



CDC Panel Session at the International Congress of Mathematicians 2022 (ICM)

Online International Cooperation in Mathematics: Challenges and Opportunities for Developing Countries on Tuesday, July 12, 2022 from 2.15PM– 4.15PM (CET)

The aim of the activity is to learn about the difficulties of mathematicians and institutions across continents, in the face of maintaining international cooperation when global mobility is limited. And just as importantly, the solutions they have found to overcome these challenges.

Special emphasis will be put on identifying how communication technology can be used to support mathematicians in developing countries, while recognizing the possibilities of a digital divide – where technological disparities may lead to further exclusion and disadvantage.

The panel make up will be as follows:

Panel Chair:

Carlos E. Kenig, IMU President

Panellists:

- Olga Gil Medrano, Commission for Developing Countries (IMU-CDC)
- Anjum Halai, International Commission on Mathematical Instruction (ICMI)
- Marie Françoise Roy, Committee for Women in Mathematics (CWM)
- Christophe Ritzenhaler, Centre International de Mathématiques Pures et Appliquées (CIMPA)
- Claudio Arezzo, International Centre for Theoretical Physics (ICTP)
- Mama Foupouagnigni, African Institute for Mathematical Sciences (AIMS) Network Headquarter Kigali
- Guillermo Cortiñas, University of Buenos Aires, Argentina
- Edy Tri Baskoro, Institut Teknologi Bandung (ITB), Indonesia



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Name:

Olga Gil Medrano

International Mathematical Union, Commission for Developing Countries (CDC)

Short Description of Organization:

The CDC offers targeted funding programs to enable research and cooperation between mathematicians in developing countries and the rest of the world by providing tailored support to mathematicians with a selection of funding opportunities for graduates, PhD students, postdocs, researchers and staff offered by the IMU or in collaboration with various mathematical institutions and organizations.

The objectives of these programs are to enhance the mathematical capacity in developing countries to conduct research, to support local initiatives and capacity building programs.

Abstract:

During the past two years IMU-CDC has been trying to accommodate its traditional programs offering mainly support for travel expenses to the restricted mobility situation. In the presentation we report the changes in the CDC policies and the experiences of mathematicians granted in the two programs “Conference Support” and “Volunteer Lecturers” in combining both onsite and online activities.



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Name:

Anjum Halai
International Commission on Mathematical Instruction (ICMI)

Short Description of Organization:

The International Commission on Mathematical Instruction is a global community devoted to the advancement of mathematics education at all levels. Its programs promote research, cooperation and development internationally.

Abstract:

Networks to promote international cooperation in mathematics education: Lessons from the CANP Project of ICMI

Creating networks and reaching out to the critical mass in mathematics education community is a potent strategy to maximize the impact of reform in mathematics education. The Capacity and Network Project (CANP¹) is a step in this direction. A key purpose of CANP is to create networks in low- and middle-income countries to enhance mathematics education at all levels. It aims to develop the educational capacity of those responsible for mathematics teachers, and create sustained and effective regional networks of teachers, mathematics educators and mathematicians, also linking them to international support.

To date ICMI has supported five CANPs each with the common purpose of advancing mathematics education but differing in its approach and methodology. The community of mathematicians and mathematics educators across the five CANPs is a significant resource because working at the grassroots level they provide insights into key issues and challenges in supporting mathematics education. An important feature of CANP is that it brings together mathematicians and mathematics educators to enable teachers to upgrade their mathematics knowledge and for mathematicians to better understand the changed nature of mathematics for teaching. Through building on local networks and sharing international experiences, the CANP community aims to deepen and broaden the understanding of lessons learnt in the process of promoting inclusive and quality mathematics education.

In the wake of the recent pandemic, the proliferation and expansion of online education infrastructure has opened significant opportunities for international cooperation in mathematics. However, there are challenges due to the uneven and inequitable access to online and digital infrastructure due to socio-cultural, historical, and political reasons. Drawing on the experience of CANP, this paper will elaborate on the challenges and possibilities of online international cooperation in mathematics, especially in the context of low- and middle-income countries.

