MATRIX × IMAGINARY 2021

September 8-9, 2021
Paris, france

PROGRAM

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WELCOME

Dear participants,

On behalf of the organizational team and the scientific committee of the MATRIX x IMAGINARY conference, we wish you a warm welcome!

Mathematics engagement is booming in all corners of the world, and the professional community behind it is becoming stronger and more and more active in exchanging ideas, collaborating in projects, and joining hands. For this conference, we also joined hands – between the Institut Henri Poincaré, a research institute with a long tradition of communicating mathematics and an upcoming dedicated maths museum space, the National Museum of Mathematics, a very active and engaging maths museum with a large online and events program and its bi-annual MATRIX conference, and IMAGINARY, an organization which creates and distributes open-licensed math exhibitions and novel outreach formats worldwide, with its own IMAGINARY conference. We joined hands: MATRIX x (meets) IMAGINARY, at IHP in Paris!

As you all can imagine and experienced yourself in the last year, we needed to act with unforeseeable constraints and had to switch plans dynamically several times. We decided to host an online gathering first, before hopefully meeting you all in person in Paris in April 2022.

During the two days of the conference, we will hear interesting talks, enjoy thought-provoking discussions, and learn about new exhibits, new museums, and ongoing collaborations among different organizations. You're even invited to join us in co-creating "The Impossible Math Exhibition" and to use the many networking possibilities.

We hope you find opportunities to share knowledge and ideas, develop new projects, and forge lasting new friendships. Enjoy!

Sylvie Benzoni, *Director, Institut Henri Poincaré, and the IHP team*
Cindy Lawrence, *Executive Director and CEO, National Museum of Mathematics, and the MoMath team*
Andreas Daniel Matt, *Director, IMAGINARY, and the IMAGINARY team*

CONFERENCE SCHEDULE

Day 1 - Wednesday, September 8

New York GMT-4	Paris / Berlin GMT+2		
9:00am	15h00	**Platform open**	
10:00am	16h00	Welcome to the conference	Sylvie Benzoni, Cindy Lawrence, Andreas Matt
10:15am	16h15	Mathemalchemy: a mathematical and artistic adventure	Ingrid Daubechies
10:30am	16h30	Writing about math for the New York Times	Steven Strogatz
10:45am	16h45	**Lightning talks: Exhibition Experiences**	
		La Maison de Fermat: A math, heritage and cultural museum	Maryvonne Spiesser, Thomas Ricaud
		A successful experience on student engagement in STEM museums	Montserrat Alsina
		“Traveling Around the World with Math.” A traveling exhibition.	I-Wei Lai
11:00am	17h00	**Coffee break and networking**	
11:15am	17h15	**Math Museums Panorama**	
		Math museum exhibits from around the world	Daniel Ramos
		Museums of mathematics worldwide: activities of Mathematikum	Albrecht Beutelspacher
		Maison Poincaré	Sylvie Benzoni
		MathsCity	Katie Chicot
		Seattle Universal Math Museum	Tracy Drinkwater
		Kiev Math Museum	Yevhen Kudriavets
		UFMG Mathematics Museum	Carmen Rosa Giraldo Vergara, Fabio Enrrique Brochero Martínez
		Discussion	Moderated by Cindy Lawrence
12:15pm	18h15	**Coffee break and networking**	
12:30pm	18h30	**Joining Hands: Ideas to Foster Collaboration**	
		A Network of Permanent Exhibitions	Guido Ramellini
		The Handbook of Mathematical Science Communication	Anna Maria Hartkopf, Erin Henning
		A website to share ideas and objects	Indira Chatterji, Rémi Coulon
		Julia Robinson Mathematics Festival	Daniel Kline, Julia Robinson
		Collaborative Communities	Stephon Alexander, Cindy Lawrence
		Discussion	Moderated by James Tanton
1:15pm	19h15	**Meal / snack break and networking**	
2:00pm	20h00	**The Impossible Math Exhibition**	A co-creative experiment
3:30pm	21h30	**Networking Extra (until 3:30pm | 22h30)**	

