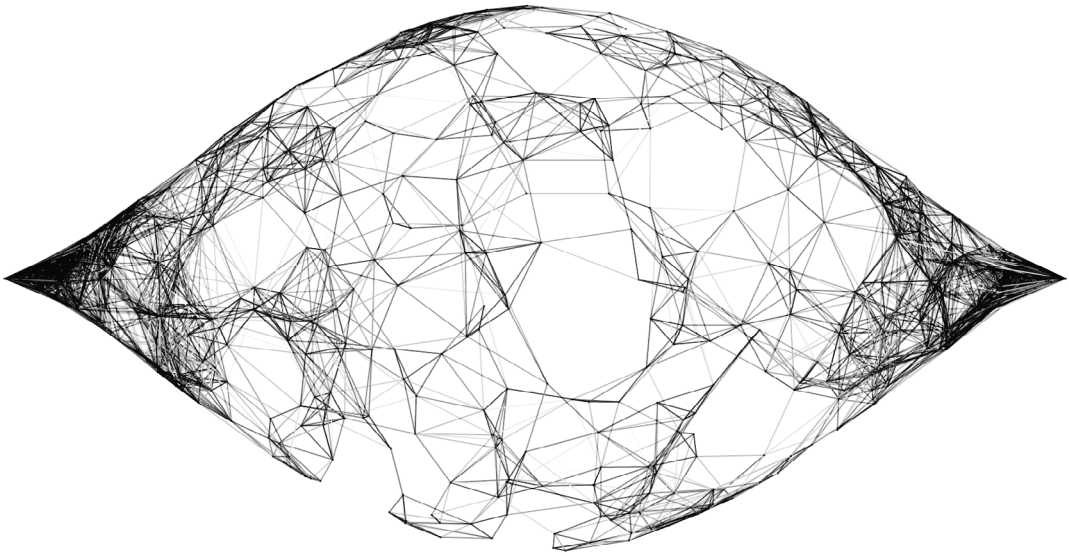
IMAGINARY CONFERENCE 2016



JULY 20–23, 2016
BERLIN, GERMANY
PROGRAM

WELCOME

Dear participants,

in the name of the organizational team and the scientific committee of the IMAGINARY conference, I wish you a warm welcome!

This conference is special in many ways: first, it is very international. We welcome participants from Asia, Africa, North America, South America, Europe, and Australia. Then, the topics covered are very diverse, from mathematical music to augmented reality, from 3d printing to new forms of mathematical writing, from math art to novel visualizations, from the new video format MathLapse to exhibition design and first-hand experience of communicating mathematics around the world. Probably the most special feature are the collaborative workshops. How can small teams at a conference jointly work on prototypes, new concepts and concrete outputs? This is an experiment and fits to the collaborative and open philosophy of IMAGINARY.

The IMAGINARY conference is made possible due to the generous support by the Volkswagen Foundation, which also offered special travel grants to selected participants. Thank you!

We wish you an enjoyable conference, happy networking and great exchange of knowledge and ideas,

Andreas Daniel Matt
and the IMAGINARY team

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CONFERENCE SCHEDULE

TUESDAY (AT 7ECM)

16:00	Visit IMAGINARY Exhibition at 7ECM	Foyer, 1st and 2nd floor
17:30	Public Lecture by Helmut Pottmann: „Mathematics in Modern Architecture“	Audimax (H0105)
18:30	Film by Ekaterina Eremenko: „The Discrete Charme of Geometry“	Audimax (H0105)
20:00	Get Together	tbd

WEDNESDAY

8:45	Registration
9:15	Opening

SESSION
KNOWLEDGE TRANSFER AND PEDAGOGICS OF MATHEMATICS COMMUNICATION

10:00	INVITED SPEAKER Richter-Gebert
10:30	Coffee Break
11:00	von Renesse
11:20	Lordick
11:40	Budin
12:00	Kilian
12:20	Bošković and Stanković
12:40	Lunch Break
14:00	Parallel Workshops
	Coffee Break
19:30	Dinner Break

THURSDAY

SESSION
2D AND 3D VISUALIZATION, CREATION OF EXHIBITS AND AGILE DESIGN AND TOOLS FOR MATHEMATICS COMMUNICATION

9:00	INVITED SPEAKER Karcher
9:30	Arroyo
9:50	Oliveira
10:10	Kelemen
10:30	Coffee Break
11:00	Brasó and Roelofs
11:30	Dome Building Activity and Lunch Break

SESSION
IMAGINARY AROUND THE WORLD

13:30	Park
13:45	Yocgo
14:00	Igodt
14:15	Armentano and Pereira
14:30	Additional Panel Members
14:45	Discussion
15:00	Coffee Break
15:30	Parallel Workshops
19:30	Conference Dinner

FRIDAY

SESSION
COMMUNITY, NETWORKING AND LEGAL ASPECTS

09:00	INVITED SPEAKER Cheng
9:30	Cattaneo
9:50	White and McIntosh
10:10	Bracco
10:30	Coffee Break
11:00	Lawrence and Peters

SESSION
MATHEMATICAL WRITING, JOURNALISM AND MEDIA

11:30	INVITED SPEAKER Segerman
12:00	Lunch Break
13:30	Truc
13:50	Firsching and Niediek
14:10	Pessers
14:30	Coffee Break
15:00	Parallel Workshops
19:30	Dinner Break
21:00	MathLapse Awards and Film Night

SATURDAY

9:00	Workshops
10:00	Presentations
	Coffee Break
13:00	End

PRE-OPENING AT 7ECM

On Tuesday, July 19, the day before the official start of IC16, we invite you to visit the IMAGINARY exhibition at the 7th European Congress of Mathematics (7ECM) taking place in Berlin as well (see chapter "useful addresses" for details). IMAGINARY will present a mathematical image gallery and a selection of interactive programs, among them two first-time exhibits. The exhibition will be completed by the international traveling exhibition 'Views in 3-Manifolds' by Pierre Berger and his team, which proposes a sensitive approach to the concept of space of dimension 3.

