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# The International Conference on Creative Mathematical Sciences Communication ONLINE EVENT (CMSC'20) AND CMSC'21

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You are warmly invited to register now for the 5<sup>th</sup> International Conference on Creative Mathematical Sciences Communication (CMSC'21) which will be held at Adam Mickiewicz University in Poznań, Poland, 2–6 July, 2021.

The International Conference on Creative Mathematical Sciences Communication (CMSC) is a unique gathering of computer scientists and mathematicians, teachers, musicians, dancers, dramatists, game designers, educators and communicators of all sorts.

Due to the pandemic, the in-person event scheduled for 2020 has been postponed and a short CMSC Online Event was organized as a “teaser” or trailer in order to feel the spirit of the full 5<sup>th</sup> CMSC 2021. See the website at <https://cmsc.wmi.amu.edu.pl> for the recording.

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The International Conference on Creative Mathematical Sciences Communication (CMSC) is a unique gathering of computer scientists and mathematicians, teachers, musicians, dancers, dramatists, game designers, educators and communicators of all sorts. The CMSC aims to explore new ways of communicating the rich mathematics, algorithmics, and open problems underlying computer science, including algorithmic and computational thinking across the curriculum, using outdoor activities, art, dance, music, drama and all forms of storytelling. The conference is an opportunity to share ideas and further refine and develop activities.

The unique interaction between artists (theatre, dance, graphic arts, music) and mathematicians / mathematics educators and communicators was seen at the first conference in the series, held at Charles Darwin University,

Northern Territory, Australia in 2013 (see [1]). It included camping in the outback and visiting Aboriginal schools.

The second CMSC was hosted at the Institute for Mathematical Sciences in Chennai (IMSc) by Ramanujam, and included a Science Day at a gathering of local, rural schools with hundreds of students attending.

The 3<sup>rd</sup> CMSC was hosted by Rudiger Reischuk at the University of Lübeck.

The TLC Art Academy of Wellington, New Zealand owned by Jonathan and Alice Wilson Milne was the site of the 4<sup>th</sup> CMSC and possibly the first time a computer science and mathematics conference was held at an art academy (see [2]). Jonathan led the conference participants in exploring the math found in minute details of our quick abstract paintings.

Due to the pandemic, the in-person event scheduled for 2020 has been postponed until 2 - 6 July 2021.

**You are hereby warmly invited to register now for this 5<sup>th</sup> International Conference on Creative Mathematical Sciences Communication (CMSC'21) which will be held at Adam Mickiewicz University in Poznań, Poland, 2–6 July, 2021.** The local organizing committee is headed by Dr. Małgorzata Bednarska-Bzdega. Partners include the Ignacy Jan Paderewski Academy of Music in Poznań, the Teacher Training Centre and the Supercomputing and Networking Center, and the International Cryptology Game the CODEBREAKERS. The conference is in cooperation with ACM-SIGCSE.

Conference website is at:

<https://cmsc.wmi.amu.edu.pl><<https://cmsc.wmi.amu.edu.pl/>

Welcome are submissions in various formats including activities, demonstrations, papers, workshops and ideas for leading round-table discussions, and activities that are still in development. Importantly, we welcome reports from scientists on how outreach has contributed to their research program.

Special Events include an *All Community Day* of mathematics activities for children and adults, a vibrant mathematical festival for all of Poznań where all students, teachers, parents are invited to participate in indoor/outdoor activities and workshops, to bring their favourite activities, and to critique activities that are still in development, such as a GPS Sorting Network or an Invisible Graph Dominating Set. The activity can be experimental – something that one would like to try and get participant feedback.

Challenge yourself to communicate our research culture to young people and you will inevitably confront fresh mathematical questions that will renew your own research, and your field. The creative dynamic is bi-directional. Welcome are reports from scientists on how outreach has contributed to their research program; such as, new theorems or research directions that have come about as a result of interaction with youngsters.

New curricula requirements in schools around the world offer an opportunity to attract children to open problems, to dare reach for gold. Combinatorics and computer science mathematics offer extensive opportunities in this regard.

A crypto game is being planned by the Enigma Museum, which is a showcase for cryptography, and for the Poznan mathematicians who broke the cyphers of the German Enigma during WWII.<sup>1,2</sup>

The Music Academy in Poznań will present its premier algorithmic music concert, the culmination of a course that teaches computer science, mathematics and music.