Day 2 - Thursday, September 9

New York GMT-4	Paris / Berlin GMT+2		
9:00am	15h00	**Platform open**	
10:00am	16h00	Welcome to day 2	Sylvie Benzoni, Cindy Lawrence, Andreas Matt
10:05am	16h05	Elm, a good friend of mathematics	Erkal Selman
10:20am	16h20	Variants of the 15-puzzle and the effects of holonomy	Henry Segerman
10:45am	16h45	**Lightning talks I**	
		Sketchnotes of Science	Constanza Rojas-Molina
		What we talk about when we talk about Comics&Science - A Scicomm Experience	Andrea Plazzi, Roberto Natalini
		Projeto Visitas: Fibo e Sofia	Aniura Milanes Barrientos, Belo Horizonte
11:00am	17h00	**Coffee break and networking**	
11:15am	17h15	**Lightning talks II**	
		Polypad	Philipp Legner
		Manim (Mathematical Animation Engine)	Oliver Schön
		“One for all, All for one”	Riccardo Moschetti
		Math games for real	Gaston Ibarburu
		Bugbottle	Beau Janzen
11:50am	17h50	**Lightning talks III**	
		Pooled testing	Lauren Siegel
		Revising the visualisation of the “Poincaré homology sphere”	Renate Quehenberger
		Infinite Fun: Inventing and Exploring with Mobies	Alexey V. Ivchenko, Yana Mohanty
		Alternative Perspectives	Anton Bakker
		Experience Workshop STEAM Network	Kristóf Fenyvesi, Christopher Brownell, Zsolt Lavicza
		Fundapromat	Jeanette Shakalli
12:20pm	18h20	**Coffee break and networking**	
12:30pm	18h30	**The Impossible Math Exhibition (ending)**	
1:00pm	19h00	Symmetry Selfie	Jürgen Richter-Gebert, Tim Nissen
1:15pm	19h15	Conference closing	
1:30pm	19h30	**Meal / snack break and networking**	
		Networking Extra (until 3:30pm | 21h30)	

INVITED SPEAKERS - DAY 1

Ingrid Daubechies

Ingrid Daubechies is a mathematician, although her degree is in (theoretical) physics, and she thought she would become an engineer while growing up. Her mother was heartbroken when she opted for pure science instead, and predicted Ingrid would end up in the gutter, jobless. Fortunately, matters turned out better. Ingrid is now at Duke University. Her academic work focuses on mathematical methods for the analysis of signals, images and data, with applications in many directions. She enjoys working in collaboration with others, in her scientific work as well as otherwise; she is thrilled to be part of the Mathemalchemy team.

Mathemalchemy: a mathematical and artistic adventure

ABSTRACT

This will be a short description of the Mathemalchemy project, a collaboration of 24 mathematicians and artists who designed and built, during a pandemic that kept them physically separated for most of the time, a large installation that celebrates the fun, beauty and creativity of mathematics.

More info at mathemalchemy.org.

WEDNESDAY
SEPTEMBER 8, 2021
10:15AM (GMT-4) / 16H15 (GMT+2)

Steven Strogatz

Steven Strogatz is the Jacob Gould Schurman Professor of Applied Mathematics at Cornell University. He is currently visiting the National Museum of Mathematics (MoMath) as the 2021-22 Distinguished Visiting Professor for the Public Dissemination of Mathematics. A renowned teacher and communicator, and one of the world's most highly cited mathematicians, he has blogged about math for the New York Times and has been a frequent guest on Radiolab and Science Friday. His latest book, Infinite Powers, was a New York Times bestseller and was shortlisted for the 2019 Royal Society Science Book Prize. Follow him on Twitter at @stevenstrogatz.

Writing about math for the New York Times

ABSTRACT

In the spring of 2010, Steven Strogatz wrote a 15-part series on the elements of math, from basic to baffling, for the New York Times. To his surprise — and his editor's — each piece climbed the most emailed list and elicited hundreds of appreciative comments. In this talk Steve will describe his adventures in bringing math to the masses, and will share the lessons he learned about what works… and what doesn't.

WEDNESDAY
SEPTEMBER 8, 2021
10:30AM (GMT-4) / 16H30 (GMT+2)

SESSION

Lightning talks: Exhibitions Experiences

La Maison de Fermat: A math, heritage and cultural museum

SPEAKERS

Maryvonne Spiesser and Thomas Ricaud *(Maison de Fermat, Beaumont-de-Lomagne, France)*

ABOUT THE SPEAKERS

Fermat Science aims to promote and popularize mathematics and science, heritage and culture through the character and work of the famous mathematician Pierre de Fermat. By its actions of popularization, Fermat Science hopes to contribute to encouraging more young people (especially girls) to move toward scientific careers. It has been developing teaching tools, exhibitions, and organizes events and workshops for schools and general public.

http://www.fermat-science.com/

ABSTRACT

La Maison de Fermat: A math, heritage and cultural museum. A country, a place, a man. Two floors of this beautiful 16th century mansion will be devoted to the intellectual adventure of Pierre de Fermat, but also to his heirs, who have enriched mathematics in the fields of research initiated by Fermat, among others. La Maison de Fermat will become a math space of resources, skills and attractiveness, a space for reflection and cultural production.