There will be a public lecture offered in the adjacent lecture hall by Helmut Pottman from the Geometric Modeling and Industrial Geometry department of Technical University Vienna, Austria. The title of the talk is 'Mathematics in Modern Architecture'. The talk will provide an overview of recent progress in the emerging field of Architectural Geometry, elaborate on important relations to contemporary research in Geometry and Computer Graphics, and illustrate the transfer of mathematical research into the architectural practice at hand of selected projects.

The movie 'The Discrete Charm of Geometry' by Ekaterina Eremenko will be screened right after the public lecture. Akin to the scientists' search for the right discretization of continuum, this film itself is composed of fragments – individual characters of different ages, temperaments and scientific approaches – which form a single continuous melody. The question of where the boundaries lie between mathematics and the lives of those who are involved in it and how much they are willing to sacrifice is as important as the search for precise scientific answers. A unique and unprecedented dive into the unknown world of mathematicians.

INVITED SPEAKERS

JÜRGEN RICHTER-GEBERT

Jürgen Richter-Gebert is full professor for geometry and visualisation at the Technical University of Munich. Besides his mathematical research interests in projective, combinatorial and computational geometry he is very active in communicating mathematics to a general public – both in the real world by hands-on exhibitions and virtually by software and apps. He is the author of award winning softwares like the iOS App iOrnament and the interactive geometry software Cinderella and he founded the math exhibition ix-quadrat at the Technical University of Munich. In 2011 he was awarded the national teaching award Ars Legendi by the Stifterverband der deutschen Wissenschaft.

WWW.SCIENCE-TO-TOUCH.COM
WWW-M10.MA.TUM.DE/BIN/VIEW/LEHRSTUHL/RICHTERGEBERT

FAST PROTOTYPING OF INTERACTIVE MATHEMATICAL CONTENT

ABSTRACT

Designing interactive content for mathematics exhibitions is a challenging task. Multiple aspects ranging from educational value via mathematical correctness to performance issues and user interface design have to be taken into account. The talk will illustrate the complete path from an idea of an exhibit to a fully functional interactive implementation in various scenarios. Special emphasis will be laid on aspects of user interaction and on high level implementation possibilities. Scenarios will be taken from interactive exhibits in big museums, teacher training courses, interactive web pages and apps. Mathematical topics will include swarm simulation, 3D polyhedral geometry, connections of art and science, as well as hybrid scenarios where virtual and real world meet. The talk will contain many life demos in the framework Cinderella/CindyJS and (at least partially) demonstrate the full workflow of designing an interactive exhibit.

WEDNESDAY
JULY 20, 2016
10 AM

HERMANN KARCHER

Hermann Karcher is a retired mathematician from the Department of Mathematics at Bonn University. His research publications are in Riemannian Geometry, Hypersurface Theory and Minimal Surfaces. He gave many talks in schools. Together with Richard S. Palais he wrote the mathematical code in the visualization program 3D-XplorMath.
WWW.MATH.UNI-BONN.DE/PEOPLE/KARCHER

3D-XPLORMATH: MORE THAN 300 MATHEMATICAL OBJECTS, ALL WITH ANIMATIONS AND EXPLANATIONS.

ABSTRACT:
The Java version of the free visualization program 3D-XplorMath has long been part of IMAGINARY. I will demo the Pascal version (unfortunately still MacIntosh only) which now has explanations for all its objects. It is also richer in animations which deform the objects or add visualizations of the object's construction. All 3-dimensional objects can be shown in anaglyph stereo, red-green glasses will be provided.
The program is intended for individual experimentation. Its development has mainly benefitted from demo-lectures to audiences ranging from school kids (13 years and up), students of my courses and colleagues at conference evenings.

THURSDAY
JULY 21, 2016
9 AM

EUGENIA CHENG

Eugenia Cheng is Senior Lecturer of Pure Mathematics at the University of Sheffield and Scientist in Residence at the School of the Art Institute of Chicago. Her first popular maths book „How to Bake Pi" was published by Basic Books (US) and Profile (UK) last year to widespread acclaim including from the New York Times, National Geographic, NPR, BBC and the Late Show with Stephen Colbert.
WWW.EUGENIACHENG.COM

HOW TO BAKE PI

Abstract:Mathematics can be tasty! It's a way of thinking, and not just about numbers. Through unexpectedly connected examples from music, juggling, and baking, I will show that maths can be made fun and intriguing for all, through hands-on activities, examples that everyone can relate to, and funny stories. I'll present surprisingly high-level mathematics, including some advanced abstract algebra usually only seen by math majors and graduate students. There will be a distinct emphasis on edible examples.

FRIDAY
JULY 22, 2016
9 AM

HENRY SEGERMAN

Henry Segerman is a mathematician and mathematical artist, based at the Department of Mathematics at Oklahoma State University. His research is in three-dimensional geometry and topology, and in mathematical visualization. As an artist he works mostly in 3D printed sculpture, with other interests in virtual reality, procedural generation, self-reference, ambigrams and puzzles.
WWW.SEGERMAN.ORG

VISUALIZING MATHEMATICS WITH 3D PRINTING: AUGMENTING A TRADITIONAL BOOK WITH NEW MEDIA & EDITING SPHERICAL VIDEO WITH MÖBIUS (AND OTHER) TRANSFORMATIONS

I will talk about the development of a new popular mathematics book, coming out in September 2016. Most of the figures in the book are photographs of 3D printed objects. Readers can visit the book's website http://3dprintmath.com to explore virtual versions of the figures, download to print themselves or order online. This allows me to introduce topics which are not generally covered in popular mathematics books, presumably because of the difficulty of conveying truly 3D content.
Then, I will speak on two further topics. First, the technology of spherical video, and how it differs as a medium from ordinary flat video. Second, some techniques for editing spherical video, using Möbius transformations and other conformal mappings of the Riemann sphere.