The LEGO Education Studio of Poznań will offer workshops for CMSC participants.

The related conference Contemporary Mathematics Education CME'21 (formerly known as Children's Mathematical Education), has announced its new dates: Monday 28 June - Thursday 1 July 2021 in Gdansk, Poland.

On 7 July, there will be a research discussion meeting (FPT Workshop) on Multivariate Algorithmics: Fresh Ideas and New Results, from 9:30 AM to 4 PM.

**We look forward to seeing you at the 5th International Conference on Creative Mathematical Sciences Communication (CMSC'21) Adam Mickiewicz University in Poznań, Poland, 2–6 July, 2021.**

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<sup>1</sup>Over the past 10 years, approximately 12,000 people from all continents have participated in the International Cryptology Game (<https://www.thecodebreakers.org>) available in many languages; see the trailer here: <https://youtu.be/8mGs3DR1ESo>.

<sup>2</sup>Here is a documentary (made in Poznań!) about Enigma conquerors. It was presented in Bletchley Park a few years ago: <https://player-cl3.ecdn.jint.pro/video/2243?callack=wtkplay.pl>. Another, new short documentary presenting new facts about the Enigma decryption can be viewed at: <https://www.youtube.com/watch?v=-kqUKzBBBdo>.

## **A Partial Report on the 2020 Online Event**

A short CMSC Online Event was organized as a “teaser” or trailer in order to feel the spirit of the full 5<sup>th</sup> CMSC 2021. The fast-paced program included presentations of no more than 15 minutes each, followed by friendly, enjoyable sharing of ideas and the stimulation of imaginative new possibilities in the remote style we are now, (at least for a while), adapting to.

The Creative Mathematical Sciences Communication (CMSC’20) Online Event, July 3 in Poznań, Poland, and around the world felt as exciting as a carnival as dancers whirled mathematical shapes, an algorithmic music ensemble gave a premier performance, and presentations described innovative activities attracting interest in the mathematical sciences. See the website at <https://cmsc.wmi.amu.edu.pl> for the recording.

Frances Rosamond, Chair of CMSC (University of Bergen) and Brett Stephenson (University of Tasmania and Guilford Young College) introduced the CMSC Online Event presentations. Brett and Sarah Carruthers (Vancouver Island University) were co-chairs of the Program Committee.

Frances began the Online Event with an introduction and brief history of CMSC.

Here are some of the highlights of the online 2020 event, just to whet your appetite for the upcoming 2021 event:

### **Judith Gal-Ezer “The Power behind the Power Point”**

Judith Gal-Ezer (Open Univ of Israel) is a special Scientific Guest of the City of Poznan, the Mayor of Poznań’s program Scientific Poznań. Prof. Gal-Ezer spoke about the teaching of computer-integrated mathematics and computer science education. She has received the 2007 SIGCSE Award for Outstanding Contribution to Computer Science Education.

### **Jerzy Pogonowski “Mathematical puzzles in education”**

Prof. Pogonowski is an expert in applications of logic, methodology of science and philosophy of mathematics the Department of Logic and Cognitive Science at the Adam Mickiewicz University in Poznań. He teaches mathematical logic, problem solving and general linguistics, and gave examples of teaching by mathematical puzzles.

**Julia Hybiak, Michal Janocha and Wojciech Kaszuba “Lambdaensemble”**

Joint forces of the Adam Mickiewicz University and the Academy of Music in Poznań premiered some of their algorithmic music. Ms Hybiak is a student of Adam Mickiewicz University and a primary school teacher of math and CS. Michal Janocha and Wojciech Kaszuba work in the Institute of Composing and Music Theory of the Academy of Music. They are involved in a course of algorithmic music, for CS, math and music students. We will see the results of the course at CMSC’21, at the Student Laptop Orchestra concert.

**Tim Bell “CS Unplugged: Update from New Zealand”**

A professor in the Department of Computer Science and Software Engineering at the University of Canterbury, Prof. Bell has changed the landscape of computer science study programs in New Zealand high schools. Bell is a leader of the *CS Unplugged* project and co-author of the interactive *CS Field Guide*, which is of tremendous value to teachers in this online teaching era (see <https://www.csunplugged.org>). He was awarded the 2018 SIGCSE Award for Outstanding Contribution to Computer Science Education.