The main aim of La Maison de Fermat is to create a place of attraction for students et for tourists dedicated to mathematical culture and to heritage. How?- By immersing the visitor in the life of a 17th century family- By honoring the memory of Pierre de Fermat, passing on his passion for mathematics to the public- By giving “another idea of mathematics” thanks to an innovative space for scientific and mathematical culture.

La grande salle des MathématiquesOn the third floor, a 150 m2 space will host different exhibitions every two years.The aim is to make people perceive intuitively that mathematics is everywhere in everyday life. The first exhibition scheduled for the opening of La Maison de Fermat will be on the theme of AI. Fermat Science has set up in France, in partnership with La Maison Poincaré in Paris (Institut Henri Poincaré) and La Maison des Mathématiques et de l’Informatique in Lyon, a touring of mathematical exhibitions throughout the country. They are intended for a wide audience and are accompanied by workshops and hands-on designed for students.

This exhibition “Entrez dans le monde de l’IA”, coordinated by Fermat Science, is the result of the collaborative work of a team of specialists in this field.

A successful experience on student engagement in STEM museums

SPEAKER

Montserrat Alsina *(Universitat Politècnica de Catalunya, Barcelona, Spain)*

ABOUT THE SPEAKER

Researcher in Number Theory. Curator of the exhibition “Mathematics and Life” from 2009, member of Scientific Committee of III Matrix Conference 2018, MMACA collaborator, promoter of projects as 7deMates, Time for Mathematics and STEAM en ACCIÓ, and main researcher of FECYT funded project AquaEsTEAM.

ABSTRACT

We want to share a successful experience about engagement of university students in a Math exhibition and other activities in Science and Technology Museums.

The project has been carried out with engineering students from the Universitat Politècnica de Catalunya-BarcelonaTechat Manresa in collaboration with the Technology Museum in Manresa, belonging to Parc de la Sequia,on the occasion of the exhibition “Mathematics and Life”.

Students began with a training part, which included a personal discovery of the exhibition, experimentation, sessions by experts in playful communication, and even a night at the museum. It led to a creative part where students designed new activities around the Math exhibition aimed at schoolchildren and the general public. The activity got financial support from City Council of Manresa. As expected, they enjoyed acting as guides for the exhibition, and the collaboration continued during the last two academic years, despite covid restrictions.

Anyway, the most remarkable and innovative feature is the positive impact in the academic path of students involved in the project. Examples will be given. Following this direction, a new project will begin this September, with some funds from UPC and FECYT and some institutions.

“Traveling Around the World with Math.” A traveling exhibition.

SPEAKER

I-Wei Lai *(National Taiwan Normal University, Taipei, Taiwan)*

ABOUT THE SPEAKER

I am an associate professor and have devoted myself into popular math for more than 10 years. We have a team called “Numeracy Lab”, whose facebook fanpage has around 100K followers.

https://www.facebook.com/numeracylab/

ABSTRACT

In this April, we have created a small traveling interactive exhibition entitled “Traveling Around the World with Math.” The idea of this exhibition is that, due to covid-19, we are locked in our hometown. Instead of traveling to different countries like before, we have installed the famous tourist attraction in this exhibition, e.g., Notre-Dame de Paris, Egyptian Pyramids, and Taipei 101. Then, these attractions are explained and interpreted from the math perspective. For example, when we travel Egyptian Pyramids, we will explain the Egyptian numeral system; In front of the Notre-Dame de Paris, the symmetry

property of the Rose Window is utilized so that the tourist can create their own window by their gesture and colors of their clothes.

Totally six countries/attractions are presented and the target audiences are the family having kids in elementary schools. The exhibition is open in Huashan 1914 Creative Park, Taipei, Taiwan during 4th–11th April 2021. The exhibition site is around 200 m^2, attracting around 5K visitors. We currently plan to raise fund to move this exhibition to different regions in Taiwan, and hopefully to gradually increase the scale of this exhibition, i.e., adding more and more attractions. Anyway, the most remarkable and innovative feature is the positive impact in the academic path of students involved in the project. Examples will be given. Following this direction, a new project will begin this September, with some funds from UPC and FECYT and some institutions.

SESSION

Math Museum Panorama

Math museum exhibits from around the world

SPEAKER

Daniel Ramos *(IMAGINARY, Berlin, Germany)*

ABOUT THE SPEAKER

Daniel Ramos is PhD in Mathematics and works as Chief Content Officer at IMAGINARY (Berlin, Germany) and as Outreach Officer at Centre de Recerca Matemàtica (Barcelona, Spain). He has curated the exhibition La La Lab - The mathematics of music (2019), has participated in international projects with other math museums and math outreach organizations (MathSpaces.eu, Mathina.eu), and he also works on several other collaboration projects across the math outreach community.

http://mathspaces.eu/

http://mathina.eu/

http://imaginary.org/

ABSTRACT

In January 2020, IMAGINARY was commissioned by MoMath and the Overdeck Family Foundation to prepare a report on the best exhibits in math museums worldwide. We contacted 38 math museums around the world, and we got a positive answer from 15 of them. We conducted personal surveys with each of those museums and we made a selection of 17 exhibits, from those that were considered the finest from each museum by their directors.