FRIDAY
JULY 22, 2016
11:30 AM

LIST OF TALKS

SESSION

KNOWLEDGE TRANSFER AND PEDAGOGICS OF MATHEMATICS COMMUNICATION

DISCOVERING THE ART OF MATHEMATICS

SPEAKER

CHRISTINE VON RENESSE

Abstract: Christine von Renesse will present the efforts of the project "Discovering the Art of Mathematics" (DAoM) to teach a final course in mathematics to students at the college level using inquiry-based learning. The connection between photography and mathematics will be used to showcase how inquiry can connect art and mathematics while developing deep mathematical content. All teaching materials produced by DAoM are freely available online at www.artofmathematics.org.

INFORMATION ABOUT THE SPEAKER:

Christine von Renesse is a passionate teacher, who loves teaching at all levels - from elementary school through college. She uses open inquiry techniques in all her classes, believing that this is the most effective and enjoyable way of learning and teaching. Prof. von Renesse received a Diplom in Mathematics and a Masters in Elementary Education from the Technical University Berlin, Germany, as well as a PhD in Algebraic Geometry from the University of Massachusetts, Amherst, USA.

WWW.ARTOFMATHEMATICS.ORG

UTILIZATION OF MATHEMATICAL MODEL COLLECTIONS FOR MULTIDISCIPLINARY RESEARCH AND KNOWLEDGE TRANSFER

SPEAKER

DANIEL LORDICK

Abstract: Collections of mathematical models are a historical evidence for "notion" (comprehension by experience), they are a cultural heritage and in recent years appreciated as scientific sources. Since the models are often hidden in single Institutes, it is rewarding to make them accessible via online research. In DAMM (Digital Archive of Mathematical Models) we used the latent 3D-Web-technologies to compensate the lack of physical presence. This approach facilitates virtual cutting and the connection of material models with computer algebra systems.

INFORMATION ABOUT THE SPEAKER

Daniel Lordick studied architecture at the TU Berlin and Carleton University in Ottawa, Canada. He got his PhD on a geometric topic from the University of Karlsruhe. He is professor for geometric modelling and visualization at the TU Dresden, Institute of Geometry. He can be reached by e-mail: daniel.lordick@tu-dresden.de.

WWW.DANIELLORDICK.DE

DESIGNING SPATIAL VISUALISATION TASKS

SPEAKER

MATEJA BUDIN

Abstract: The purpose of this talk is to introduce some tasks to develop spatial visualization ability through mathematical experience.

INFORMATION ABOUT THE SPEAKER

A founder and a programme leader of Mathema, Institute for popularisation of mathematics in Ljubljana, Slovenia. One of the aims of Mathema is raising public awareness of mathematics and popularisation of mathematics among the youngest.

WWW.MATHEMA.SI

EXAMPLE OF A SELF-CONTAINED E-LECTURE

SPEAKER

AXEL KILIAN

Abstract: An interactive e-lecture about cycloids is presented. It consists of a video, an e-book, a simulation tool, and an exam. The whole lecture is html-based and can be used with a common browser. After the presentation, the author would like to discuss if and how this type of material may be useful in future math education. The lecture is accessible at www.iks.hsmerseburg.de/~kilian/eLecture.

INFORMATION ABOUT THE SPEAKER

Although my background is theoretical physics, I teach mathematics at the Hochschule Merseburg. I like programming and wrote a book Programmieren mit Wolfram Mathematica Springer Berlin Heidelberg, 2010.
WWW.HS-MERSEBURG.DE/~KILIAN

MASSWORD PATH

SPEAKERS

JASNA BOŠKOVIĆ AND TATJANA STANKOVIĆ

Abstract: The application of geometry in other sciences is inevitable. Therefore, grasping and describing space around us is important. In this workshop, we shall present several ways of geometry application in data protection and share an idea of approaching cryptography and geometry to the pupils. Our goal is to help pupils to grasp space better and to understand some tools for its description by using game of encryption in the online environment that is the most common environment to them.

INFORMATION ABOUT THE SPEAKERS

Tatjana Stanković is a PhD student at the Faculty of Mathematics in Belgrade (University of Belgrade) and she teaches mathematics in the Electrotechnical School “Nikola Tesla” in Pancevo.
She is interested in mathematics and in methodology of teaching mathematics, in communication and knowledge transfer in mathematics and science, in connecting mathematics and art, in connecting mathematics and science.

Jasna Bošković has finished the Faculty of Electrical Engineering, Chair of Computer Engineering and Information Theory (University of Belgrade) and she teaches several subjects related to computer science in the Electrotechnical School “Nikola Tesla” in Pancevo. She is devoted to interdisciplinary project-based learning that involves pupils in research of various topics from different angles.
ETEBLOG.WORDPRESS.COM/

SESSION

2D AND 3D VISUALIZATION, CREATION OF EXHIBITS AND AGILE DESIGN AND TOOLS FOR MATHEMATICS COMMUNICATION

AROUND WILD KNOTS

SPEAKER

AUBIN ARROYO

Abstract: The process of elaboration of the material of the project Wild Knots, which include computer generated animations, still images and some interactive software, has been interesting from several angles: the selection of the subject, how to recreate an infinitely complicated object with a computer, which media should be used, and which is the audience they are directed to, for instance. It seems that these questions appear in any project of producing mathematical content for the general audience. In this short talk I would like toshare my experience around this project.

INFORMATION ABOUT THE SPEAKER

Aubin Arroyo works at Instituto de Matematicas (Unidad Cuernavaca), UNAM in Cuernavaca. His main subjects of research are: Dynamical Systems and Geometry. He was born in Mexico City and made his PhD at IMPA, Brazil.