**Katarina Cheng “Math through dance: A translation”**

Miss Cheng is a high school student from Santa Monica, California, USA. She showed her winning video in the Strogatz Prize Performance category, “Dancing the Dihedral Group”.<sup>3</sup>

**Rohan Jha “Internet security and cryptography”**

Mr. Jha is a high school student from India, living in New Jersey, USA. He won the Strogatz Prize for Math Communication in the Writing category by starting the magazine *Math Musings* to make math fun for everyone and to promote the beauty of math. Mr. Jha gave an introduction to elliptic curve cryptography.<sup>3</sup>

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<sup>3</sup>Katarina Cheng and Rohan Jha are two of the high school student winners of the worldwide Steven H. Strogatz Prize competition for Math Communication, awarded by the Museum of Mathematics (MoMath) in New York; see more about the competition at <https://momath.org/the-steven-h-strogatz-prize-for-math-communication/>).

### Andreas Daniel Matt “I AM A.I. – explaining artificial intelligence through interactive applications, games and stories”

Andreas Daniel Matt is Managing Director of IMAGINARY (IMAGINARY was initiated at the Mathematisches Forschungsinstitut Oberwolfach, a member of the Leibniz Association). Mr. Matt presented the Artificial Intelligence exhibit: [www.i-am.ai](http://www.i-am.ai) (see <https://www.i-am.ai/>). The exhibit examines questions like: How does a neural network learn? Why is a computer able to recognize the numbers I write? Can artificial intelligence be wrong sometimes? What are training data sets? Is it possible to perform a task without understanding it? Matt is a math communicator, fond of visual and interactive mathematics.

### The Dr. Schaffer and Mr. Stern Dance Ensemble

Karl Schaffer is a mathematician and a dancer. He teaches mathematics at De Anza College in Cupertino, California. Erik Stern is a musician, a dancer, and interdisciplinary educator, a Professor of Dance at Weber State University in Ogden, Utah. World-famous for their performances and workshops that unify concepts in both mathematics and dance, they perform at math and art conferences, in schools, and museums (e.g. the MoMath in New York, the National Science Museum in Seoul). They promote whole body math and movement activities for the K-12 classroom that unify concepts in both mathematics and dance (<http://schafferstern.org>).



Karl Schaffer and Erik Stern; Tim Bell & CS Unplugged; Poznan Academy of Music

**Pawel Perekietka and Michal Ren “Enigma codebreakers”**

Pawel Perekietka is a CS teacher in a high school in Poznań and author of a CS handbook for high schools. He is founder and organizer of Koala Team Contest for schools (Koala=Combinatorics+Algorithms+Logic). Michal Ren is an adjunct professor at Adam Mickiewicz University in Poznań. He is an organiser of many math and CS festivals for wide audiences. Pawel and Michal are co-authors of the Polish translation of CS Unplugged project resources. They discussed the Polish mathematicians, Marian Rejewski, Jerzy Różycki and Henryk Zygalski who broke the Enigma code and during WWII gave the methods to their British and French allies.

**Frances Rosamond “Conflict models by graphs”**

Informatics professor at the University of Bergen, Prof. Rosamond started the CMSC conference series in 2013. She gives *CS Unplugged* workshops around the world with her husband Michael Fellows. Rosamond has initiated Bebras in Norway. She presented conflict resolution using graphs (Vertex Cover) as an example of modelling that can be used by teachers in any subject area.

Please keep in mind that a recording of the event is now posted on the CMSC website at <https://cmsc.wmi.amu.edu.pl/news/> by the Poznań Supercomputing and Networking Center, that provided the technology expertise for the online mini-conference.

**References**

- [1] Rosamond, F. “Computer Maths: Curiosity, Art, Story! The First International Conference on Creative Mathematical Sciences Communication,” *Journal of Humanistic Mathematics*, Volume **3** Issue 2 (July 2013), pages 153-155. Available at: <https://scholarship.claremont.edu/jhm/vol3/iss2/16>
- [2] Rosamond, F. “CMSC 2018: 4th Creative Mathematical Sciences Communication Conference,” *Journal of Humanistic Mathematics*, Volume **8** Issue 1 (January 2018), pages 489-490. Available at: <https://scholarship.claremont.edu/jhm/vol8/iss1/30>