We present this report in written, pdf, form (available at imaginary.org) and also in online form through the platform mathcom.wiki, where more exhibits and information about those museums and exhibits can be added by the community.

Museums of mathematics worldwide: activities of Mathematikum

SPEAKER

Albrecht Beutelspacher *(Mathematikum, Giessen, Germany)*

ABOUT THE SPEAKER

Albrecht Beutelspacher is professor of mathematics at the University of Giessen, Germany. Also, he is the founder and director of the Mathematikum in Giessen.

ABSTRACT

In this talk, I will shortly speak on new exhbitions. Also I will add a few remarks on mathematics museums in general and the type of exhibits we use (and recommend).

Maison Poincaré

SPEAKER

Sylvie Benzoni *(Institut Henri Poincaré, Paris, France)*

ABOUT THE SPEAKER

Sylvie Benzoni is a mathematician whose main research interests concern equations for fluids and waves. She has been involved in maths outreach for years, and stepped in as director of the Institut Henri Poincaré in 2018. She is in charge of a great extension project initiated by Cédric Villani, which includes a maths museum called Maison Poincaré due to open in 2023.

ABSTRACT

Maison Poincaré is the name of a maths museum project supported by the Institut Henri Poincaré and its public and private funders, aiming at bridging the gap between maths and the society. Its main originality lies in its direct connection with higher education and research through the institute's other activities. The idea here is to showcase its permanent exhibition.

MathsCity

SPEAKER

Katie Chicot *(MathsWorldUK, Leeds, UK)*

ABOUT THE SPEAKER

Dr Katie Chicot, is the CEO of MathsWorldUK whose aim is to create the UK's first Mathematics Discovery Centre. Alongside this Katie is a Senior Lecturer, Staff tutor in Mathematics and Statistics at the Open University. Outreach has included captaining the OU's team on BBC2's Beat the Brain, creation of a maths/brain teaser app called Perplex, and working as academic consultant to BBC Radio 4's More or Less.

http://mathscity.co.uk/

ABSTRACT

As a step on the path to creating the UK's first Mathematics Discovery Centre this year we will establish MathsCity in Leeds. This will be both a destination wonderland of mathematics exploration, and a template that we use to scale up longer term to building the bigger centre.

We have been given the use of a retail unit in the busiest shopping arcade called Trinity Leeds for 12 months, rent free. The exhibits featured in MathsCity will include 22 medium to large exhibits and a further 10 smaller table-top activities: the themes explored are problem solving (the existing Explore Maths touring exhibition, and follow-on materials as displayed on our website at: Explore Maths) and shape and space. The Workhaus, a highly respected museum fit out company, has been tasked with designing and fitting out the space, with the aim of completing in time for MathsCity to open during September. The formal public launch will take place later in the year.

Our website is under construction, and the holding page can be viewed http://mathscity.co.uk/ We're excited to share our progress with attendees of Matrix.

Seattle Universal Math Museum

SPEAKER

Tracy Drinkwater *(Seattle Universal Math Museum, Seattle, WA, USA)*

ABOUT THE SPEAKER

Tracy Drinkwater is an educator and leader in inclusive math education, with an extensive background in teaching children as well as future educators. Tracy's advocacy for expanding hands-on learning to all math learners inspired her to create a Math Museum in Seattle.

http://www.seattlemathmuseum.org/

ABSTRACT

As a global leader in the science and technology sectors, Seattle is a natural home for the next math museum in the United States. We are planning to establish the museum over the next 3–5 years in the Seattle region. At Seattle Universal Math Museum (SUMM), we believe in the wonder and beauty of math. Math achievement impacts the trajectory of young lives. We seek to inspire each and every learner and collaborate with existing community partners to help drive equity-based, culturally relevant math education opportunities.

SUMM will build a dynamic museum to house engaging math exhibits, hands-on experiences, programs, and play areas to stimulate inquiry, ignite creativity and curiosity, and reveal the wonders of mathematics through play and exploration.

SUMM will inspire marvel and instill joy in math learningfor children at the critical juncture of 8 to 13 years old, which will impacttheir opportunities and fulfillment for the rest of their personal andprofessional lives. SUMM – bringing math to life!