WWW.MATCUER.UNAM.MX/~AUBIN/

ATRACTOR - VISUALIZATION OF MATHEMATICS USING 3D TELEVISIONS AND REALISTIC VIRTUAL EXHIBITS

SPEAKER

ANA CRISTINA OLIVEIRA

Abstract: In recent years, Atractor Association has been engaged both in producing mathematical stereo 3D contents and in creating realistic virtual versions of mathematical physical exhibits. In this presentation we highlight some of Atractor's contributions in these fields:
1) Atractor's contents for 3D televisions-movies, images, applets (some of them accessible from Atractor's site) and
2) examples of interactive realistic virtual exhibits, which can also be used in 3D televisions.

INFORMATION ABOUT THE SPEAKER

I've been working full time in Atractor Association since 1999, and I have been involved in its main activities, namely training sessions for teachers, the creation of the exhibition Matematica Viva, the creation of several resources in Atractor's site. I have a large experience in producing virtual resources.

WWW.ATRACTOR.PT

THE ALGORITHM OF FLUID GEOMETRIES – THE UNIVERSALITY OF SPHERE-VORTEX ARCHETYPE

SPEAKER

GABRIEL KELEMEN

Abstract: A holistic and transdisciplinary approach to nonlinear phenomena in fluids, induced by acoustic stimulation, illustrating the connection between the sphere, vortex and torus as archetypal morpho-dynamic principle. Under the influence of sound waves, rhythmic fluctuations propagated in liquid media induce and maintain geometrical symmetries revealing the natural result of converting the harmonic movement into polygonal-polyhedral patterns. The research leads to the elaboration of a hierarchic algorithm, a mathematical interpretation of natural morpho-dynamic diversity.

INFORMATION ABOUT THE SPEAKER

Gabriel Kelemen, Ph.D., is an artist and researcher, lecturer and head of the Art History and Theory department on the Faculty of Arts and Design at West University of Timisoara, Romania. His studies on the geometry of liquids and stationary waves have led to the elaboration of his own theory - The Universality of Sphere-Vortex Principle and have been published in several editions. Already popular in scientific and artistic circles in his country, his drawings, photos, videos and sculptures are becoming widely exhibited in Europe and USA, and he is a pioneering figure in the field of Cymatics.

500PX.COM/KELEMENGABI

THE SELF-SUSTAINING DOMES BY LEONARDO (EXTENDED TALK)

SPEAKERS

ENRIC BRASÓ AND RINUS ROELOFS

Abstract: Hidden in a corner of the writings of Leonardo da Vinci, there are sketched two structures of self sustaining domes made from sticks without any clamping element.
Rediscovered and studied by Rinus Roelofs, recently a work group from the MMACA Association has developed on this concept and designed 11 different patterns. We are taking this activity to schools, museum workshops

and street fairs. This activity is spectacular, attractive and adaptable to all ages, we can even work with groups of five year old.

INFORMATION ABOUT THE SPEAKERS

Enric Brasó is Graduate in Mathematics, professor at high school. His work focuses on the creation of materials for teaching and disseminating the mathematics.
WWW.XTEC.CAT/~EBRASO

Rinus Roelofs is a sculptor with a great interest in mathematics. His main subjects are stuctures and transformations. He uses the computer to design virtual models and to create animations. After that he uses several techniques, like 3D printing, and materials (for example metal, stone, wood, paper, ceramics, textile and plastics) to transform his designs into real-world objects. Making models helps to understand the beauty of mathematical structures.
WWW.RINUSROELOFS.NL

SESSION

IMAGINARY AROUND THE WORLD

IMAGINARY IN KOREA

SPEAKER

HYUNGJU PARK

Abstract: Since the National Institute for Mathematical Sciences (NIMS) presented a very successful NIMS-IMAGINARY exhibition in collaboration with MFO in ICM 2014, we have been operating a permanent IMAGINARY exhibition in Korea. In this talk, we will go through the achievements we have made during the last 2 years. In particular, as a government-funded research institute, we will share our experiences on how we have used relevant community resources, developed mathematics communication networks and overcame practical obstacles.

INFORMATION ABOUT THE SPEAKER

Hyungju Park is President at National Institute for Mathematical Sciences of Korea, and a Chair Professor at Ajou University. He received his physics bachelor's degree at Seoul National University and Mathematics PhD at University of California, Berkeley. He served as a professor at Oakland University, Korean Institute for Advanced Study (KIAS), and Pohang University of Science and Technology (POSTECH).
He is an internationally renowned leader in his field. Specifically, he successfully organized International Congress of Mathematicians (ICM) 2014 Seoul as the chairman of the organizing committee. Afterwards he became the first Korean member of the executive committee of International Mathematical Union (IMU).
WWW.MATHUNION.ORG/FILEADMIN/IMU/EC/2015-2018/CV-EC06-PARK-HYUNGJU.PDF

IMAGINARY IN AFRICA - FUTURE PERSPECTIVES

SPEAKER

ROSITA YOCGO

Abstract: The African Institute for Mathematical Sciences, a pan-African network of Centres of Excellence for mathematical science postgraduate training, research and public engagement is also contributing towards building the pipeline for the next generation of African scientists on the continent through diverse outreach activities which involves pupils, students, teachers, lecturers, researchers, industry, policy makers and the general public. Its collaboration with IMAGINARY and the Mathematisches Forschungsinstitut Oberwolfach is therefore one of the novel mechanisms to achieve this. The AIMS-IMAGINARY platform is aimed at stimulating interest in the mathematical sciences among diverse groups of people through the use of interactive visual and hands-on mathematical science concepts.

