, as well as indications on how the CWM money would be spent. Proposals should further include information about other sources for funding if available.

There will be only one call for applications regarding activities in 2019 with deadline **15 December, 2018**. Applications should be sent to applications-for-cwm@mathunion.org.

The authors of successful applications will be informed no later than 31 January, 2019. Depending on demand, successful applications may not be funded in full. Successful applicants will be asked to send a short report of the activity with details of how the budget was spent before the end of 2019.

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6. THE INTERNATIONAL DAY OF MATHEMATICS: NEWS, LOGO AND WEBSITE

News: The proposal that UNESCO proclaims March 14 (Pi Day) as the International Day of Mathematics (IDM) is on the agenda of the 2018 October meeting of the Executive Board of UNESCO.
The declaration is proposed jointly by the Permanent Delegations at UNESCO of Bulgaria, Canada, Dominican Republic, Ghana, Ivory Coast, Mexico, Nigeria, Paraguay, Portugal, Russia, Saudi Arabia, Senegal, Solomon Islands, Syria, Uruguay and Zambia. If approved by the Executive Board of UNESCO, the declaration will be on the agenda of the next General Conference of UNESCO in the fall of 2019. If agreed at the General Conference, the first official celebration of IDM will be on March 14, 2020.

Call for bids for hosting the IDM website: The IMU invites the Adhering Organisations to submit bids for hosting of the IDM website, which will have the URL www.idm314.org. The Adhering Organisations may decide to submit a bid or to pass the information to another organisation in their country. **The deadline for this call is January 10, 2019.**

The IDM website should be designed to allow versions and/or mirror images in several languages covering at least the following topics:
(i) The theme of the year;
(ii) All activities occurring around the world, posted by regions and countries, possibly with an event map;
(iii) A resource section containing Open Source curriculum enrichment material and/or proposals of activities for the public related to the theme, offered in several languages; (iv) A section for the media including presentations of the centralized international events, for instance the celebrations at UNESCO and press releases;
(v) A blog;
(vi) A news section.
The website may also offer a presence on Social Media.
Apart from the description of the proposed website, the bid should also contain the description of the proposed administrative support to the IDM website.

More details will be sent to the IMU Adhering Organisations through a circular letter and will be posted on www.mathunion.org/outreach/IDM and http://www.idm314.org.

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7. COMPETITION FOR THE LOGO OF THE INTERNATIONAL DAY OF MATHEMATICS

The IMU announces a competition for the logo of the IDM.
Ideally, the logo should be presented in different formats for web use and for printing on posters. An editable version of the winning logo will be needed for use in high quality work. If this is impossible, IMU may call on a professional graphic designer for this purpose.
Logos together with author information (full name, date of birth, career or profession, personal webpage if any, and email) should be submitted by email at idm@mathunion.org. An e-mail confirming receipt of submissions will be sent. In case of not receiving a confirmation within 48 hours, please resend the work.
An individual may submit more than one logo.
The deadline for submission of logos to the competition is **December 31, 2018**.
The Executive Committee of the IMU will nominate a jury and its decision will be final.
The author of the winning logo will assign all rights to the logo to the IMU, as well as the permission for

slight modifications. In return, the name of the winning author will appear on the IDM website.

More details will be sent to the IMU Adhering Organisations through a circular letter and will be posted on www.mathunion.org/outreach/IDM and http://www.idm314.org.

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8. ICIAM PRIZES 2019

The 2019 ICIAM Collatz prize goes to Sidharta Mishra (ETH, Zürich, Switzerland) for his breakthrough contributions that skillfully combine modelling of real world problems and rigorous mathematical analysis with the development of efficient and accurate numerical schemes and high performance computing.

The 2019 ICIAM Lagrange prize will be awarded to George Papanicolau (Stanford University, USA) for his brilliant use of mathematics to solve important problems in science and engineering; in particular, problems involving inhomogeneity, wave propagation, random media, diffusion, scattering, focusing, imaging, and finance.

The 2019 ICIAM Maxwell prize goes to Claude Bardos (Université René Diderot, Paris, France) for his seminal contributions to nonlinear partial differential equations, kinetic theory, and mathematical fluid mechanics.

The 2019 ICIAM Pioneer prize will be awarded to Yvon Maday (Pierre and Marie Curie University, Paris-6, France), in recognition of his leading role in the introduction of powerful methods for numerical simulation, such as spectral methods, reduced order modelling, domain decomposition, models and simulation in medical sciences, fluid-structure interaction, and ab-initio chemistry. Several of his result helped launching start-ups, and they are intensively used in industry.

The 2019 ICIAM Su Buchin prize goes to Giulia di Nunno (Oslo University, Norway), for her long-lasting record of actively and efficiently encouraging top-level mathematical research and education in developing African countries.

These prizes will be awarded during the Opening Ceremony of the ICIAM 2019 Congress (Valencia, Spain, 15-19 July 2019).

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9. A NEW MATHEMATICAL WEBSITE FOR THE PUBLIC

A new website devoted to the popularization of Mathematics has been launched in France. It is called "Florilège de la popularisation des mathématiques" (Anthology of popularization in mathematics).

This site collects more than 1300 actions made in France or in French, in the past and in the present, and directed to the public. It includes references to books, magazines, comics, lectures, exhibitions, competitions, movies, videos, etc.

Florilège addresses everyone with an interest in mathematics, in particular journalists, high-school students and teachers, university students, professional mathematicians and, of course, the public.

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10. SUBSCRIBING TO IMU-NET

There are two ways of subscribing to IMU-Net:

1. Click on http://www.mathunion.org/organisation/IMU-Net with a Web browser and go to the "Subscribe" button (at the bottom) to subscribe to IMU-Net online.

2. Send an e-mail to imu-net-request@mathunion.org with the Subject-line:
Subject: subscribe

In both cases, you will receive an e-mail to confirm your subscription so that misuse will be minimized. IMU will not use the list of IMU-Net emails for any purpose other than sending IMU-Net, and will not make it available to others.

IMU-Net is the electronic newsletter of the International Mathematical Union.
More details about IMU-Net can be found at: http://www.mathunion.org/organisation/imu-net/.
You can find here, for instance, detailed information about subscribing to the IMU-Net mailing list and unsubscribing from it.