Kiev Math Museum

SPEAKER

Yevhen Kudriavets *(Science Museum of Kyiv, Kiev, Ukraine)*

ABOUT THE SPEAKER

Yevhen Kudriavets is Deputy Director for International Relations and Strategic Projects in UNESCO Center Junior Academy of Sciences of Ukraine and the general manager for the Science Museum of Kyiv.

ABSTRACT

In my talk, I will present the current plan and status of opening a mathematics museum in Kyiv, Ukraine.

UFMG Mathematics Museum

SPEAKERS

Carmen Rosa Giraldo Vergara and Fabio Enrrique Brochero Martínez
(Departamento de Matemática, Universidade Federal de Minas Gerais, Brazil)

ABOUT THE SPEAKERS

We are PhDs in Mathematics and Professors of the Mathematics Department at the Federal University of Minas Gerais - Brazil. Founding members of the UFMG Mathematics Museum.

http://www.mat.ufmg.br/museu/

ABSTRACT

The learning of Sciences, and in particular Mathematics, is not exclusive to teaching formal. The "informal activities", developed in and by different spaces, in particular university museums, brings science closer to different audiences, contributing to stimulate their learning and creating scientific vocations. In this sense, the UFMG Mathematics Museum has developed activities seeking to promote Mathematics and to stimulate interest, especially among students and teachers of Basic Education.

From this, one of the consequences of the activities developed by the UFMG Mathematics Museum has been the making of interactive objects and the production of booklets with molds and instructions. An example of this are the kits for assembling the "Sierpinski Tetrahedron" and the Platonic and Archimedean solids.

When searching about the activity of building the Sierpinski tetrahedron, it's found that they are usually made from smaller cardboard tetrahedrons or from sticks joined by gums or marshmallows. In both procedures we found disadvantages in both methods, during the process of gluing the tetrahedrons in the first case and due to the instability of the connections with larger iterations in the second case. The idea of our project, both for the Sierpinski Tetrahedron and for solids, was to use wooden rods and make a custom design of connectors to 3D print, thus resulting in an activity that is easy to assemble and that has an stable structure.

SESSION

Joining Hands: Ideas to Foster Collaboration

A Network of Permanent Exhibitions

SPEAKER

Guido Ramellini *(MMACA, Barcelona, Spain)*

ABOUT THE SPEAKER

Retired Secondary School Teacher. Member of the founding group of the MMACA. Trainer and popularizer. Grandpa.

https://mmaca.cat/en/

ABSTRACT

Many of the experiences related to the dissemination of mathematics that we have shared in the Matrix Conferences highlight the fundamental step that occurs when you manage to have a permanent home, after years of traveling exhibitions, fairs and workshops.

There are two new spaces in an advanced state of planning which we would like to join the MMACA Network. In Girona, the historical value of the building and then the pandemic have retarded the creation of a small permanent space, capable of offering an exhibition and workshops on site or in nearby schools.

In Santa Coloma de Gramanet, on the north-eastern outskirts of Barcelona, we were offered a space inside a neighbourhood library, with the possibility of using outdoor spaces and the auditorium for collective initiatives and collaborative projects.

We have also started conversation in Tarragona, Lleida and Manresa, as part of projects involving other entities.

We believe that facing these different challenges can be positive for analysing the weaknesses and strengths of our projects.

The other positive aspects of establishing and managing a network of smaller spaces remain: sustainability, proximity to local realities and a constant exchange of ideas and materials within the network in order to periodically innovate and renew each collection.

The Handbook of Mathematical Science Communication

SPEAKERS

Anna Maria Hartkopf and Erin Henning *(Freie Universität Berlin, Germany)*

ABOUT THE SPEAKERS

Dr. Anna Maria Hartkopf is a PostDoc at Freie Universität and head of MIP.labor, a laboratory for developing new formats of science communication in mathematics, physics and computer science.

Erin Henning is a PhD candidate at the Freie Universität Berlin. In her research, she is developing methods to evaluate science communication projects in mathematics, physics and computer science.

ABSTRACT

We would like to invigorate the discourse and exchange about science communication in mathematics.

In our talk, we want to introduce the Handbook of Mathematical Science Communication, which shows some efforts and projects that have been undertaken to communicate mathematics and lays the groundwork of a framework of notions to analyze their objectives, motivations, and methods. The Handbook of Mathematical Science Communication, which is still a work in progress, shall be a starting point for a scholarly exchange about and among the many endeavors, projects and actors that communicate mathematics.

https://page.mi.fu-berlin.de/annahartkopf/hmsc.html

A website to share ideas and objects

SPEAKERS

Indira Chatterji *(Université Côte d'Azur, France)* and Rémi Coulon *(Université de Rennes, France)*