INFORMATION ABOUT THE SPEAKER

Rosita Endah Epse Yocgo, Ph.D, is the Research Manager at the African Institute for Mathematical Sciences, The Global Secretariat. Rosita's portfolio includes overseeing the development and growth of the AIMS network research through the conceptualization and implementation of diverse research programmes - including scientific outreach activities such as AIMS-IMAGINARY.
WWW.NEXTEINSTEIN.ORG

IMAGINARY IN BELGIUM

SPEAKER

PAUL IGODT

Abstract: Based upon experience in the traveling IMAGINARY exhibition in Belgium, the potential of a splendid collection of cardioid variations will be discussed. Not only splendid 3D models, but also mathematical animations and their potential to improve mathematics learning will be presented.

INFORMATION ABOUT THE SPEAKER

Paul Igodt is one of the founders (in 1985) and now acting chairman of the Flanders Mathematics Olympiad (for short VWO; see: www.vwo.be, www.usolvit.be). In collaboration with the universities and the Belgian Math. Society, VWO organised a traveling IMAGINARY exhibition in Belgium (September 2015—May 2016) (www.imaginarymaths.be). Societal outreach for mathematics is an annual theme in the activities of the olympiad organisers.

WWW.KULEUVEN-KULAK.BE/~IGODT

IMAGINARY IN URUGUAY

SPEAKERS:

DIEGO ARMENTANO AND MARIANA PEREIRA

Abstract: In this talk we will give an overview of the first experience of IMAGINARY expositions in Uruguay during 2015, where we had over 20 thousand visitors. We will concentrate on the exclusive design of the exposition for itinerancy, new activities developed, and our conclusions of what worked and what should be improved. We will briefly describe the plans for 2016—2017 to take this exposition around Uruguay visiting at least 10 cities.

INFORMATION ABOUT THE SPEAKERS

Diego Armentano is a mathematician from Universidad de la República, Uruguay. His research field is related to the complexity analysis of numerical algorithms, and random algebraic geometry. He is very interested in improving the way we teach maths, and specially in the communication of math to the community. In 2014 he has been fortunate to meet Andreas Matt who immersed him in the incredible experience of IMAGINARY.

Mariana Pereira obtained my PhD in Math at Texas A&M in 2007 and has been working at the Universidad de la República, Uruguay, since then. Her research interest is mainly in Algebra and Combinatorics. In 2014, she started organizing different IMAGINARY expositions in Uruguay, as part of the emerging local team. Since 2015 she has been exploring the fascinating world of Scientific Monologues.

SESSION

COMMUNITY, NETWORKING AND LEGAL ASPECTS

MATHEMATICS DOWN TO EARTH: A GAME OF CARTOGRAPHY

SPEAKER

ALESSANDRO CATTANEO

Abstract: How to design a mathematical exhibition in order to catch the attention of people? It is a game of topics, of choices, of new technologies, all of them playing little but fundamental roles. This is the story of one of our attempts to hit this mark: the exhibition “Mathematics down to Earth” - an exhibition about cartography.

INFORMATION ABOUT THE SPEAKER

Alessandro Cattaneo studied Mathematics at University of Milan, with a thesis about the symmetry classification of Johnson polyhedra, he is interested in many topics concerning popularization and didactics of Mathematics.
He is one of the founders and active collaborators of Curvilinea, a cooperative company that realizes exhibitions, conferences and laboratories about math from 2012. He participated in the Mathematics of Planet Earth exhibition in 2013 and took part in the construction of some exhibits of the recent exhibition MaTeinItaly.

WWW.CURVILINEA.ORG/ALESSANDRO-CATTANEO

MATHEMATICS OUTREACH INTERNATIONAL

SPEAKERS

DIANA WHITE AND JANINE MCINTOSH

Abstract: In November 2015, a group of 18 mathematics outreach specialists converged at the Banff International Research Station (BIRS) in Alberta, Canada, for an international math outreach workshop. The participants included academic faculty from both local and world-renowned institutes and universities, graduate students, program directors, journalists, and filmmakers. Coming from Australia, Canada, Denmark, France, Germany, the United Kingdom and the United States. Throughout the workshop, participants discussed how sharing ideas could benefit the global outreach paradigm. They reached agreement on the need to develop an international networking infrastructure for outreach, and explored both the possibilities of expanding existing activities and creating new ones. The result was Mathematics Outreach International (MOI), a new international initiative to support the expansion and enrichment of outreach activities worldwide, especially those aimed at developing countries and traditionally
under-represented groups. MOI will get advice from an international advisory board made up of prominent outreach leaders, launch a website containing resources and links to organizations, groups, and individuals coordinating national and international outreach activities, and contact the International Mathematical Union (IMU) to explore the possibility of becoming an IMU committee. In addition, MOI will organize workshops and conferences, and will propose them as satellite activities of international meetings of mathematical associations. MOI may also undertake other activities, such as the administration of an International Mathematics Outreach blog, a newsletter, or soliciting guidance from its advisory board on how to encourage policy

INFORMATION ABOUT THE SPEAKERS:

Diana White is an associate professor of mathematics (commutative algebra) and mathematics education at the University of Colorado Denver, where she specializes in teacher training, teacher professional development, and mathematical outreach. In addition, she directs the National Association of Math Circles, a primary outreach effort of the Mathematical Sciences Research Institute. She is the one of the initial five members on Mathematics Outreach International, a new initiative to support the expansion and enrichment of outreach activities worldwide.

RMMTC.UCDENVER.EDU

Janine McIntosh manages AMSI Schools. Janine leads a professional development and schools visit program for teachers across Australia. Through clusters of schools supported by industry and government partners, Janine's aim is to encourage more Australians to enjoy and study mathematics. Janine is one of the authors of ICE-EM Mathematics, and has developed a suite of online and careers materials in her time at AMSI. Janine was one of the writers for the Australian Curriculum: Mathematics F – 10. She is an experienced primary teacher, who has worked as a lecturer in mathematics education at the University of Melbourne and serves on the Maths Challenge and AMOC Committees of the Australian Mathematics Trust.