¹CANP is supported by the International Commission of Mathematical Instruction (ICMI) supported by the International Mathematical Union (IMU), UNESCO and the International Council of Scientific Unions (ICSU) as well as regional governments and institutions. For further information on CANP please see <https://www.mathunion.org/cdc/scholarships/capacity-networking-project-canp-project-support>



Name:

Marie-Françoise Roy
International Mathematical Union, Commission for Women in Mathematics

Short Description of Organization:

The Committee for Women in Mathematics (CWM) of the IMU was created by the EC in March 2015, with the following terms of reference:

- (1) To promote international contacts between national and regional organizations for women in mathematical sciences;
- (2) To maintain up-to-date content on the Women in Mathematics part of the IMU website and, with appropriate assistance from the IMU, to ensure its technical development;
- (3) To consider how best to facilitate electronic communications among the community of women mathematicians internationally;
- (4) To work with groups, committees and commissions of IMU on topics pertaining to women mathematicians and their representation;
- (5) To publicize, and where needed to suggest, working practices that ensure equal opportunities for women mathematicians in universities and research institutions, for example appropriate funding arrangements, family friendly policies and facilities;
- (6) To report annually to the IMU Executive Committee and to propose actions that would foster equal treatment of women in the mathematical community and lead to an increase in the representation of women in mathematics at all levels.

Abstract:

Title: Women in Mathematics in Corona times

Summary

- Short presentation of CWM and the continental organizations for women in mathematics
- Three examples of recent activities with the help of digital and communication technology
 - o CWM ambassadors and their virtual meetings
 - o CWM call in Covid times
 - o May 12 initiative in Covid times



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Name:

Christophe Ritzenthaler
Centre International de Mathématiques Pures et Appliquées (CIMPA)

Short Description of Organization:

Located in Nice, France, CIMPA is a French association and a UNESCO 2 center. It benefits from the financial support of France, Germany, Norway, Spain and Switzerland. For more than 40 years, it has been promoting international mathematics research in cooperation with developing countries and contributing to the training of mathematicians in these countries. We operate in more than 100 countries.

We have many activities to do so: fellowships for students or young researchers to participate to short thematic programs in Europe and also research in pairs program for more advanced colleagues.

But mostly our actions take place in developing countries with courses and research schools. The latter gather during two weeks lecturers from all around the world and participants from the host countries or other developing countries from the region.

Abstract:

In 2021 we were able to

- organize 18 hybrid/online research schools;
- record and broadcast 7 online courses;
- support 14 young mathematicians to attend thematic semester remotely.

The main difficulty is often the lack of proper environment, like a classroom, for the lecturers and the participants. This changes the dynamic of the learning process and alter the quality of the exchanges, and we will explain partial solutions we found with respect to these issues.

On top of the obvious advantages (lowering carbon footprint, preserving activities when it is impossible to travel and increasing the outreach), we will see how one can extend the duration of our actions thanks to preparation or follow-ups with online technology, in particular through an open-source Learning Management System we designed.



Name:

Claudio Arezzo

Abdus Salam International Center for Theoretical Physics (ICTP)

Short Description of Organization:

Based in Trieste, Italy, the **Abdus Salam International Centre for Theoretical Physics (ICTP)** is a Category 1 United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute, operating under the tripartite agreement between the Italian Government, the International Atomic Energy Agency (IAEA) and UNESCO.

The mission of ICTP rests on three equally important foundational pillars:

- ICTP conducts world-class research in frontier areas of science and strives to maintain a conducive environment of scientific enquiry for the entire ICTP community.
- ICTP is dedicated to fostering growth of advanced studies and research in physical and mathematical sciences through high-level scientific programmes especially in support of excellence in the developing world to help bridge the knowledge divide.
- ICTP is committed to science advocacy and international cooperation through science by providing an international forum of scientific contact for scientists from all countries.

Abstract:

Since the explosion of the pandemic at the beginning of 2020 ICTP has used digital communication technologies to support all its training and research programs. With the exception of our Pre-PhD and Postdoctoral programs all our activities have taken place online until mid-2021, while after various forms of hybrid formats have been implemented.

Since the beginning of the pandemic ICTP-Math has organized in online/hybrid format:

- Master courses online when physical presence forbidden;
- almost 100 seminars;
- 6 special lecture series/working groups;
- 4 online Research Schools, 8 hybrid Schools (2 in Eastern Africa with EAUMP, Brazil, Vietnam and 4 Trieste).

We will discuss which lessons we have learnt depending on the aim and target of each program.

- Training: it is clear that physical presence in the classroom is still significantly better than online teaching (mainly done on Zoom). Yet, with the support of parallel asynchronous communication tools (e.g. Moodle, Slack et al.) strong participation of students/participants can indeed be achieved, with the clear advantage of a bigger outreach. Recording and making lectures available on channels as YouTube in real time is also a great help.
- Towards Research: while the classical seminar format has slowly become less appealing, new forms of online/hybrid interactions have emerged and are certainly going to remain after the pandemic. In particular the format of having a small group of scientists in one place running a thematic program in collaboration with (max 10-15) scientists online turned out to



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be very successful. Typically, such activities last much longer than the classical “School on...”, take only few hours per week (also to address the time-zone problem for the online participants), and can indeed produce original work by the participants. ICTP is about to open a call for such initiatives.