ABOUT THE SPEAKERS

Indira Chatterji, from Université Côte d'Azur, is interested in geometric group theory. She obtained a PhD from ETH Zurich in 2001, went on a postdoc at Cornell and has been a professtor at the Ohio-State University, Université d'Orléans and Jawaharlal Nehru University. She likes to illustrate mathematical concepts with short movies.

http://chatterj.perso.math.cnrs.fr/index.html

Rémi Coulon is a researcher in mathematic. His interests focus on geometric group theory, dynamical systems and illustrating mathematics. After getting his PhD in 2010 from the Université de Strasbourg, he worked at the Max-Planck Institute for mathematics (Bonn, Germany) and Vanderbilt University (Nashville, TN). Since 2014, he is a permanent researcher at the CNRS / Université de Rennes 1.

http://rcoulon.perso.math.cnrs.fr/

ABSTRACT

A website to share ideas and objects illustrating mathematics among french mathematicians. We hope that this website will foster communication in the community, through sharing our passion for mathematics. The website and the concept are very simple. We will have an official launching on-line in September 2021, and will be supporting financially the making of objects that will be offered on loan through our website.

https://kits.math.cnrs.fr/

Julia Robinson Math Festivals

SPEAKER

Daniel Kline *(Julia Robinson Mathematics Festival, Calabasas, CA, USA)*

ABOUT THE SPEAKER

Daniel Kline is the Executive Director of the Julia Robinson Mathematics Festival, an education non-profit that spreads the joy of math through events that celebrate problem-solving called math festivals. Daniel holds a BS in Mathematics from the University of Chicago and an M.S.Ed. in Secondary Math Education from the University of Pennsylvania. He draws heavily from his experiences in Budapest, where he learned how to develop mathematical concepts through games and manipulatives, which informs much of his current work today.

ABSTRACT

Most kids (and adults) think of math as the procedures and formulas they memorized in math class. At the Julia Robinson Mathematics Festival, we celebrate the joy and beauty in problem solving by providing opportunities for students to explore discovery-based, play-based, hands-on math activities. Our vision at JRMF is a world where every child believes “I can do math” and “Math is fun.” To bring about this vision, JRMF hosts and helps others host math festivals.

A math festival is an event with multiple tables, each set up with a different, manipulative-based game, puzzle, or crafting activity. Each activity is staffed by trained facilitators to help guide students through the discovery process. Students have the agency to choose which activities they do and for how long they do them for. A math festival provides students with the opportunity to problem solve with agency, play, and joy. In 2019, we helped hosts around the world put on over 120 math festivals. In 2020, we were on track to help put on over 200 math festivals. Our current goal as an organization is to produce the resources (e.g., activities, apps, facilitator guides, etc.) and services to make it even easier for hosts to put on math festivals. Every child deserves to have at least one experience of feeling confident and joyful about math, and we at JRMF want to make that a reality.

https://www.jrmf.org/

Collaborative Communities

SPEAKER

Stephon Alexander *(Brown University, Providence, RI, USA)*
and Cindy R. Lawrence *(MoMath, New York, NY, USA)*

ABOUT THE SPEAKER

Stephon Alexander is Professor of Physics at Brown University and the President of the National Society of Black Physicists. Alexander is a specialist in the field of string theory and cosmology, where the physics of superstrings are applied to address longstanding questions in cosmology. In his critically acclaimed book, The Jazz of Physics, Alexander revisits the ancient interconnection between music and the evolution of astrophysics and the laws of motion. He explores new ways music, in particular jazz music, mirrors modern physics, such as quantum mechanics, general relativity, and the physics of the early universe.

Cindy R. Lawrence is a lifelong math enthusiast whose career began in accounting and finance, segued into professional education, and ultimately landed her as the Executive Director and CEO of MoMath, the National Museum of Mathematics. In her role with the Museum, Lawrence focuses on the creative design process for exhibits and programs as well as ongoing oversight of all aspects of Museum operations, with a focus on public outreach, engagement, and demonstrating to audiences of all ages and backgrounds that math can be interactive, exciting, and fun.

ABSTRACT

How do we encourage diverse audiences to step into the wonderful world of mathematics? Sometimes, collaboration between distinctly different organizations can be the key. Join Stephon Alexander, theoretical physicist, computational physicist, acclaimed author, and Advisory Board member of the Universal Hip Hop Museum, and Cindy Lawrence, Executive Director and CEO of the National Museum of Mathematics, for a brief look into a new project that aims to unite New York City youth around the twin themes of music and math.

Erkal Selman

I have been interested in puzzle games since childhood. I studied Mathematics in Berlin with a focus on discrete Mathematics and algorithms. In the last two years, I have been professionally building browser games full-time, using a purely functional programming language called Elm. I am very much interested in creating aha! moments via interactive visuals and puzzle games.