DERIVAS MATEMATICAS

SPEAKER

MARCOS BRACCO

Abstract: The goal of this talk is to reflect generically about spatial strategies for infrastructural design and to present possible solutions with respect to traveling mathematics exhibitions. The experiences are based on several IMAGINARY exhibitions staged in Uruguay in 2015.

INFORMATION ABOUT THE SPEAKER

Marcos Bracco has been working on the design and assembly of the itinerant exhibition IMAGINARY URUGUAY.

TAKING IT TO THE STREETS: THE VALUE OF LARGE PUBLIC MATH DEMONSTRATIONS & MATH MADE REAL: IT'S NOT JUST FOR PRESCHOOL ANYMORE! (EXTENDED TALK)

SPEAKERS

CINDY LAWRENCE AND ALICE PETERS

Abstract - Part 1: Collaboration, coordination, construction, camaraderie, and community - these are not words the public typically associates with

mathematics, but putting together large-scale public math demonstrations can literally change public perceptions of mathematics overnight. See how the MathHappening and Math Builds events orchestrated by the National Museum of Mathematics are creating a buzz around the US and providing a new sense of what mathematics is and can be.

Abstract - Part 2: Playing with blocks, putting together a puzzle, ordering and rearranging... our youngest students are natural math investigators. But why relegate the fun of physical play and exploration to grade school? Why not continue to captivate students with a math lab kit that gets kids working together and exploring mathematical phenomena with engaging manipulatives? The National Museum of Mathematics is piloting Math Made Real, a series of six activities designed to capture the interest – and the minds – of students right at that critical age when many start to walk away from math. Designed to be distributed in classrooms around the world, Math Made Real will provide teachers with a way to get students excited, and keep them engaged, with the richness of mathematics.

INFORMATION ABOUT THE SPEAKERS

Cindy Lawrence is a lifelong math enthusiast who currently serves the National Museum of Mathematics (MoMath), America's only museum of mathematics, as its Executive Director. In her role with the Museum, Lawrence works to change public perceptions of mathematics by providing exciting and innovative exhibits and programs. She is also focused on improving the way youth are educated in mathematics, and on ensuring that math is engaging and accessible to all, especially to women and other underrepresented groups.
WWW.MOMATH.ORG

Alice Peters is the Chief of Operations at the National Museum of Mathematics. She was the co-founder of A K Peters, Ltd., an independent scientific publisher, specializing in high-quality books in the areas of mathematics and computer science, with a special emphasis on recreational mathematics and computer graphics. She was actively involved in publishing for more than 40 years, first as mathematics and computer science editor at Springer-Verlag, both in New York and Heidelberg and later as co-founder of Birkhauser Boston, and publisher at Academic Press/Harcourt Brace Jovanovic. She serves as a member of the board of directors of MSP Publishers, an independent non-profit scientific publisher.
WWW.MOMATH.ORG

SESSION

MATHEMATICAL WRITING, JOURNALISM AND MEDIA

EVOLUTION OF THE MATHEMATICAL JOURNAL QUADRATURE (1989-2016)

SPEAKER

JEAN-PAUL TRUC

Abstract: Is there still a place for "classical" maths journals, moreover in french, nowadays? The experience of the vulgarization journal Quadrature, created in 1989, proves that the answer is yes, as our journal has published the 100th numero in april 2016. Anyway it seems necessary to adapt the classical shape of mathematical articles to the actual theory of journalism and to create appropriate web tools to support the journal. We discuss these different questions there, with examples of recently published articles.

INFORMATION ABOUT THE SPEAKER

Jean-PaulTruc is professor (Classes Preparatoires aux Grandes Ecoles (CPGE), Ph.D., and his research fields are Hamiltonian Systems and Special functions. He has published articles, including vulgarization articles on web-sites (Atlantico for instance), and written many Maths books for teaching. He is editor in chief of the journal Quadrature since 2012.
WWW.QUADRATURE.INFO
QUADRATURE-REVUE.BLOGSPOT.FR

COMMUNICATING MODERN MATHEMATICS TO A WIDE AUDIENCE: SNAPSHOTS OF MODERN MATHEMATICS FROM OBERWOLFACH

SPEAKERS
MORITZ FIRSCHING AND JOHANNES NIEDIEK

Abstract: Communicating modern mathematics and mathematical research in writing to a wide audience is a challenging yet important endeavor. Snapshots of modern mathematics from Oberwolfach take on this challenge. These are short texts on modern mathematics aimed at mathematics teachers, science journalists, undergraduate and advanced high school students as well as the interested general public worldwide. But how to present intricate mathematical concepts to an audience without much mathematical training? For example, how do you explain what a "group" is to somebody who never took algebra?
We discuss examples from our editing work and present how we try to make mathematics more accessible. One focus will be on common pitfalls that occur when professional mathematician write texts for a broader audience.

INFORMATION ABOUT THE SPEAKERS
Moritz Firsching is a postdoc in mathematics working at Freie Universität Berlin. His main interests are discrete geometry, polytopes, topological combinatorics. He is also a fan of running computer experiments. He is an editor in the Snapshots project since 2015.
PAGE.MI.FU-BERLIN.DE/MORITZ

Johannes Niediek studied mathematics in Bonn and graduated with a Diploma thesis in non-commutative geometry. He is now pursuing a PhD in neurosciences, focusing on human memory function. He joined the Snapshots project in 2015 and enjoys communicating with mathematicians from a broad range of fields, such as robotics, algebraic geometry, statistical data analysis, PDEs, and spectral geometry. He is also interested in cross-cultural education.
WWW.MFO.DE/SNAPSHOTS

AN ALTERNATIVE WAY TO SHARE MATHEMATICAL KNOWLEDGE

SPEAKER
VICTOR PESSERS

Abstract: We will reflect on the status quo of how mathematical (research) knowledge is usually shared through articles and books, and speculate on how the rise of the internet might allow us to develop alternatives to the current practice.