Another interesting aspect of the impact of communication technologies on our work is that ICTP member can now interact with many more scientists/institutions/research groups around the world.

The main challenge is to address the problem of costs of the infrastructure required especially in developing countries. Costs to cover data usage are very high in large parts of the developing world and until capillary infrastructures (e.g. NREN) are developed we will not be able to call our activities fully inclusive.



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Name:

Mama Foupouagnigni
AIMS Global Network and Centre, AIMS-Cameroon

Short Description of Organization:

Established in 2003, the African Institute for Mathematical Sciences (AIMS) is Africa's first and largest network of centres of excellence for innovative post-graduate training in mathematical sciences. We enable Africa's youth to shape the continent's future through Science, Technology, Engineering and Mathematics (STEM) education, public engagement and research. We have five centres of excellence in South Africa, Senegal, Ghana, Cameroon and Rwanda.

AIMS Cameroon was established in 2013 with the support of the government of Cameroon, it is the fourth Centre of Excellence to be created under the AIMS Global Network (AIMS Next Einstein Initiative). AIMS Cameroon offers:

- A Master's Degree in Mathematical Sciences through a 10-month research-oriented Structured program and an 18-month Co-operative (Co-op) Education program with a direct link to industry through work placements
- A Teacher Training Program (TTP) designed to improve learning outcomes in mathematics for secondary school students
- A Research Centre led by a Chair of Research in Mathematics and its Applications

Through its facilities, partnerships, scientific output, and pan-African character, AIMS Cameroon is poised to bring Cameroon to the forefront of African science. AIMS Cameroon is located in Limbe in the South West Region of Cameroon.

Abstract:

In this talk, we first provide basic information about the Pan-African Network of Centres of Excellence in Mathematical Sciences called The African Institute for Mathematical Sciences, then keeping in mind our Pedagogic model which can be summarised as "The highly motivated and top African students trained using a unique innovative model by world class faculty-- including Fields Medallists and Nobel Laureates--- in a 24/7 enabling learning environment", we explain how the limited international mobility due to Covid-19 impacted our academic activities pushing us to make appropriate and intensive use of eLearning.



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Name:

Guillermo Cortiñas
IMAS-DM, FCEN, Universidad de Buenos Aires and Conicet

Short Description of Organization:

The Santaló Math Research Institute, IMAS, is a research institute belonging jointly to the University of Buenos Aires, UBA and the Argentine National Research and Technology Council, CONICET. It is the research institute of Mathematics Department (DM) of the School of Exact and Natural Sciences (FCEN) of the UBA.

Abstract:

The Mathematical Congress of the Americas 2021 as a fully online event that took place virtually in Buenos Aires in July 2021. It included plenary and invited talks, as well as 38 thematic sessions, and a prize award ceremony, where the Solomon Lefschetz Medals, and the Americas and MCA prizes were awarded.

Advantages and disadvantages

- Pros: the online format is much cheaper than the in-person format. This is relevant as the hosting institution is to bear the cost of lodging the plenary and invited speakers. Although the direct contact an in-person meeting is unmatched, the online format does allow for some degree of interaction, and above all, makes meetings such as MCA 2021 possible at a time where travelling and even going out of one's own homes was complicated.
- Cons: As indicated above, the kind of interactions an in-person meeting allows cannot be matched in a virtual meeting. The online format is also heavily dependent on technology working smoothly. We were lucky, for example, that the power-cut that our school suffered two weeks before the MCA meeting didn't happen again at the time of the MCA award ceremony that took place in our department conference room. In our case, also, we had a very short time to organize such a big congress (with 1644 registered participants, 38 special sessions, etc.) in the online form, which none in our team had done previously.



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Name:

Edy Tri Baskoro
Institut Teknologi Bandung, Indonesia

Short Description of Organization:

The Bandung Institute of Technology (Indonesian: Institut Teknologi Bandung, abbreviated as ITB) is a state, coeducational research university located in Bandung, Indonesia. Established in 1920, ITB is the oldest and first technology-oriented university in Indonesia.

Abstract:

Fostering Mathematics in a Pandemic Situation

The pandemic situation that has been lasting for more than two years gives us many restrictions in daily activities. However, the pandemic also provides us some opportunities and challenges. In this talk, we are going to present our experience in conducting some activities of scheduled webinars in order to revive research atmosphere and reactivate the existing collaborations during the pandemic time. Two webinars have been successfully conducted, namely Combinatorics Today Series and Mathematics Distinguished Lecture Series. By conducting them online, the quality is increasing and the coverage is wider in terms of the topics, origin of speakers and participants. This implies that the benefits will increase. Some challenges ahead will be also discussed to sustain this kind of activities.