Elm, a good friend of mathematics

ABSTRACT

Elm is an elegant, mathematics-friendly programming language well-suited for explorable explanations with complex graphical user interfaces, creative coding, making games, data visualizations and even for learning programming. In this talk, I will share my experience with Elm together with some demos and try to give you a first taste of Elm using an online editor.

THURSDAY
SEPTEMBER 9, 2021
10:05AM (GMT-4) / 16H05 (GMT+2)

Henry Segerman

Henry Segerman is an associate professor in the department of mathematics at Oklahoma State University. His research interests are in three-dimensional geometry and topology, and in mathematical art and visualization. In visualization he works in 3D printing, spherical video, virtual, and augmented reality. He is the author of the book “Visualizing Mathematics with 3D Printing”.

Variants of the 15-puzzle and the effects of holonomy

ABSTRACT

I’ll discuss some variants of the classic sliding tile “15 puzzle” that involve holonomy - the phenomenon of traveling around a loop in a curved surface and coming back rotated. I’ll demonstrate physical puzzle designs with positive and with negative curvature, and discuss their designs.

THURSDAY
SEPTEMBER 9, 2021
10:20AM (GMT-4) / 16H20 (GMT+2)

Jürgen Richter-Gebert & Tim Nissen

Jürgen Richter-Gebert. Full Professor for Geometry and Visualization at Technical University of Munich and passionate App Developer. He is running the hands-on math exhibition ix-quadrat since 2002. Collaborations with several other math exhibition makers. For his activities he was awarded the German national Communicator Award in 2021.

Tim Nissen holds a B.A. in architecture from Carnegie Mellon University. He has been working with the National Museum of Mathematics since 2010, first as its Chief of Design and now additionally as Associate Director. Prior to this, Nissen was a project director at Ralph Appelbaum Associates, where he worked on exhibit halls for the Dallas Museum of Science and Nature, park.

Symmetry Selfie

ABSTRACT

"You are great...infinitely many of you are even greater". This talk demonstrates the WIP on a project for a symmetry selfie exhibit that allows visitors of a math exhibition to create a selfie that shows infinitely many copies of them in an immersed reflection group. The talk discusses the collaboration between two museums through the lens of:

- mathematics: how three reflections can create euclidean and non-Euclidean kaleidoscopes and relations to related ongoing research about discrete conformal mappings and hyperbolic ornamental patterns.
- software and hardware ergonomy: how to access a mathematically complicated topic with an intuitive user interface and how to make this into an engaging physical object.

THURSDAY
SEPTEMBER 9, 2021
1:00PM (GMT-4) / 19H00 (GMT+2)

LIST OF TALKS - DAY 2

SESSION

Lightning talks I

Sketchnotes of Science

SPEAKER

Constanza Rojas-Molina *(CY Cergy Paris Université, France)*

ABOUT THE SPEAKER

Mathematician and illustrator. Lecturer at the CY Cergy Paris Université, working in mathematical physics, and science communicator focused on the use of graphic narrative and visual note-taking (sketchnotes) to communicate science.

http://www.crojasmolina.com/

ABSTRACT

Sketchnotes, a term coined by designer Mike Rohde, is a way of taking notes that combines text with visual elements. This visual form of notetaking has the advantage that it involves active learning, in situations where information is being received, as attending a talk, a lecture, or reading. Sketchnotes has other advantages that make it a suitable for social media: these are done quickly, spontaneously, with accessible materials, and with a colorful visual content that seeks to attract the audience. Doing Sketchnotes is a creative practice that requires developing a visual personal language, receiving and reproducing information, which make it a great exercise when applied to science communication.

In this talk, we will present different examples of communication using Sketchnotes, where they are used as a medium to start a discussion with the audience in different aspects of mathematics and the process behind doing mathematics. We will present the two Twitter drawing challenges #Noethember and #Mathyear, respectively created and co-created by the author. In the former, Sketchnotes are used to promote the life and work of German mathematician Emmy Noether. This allows us to make a reflection on the impressive work of Noether, at the same time raising awareness of the role of women in mathematics and the many obstacles they face. Lastly, #Mathyear revolves around mathematics and its interactions, and it aims to show how mathematics permeates contemporary advances in science and technology. While these examples have different aims and target audiences, they all have in common the exploratory use of Sketchnotes and drawing to communicate mathematics and a way to invite the audience to discuss and to engage in the action of drawing. Mathematics, being an abstract discipline, could be considered a challenge from the point of view of visualization. However, we emphasize the visual aspect of mathematics and how doing Sketchnotes can be an excellent exercise in the effort to reveal the visual component of mathematics.