INFORMATION ABOUT THE SPEAKER
Victor Pessers is a doctorate student in differential geometry at the KU Leuven. Besides his own mathematical research, he has taken interest in formalization of mathematics and mathematical knowledge management. An earlier talk he has given at the Radboud University on this subject, was titled "Conceiving a new way of managing mathematical knowledge".

LIST OF WORKSHOPS

RESOURCE COLLECTION FOR A CURRICULUM OF A UNIVERSITY MATHS/SCIENCE COMMUNICATION COURSE

WORKSHOP LEADER

SILVIA BENVENUTI (UNIVERSITY OF CAMERINO, ITALY)
ANDREA CAPOZUCCA (UNIVERSITY OF URBINO, ITALY)

Abstract: According to the European Charter for Researchers „all researchers should ensure that their research activities are made known to society at large, so that they can be understood by nonspecialists, thereby improving the understanding of science by the citizens." Therefore, it's part of the researchers' mission to raise the general public awareness with respect to science. On the other hand, science communication requires a specific training, which is not part of the average future researchers education. For this reason, a scientist is likely to fall into many traps, when trying to communicate his research to the general public. The purpose of this workshop is to collect materials and ideas suitable to provide any student from a „scientific" degree course with the basic tools to communicate in matters related to his discipline to an audience of non-experts.

SPHERICAL GEOMETRY IN A SCIENCE MUSEUM

WORKSHOP LEADER

ESTER DALVIT, MARIE-CURIE-INDAM POST-DOCTORAL FELLOW (UNIVERSITY OF CAMERINO, ITALY, AND UNIVERSITY OF TORONTO, CANADA)

Abstract: The aim is to produce images and animations to talk about spherical geometry in a science museum. We will use the ray-tracer POV-Ray and a simple language based on Logo. The animations will be used for projection on the giant NOAA sphere installed in science museums worldwide, including our partner MUSE in Trento, Italy. Proposed themes: Coordinates: longitude and latitude. Straight lines: flight routes. Geometrical properties: parallelism; angle sum of triangles. Regular tessellations and Platonic solids.

SORTING BALLS / ALGORITHME DE TRI MÉCANIQUE

WORKSHOP LEADER

ROBIN JAMET (PALAIS DE LA DÉCOUVERTE, FRANCE)

Abstract: An algorithm is a way to solve a problem without thought, mechanically. Sorting algorithms are good examples to show that to general public: a mechanical machine should be able to sort balls from the heaviest to the lightest.
Resumé: L'objectif est d'avoir des pistes de billes, reliées par des bascules qui permettent d'envoyer la bille la plus lourde sur l'une des pistes en dessous, et la plus légère sur une autre. Les billes arrivent dans des „cases", rangées dans l'ordre.

DÉFIS

1) Comment construire ces bascules? La bille la plus lourde peut évidemment arriver d'un côté ou de l'autre, et doit pourtant toujours repartir sur la même piste à la sortie.
2) Il faut toujours garder suffisamment de pente pour que les billes ne s'arrêtent pas (problème probablement le plus simple)
3) Toujours sur les bascules : comment faire pour que celles-ci ne se déclenchent pas avant que les deux billes ne soit arrivées ? Sinon, c'est toujours la première bille arrivée qui sera considérée comme la plus lourde, et la deuxième ne sera plus dans le circuit. Une idée à tester : en utilisant des billes métalliques, celles-ci peuvent fermer un circuit en arrivant dans la bascule.
4) Il faut absolument que les solutions techniques trouvées soient suffisamment simples pour que l'aspect mécanique, automatique de ce tri reste visible. Si le public ne comprend pas comment la machine fonctionne, l'objectif est raté : il y verra une nouvelle boîte noire, un tour de magie.

SMARTPHONES IN EXHIBITIONS

WORKSHOP LEADER

PHILIPP LEGNER (GOOGLE, MATHIGON, UK)

Abstract: While mobile devices are ubiquitous in everyday life, they are rarely utilised in museums and exhibitions, except as guide or to show additional descriptions. In this workshop we want to design exhibits that link with visitors' smartphones on a deeper level: utilising their collective computing power, using them to visualise graphs and networks, or to simulate probability experiments.
Combining the expertise of mathematicians, teachers and software developers, we will try to create more interactive, immersive and personal museum experiences.

WIKIMATHCOM

WORKSHOP LEADER

DANIEL RAMOS (IMAGINARY, UNIVERSITÉ DE MONTPELLIER, FRANCE)

Abstract: We will develop WikiMathCom, a wiki page for gathering all projects on math outreach worldwide. We aim to set a reference site to institutions, conferences, museums, exhibits, resources, and much more. Whether you participate or not in the workshop, don't forget to leave a description of your project for the wiki before leaving the conference.

INSPIRING MATHEMATICS IN AFRICA

WORKSHOP LEADER

MARK ROBERTS (AFRICAN INSTITUTE FOR MATHEMATICAL SCIENCES, TANZANIA)

Abstract: This workshop will masterplan a high profile public engagement campaign to inspire interest in mathematics among school students and broader society in Tanzania. The campaign will pilot innovative new

approaches which can then be used elsewhere in Africa. A key aim will be to communicate the importance and excitement of mathematics and its relevance to African life and careers. The campaign may include performances, exhibitions, traditional/new media, stakeholder workshops, etc. An action plan for implementing the masterplan will be developed.

MATHEMATICAL EDUCATION TV PROGRAM

WORKSHOP LEADER

ANDRÈS SOSA (FACULTAD DE CIENCIAS, UNIVERSIDAD DE LA REPÚBLICA, URUGUAY)

Abstract: The idea of this workshop is design the format of a mathematical education TV program for a general audience. The format of the TV series should be designed to be easily adapted for different regions and languages.

DEVELOPING THE GUIDEBOOK OF ELEVATED POLYHEDRA: COMMUNICATING MATHEMATICS WITH ART

WORKSHOP LEADERS

HELEN YU (TWEDUCARE & PARTNERS, TAIWAN) AND RINUS ROELOFS (SCULPTOR, NETHERLANDS)

Abstract: Elevation is a concept introduced by Leonardo da Vinci and Luca Pacioli in their book ‚Divine Proportione' (1509). Rinus Roelofs, a sculptor and also a mathematician, was inspired by the concept and has developed a set of simple paper elements to form up models of elevated polyhedra. Through artistic explorations, mathematical concepts have been communicated. During the workshop, we would like to formalize a guidebook on hands-on activities as well as exhibits to facilitate people in mathematics communications with the publication of the guidebook and modules for printing on IMAGINARY platform.

THE SURFER BOOK

WORKSHOP LEADERS

BIANCA VIOLET (IMAGINARY, GERMANY) AND OLIVER LABS (POTSDAM UNIVERSITY, MAINZ UNIVERSITY, MO-LABS, GERMANY)

Abstract: The aim of this workshop is to create a draft version of the SURFER book. SURFER is the Java-based extension of the program SURFER-2008 that was developed for the IMAGINARY exhibition in the year of Mathematics in Germany. SURFER allows users to create beautiful images by typing in the equation for a surface in space.
The content of the book is based on so called SURFER experiments which are short and creative tutorials on how to create a variety of surfaces. It shall be an open source book written by the community. The SURFER book will be available for free download in pdf format. There will be a printed version to be bought (for low cost).
The experiments are of different levels of difficulty from very easy to quite challenging. The contributions are typically two to four pages long with step by step instructions and accompanying images. The majority of the experiments, especially when dealing with a mathematical phenomenon, should be suitable for school classes and/or math students in the first semesters.

DEVELOPING A CONCEPT FOR A CUTTING-EDGE EXHIBITION ON MATHEMATICS AND MUSIC

WORKSHOP LEADERS

NORMAN FRIEDENBERGER (IMAGINARY, GERMANY), ALBERT HAASE (IMAGINARY, FU BERLIN, GERMANY)

Abstract: Both mathematics and music are universal languages that can reach high levels of abstraction. This workshop aims to explore a specific part of the interconnectivity between both worlds with an artistic, musical and communicative approach. Inspired by some recent selected contemporary works, we aim to address a generative system able to sonify mathematical models. The goal is to jointly collect ideas and to create a basic concept for such a system by describing requirements in terms of functionality, interactivity, design and sound. Interested workshop attendees will have the chance to later work on the implementation together with IMAGINARY, in order to create a new future exhibit to be premiered at upcoming exhibitions and, possibly, a music festival in 2017.

AUGMENTED REALITY CONCEPTS USING HOLOLENS IN MATHEMATICS COMMUNICATION

WORKSHOP LEADERS

CEDRIC VILLANI (INITIATOR, UNIVERSITY OF LYONS AND INSTITUT HENRI POINCARÉ, FRANCE) ALEXANDER WERLBERGER (HOLO-LIGHT COMPANY, AUSTRIA), SEBASTIAN URIBE (SOFTWARE DEVELOPER BERLIN, GERMANY)}

Abstract: Microsoft HoloLens is a new augmented reality technology designed to allow us to interact with high-definition holograms in our world. In this workshop, we will explore new concepts of using this technology for interactive mathematics communication. A HoloLens kit plus development technology will be on site in order for us to explore the possibilities of augmented reality live. New concepts might be a “Live Mathematical Experience”, where a mediator guides the public through a holographic maths world, explaining mathematical and physical phenomena (to be shown in museums), or “Interactive drawings of mathematical objects and geometries” like polyhedra, knots, and wallpaper in your living room. A first prototype of a simple maths application (for example mathematical 3d painting) with HoloLens shall be developed during this workshop and a list of possible (more elaborate) future concepts shall be presented as a result of the workshop

MATHLAPSE AWARD CEREMONY AND FILM NIGHT

On Friday night, the winners of the IMAGINARY MathLapse competition will be announced in a public award ceremony and film screening at Spektrum art (see chapter "Useful Adresses" for details). A "MathLapse" (ML) is a new educational and artistic format, which is supposed to highlight the link between mathematics and real-world phenomena. It should illustrate a single mathematical idea through true or virtual animated images. The name MathLapse is inspired by the timelapse-technique in physics: By re-scaling time, phenomena that we cannot observe with the naked eye are visualized.
Almost 50 submissions were uploaded to the IMAGINARY platform and reviewed by the MathLapse jury. There will be a laudatio for the winning videos, which will be screened prominently. Enjoy the evening with music and drinks, more MathLapses, conversations…

LIST OF PARTICIPANTS

Tarig Abdelgadir	ICTP	Sudan
Amrei Andrasch	Keen on Mars	Germany
François Apéry	Université de Haute-Alsace	France
Diego Armentano	Centro de Matemática, Universidad de la República	Uruguay
Aubin Arroyo	Instituto de Matemáticas UNAM	Mexico
Sahar Ben Hassine	TU Berlin	Germany
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Taiwo Sangodapo	University of Ibadan	Nigeria
Britta Schewe	TV station and VoD platform	Germany
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Manuel Schubbe	architecturalservices	Germany
Henry Segerman	Oklahoma State University	United States of America
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PRE-OPENING AT 7ECM:

Technische Universität Berlin,
Straße des 17. Juni 135, 10623 Berlin

CONFERENCE VENUE:

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CONFERENCE DINNER VENUE:

Wirtshaus Max und Moritz,
Oranienstrasse 162, 10969 Berlin

MATHLAPSE AWARD CEREMONY AND FILM NIGHT VENUE:

SPEKTRUM | art science community,
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CONFERENCE WEBSITE AND CONTACT:

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James Grime, mathematician and maths communicator, United Kingdom
Wolfgang Haberl, European Science Film Festival, Austria
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