Ultimately, our goal is to make mathematics and the mathematical activity closer to the general audience

and to encourage the scientific literacy of the audience. Using Sketchnotes, we aim at making the mathematical activity attractive and most importantly, relatable. We hope this will ultimately contribute to our goals and to produce a positive shift in the public perception of mathematics.

What we talk about when we talk about Comics&Science - A Scicomm Experience

SPEAKER

Andrea Plazzi *(Symmaceo Communications, Italy)*
and Roberto Natalini *(Consiglio Nazionale delle Ricerche, Roma, Italy)*

ABOUT THE SPEAKER

Andrea Plazzi (1962) gained his degree in Mathematics from his Alma Mater in Bologna and has been working for several years as an applied mathematician both in the private and public sector. After that, he devoted himself full-time to publishing, and especially to comics, as an editor and translator. Starting 2012 he's been teaming up with Roberto Natalini (CNR – Consiglio Nazionale delle Ricerche), giving birth to the Comics&Science project.

ABSTRACT

Italian Science Journalist Pietro Greco's "Scicomm Uncertainty Principle" states

$$\Delta a \bullet \Delta t \geq k$$

where a=accuracy and Δa is therefore the error we make while illustrating science ideas and principles in a mainstream context (i.e. to non experts); t=how much a scientific concept/notion is actually transmissible and Δt is the error made while trying to communicate in a way fitting what we think is our audience's ability to understand.

k>0 is a constant depending on the topic and the audience we are addressing.

It's a way to re-state the well-known "Scicomm dilemma": communicating Science implies trading what is rigourous with what is intelligible to the chosen (or given) audience.

In this setting, each attempt of communicating Science is an attempt to make the left side as close as possible to k, with precision and understanding mutually limiting themselves.

Comics&Science is one of such attempts, relying on a well known and ever-popular medium: since their birth somewhere across 19th and 20th Century, depending on definition and the country, comics (fumetti, bandes dessinées, historietas, quadrinhos, manga, manhwa) have proved to be an effective tool in conveying ideas and notions in a direct, informal way.

At the same time, they historically are an entertaiment-oriented medium, a way of spending leisure time in a gratifying way.

Bringing these two sides of the coin together is what Comics&Science is about.

Projeto Visitas: Fibo e Sofia

SPEAKER

Aniura Milanes Barrientos *(Federal University of Minas Gerais, Belo Horizonte, Brazil)*

ABOUT THE SPEAKER

I completed my PhD studies in Mathematics in 2002 at IMPA, Rio de Janeiro. I work at UFMG since 2004. From 2013 on I have been working with some colleagues and students in maths outreach projects.

ABSTRACT

I lead a team of mathematics students that interact with groups of elementary students who visit us, by means of fun maths activities and games. However, since the beginning of 2020 because of the Covid pandemic, face-to-face interactions are not possible anymore, so we have adapted some of the activities to the online setting. Our team keep publishing content about math, mainly for Instagram (https://www.instagram.com/projetovisitas/). Last year one of the students produced a short cartoon series that was based on three of the most successful activities of our project. We put the posts together and made a little comic book whose digital version can be accessed online.

https://tinyurl.com/22xhbmt7/

SESSION

Lightning talks II

Polypad

SPEAKER

Philipp Legner *(Mathigon, London, UK)*

ABOUT THE SPEAKER

Philipp is the founder of Mathigon, an award-winning online learning platform. Called "a true mathematical wonderland" in The Guardian and "a front-runner for a new generation of textbooks" by Common Sense Education, Mathigon is free, open-source, and used by millions of students and teachers all around the world. Previously, Philipp worked at Google, Bloomberg and Wolfram Research. He studied mathematics at Cambridge University and mathematics education at the UCL Institute of Education in London.

ABSTRACT

Polypad is a virtual canvas for learning and exploring mathematics. Our goal is to create the ultimate "mathematical playground" where students can discover new ideas, learn problem solving, be creative, and collaborate with each other. It's incredibly intuitive to use, and contains dozes of tools: number and algebra tiles, tangram and pentominoes, multiplication grids, fraction bars, dice and spinners, balance scales, prime factor circle, number lines, playing cards and much more – as well as graph plotting, dynamic

geometry, and data science tools. Students can freely explore, but educators can also set up and share specific games, puzzles or activities. In this short presentation, we will explore some of the key features of Polypad, present unique visualisations and representations of mathematical concepts, and show the audience how they can get involved.

https://mathigon.org/polypad/

Manim (Mathematical Animation Engine)

SPEAKER

Oliver Schön *(University of Tübingen, Germany)*

ABOUT THE SPEAKER

I am a PhD student in Theoretical Physics at the University of Tübingen. I reached this position via a Bachelors degree in Mathematics and a Masters degree in Mathematical Physics. In my spare time I act as a Community Developer for the open source project Manim, an animation library I want to present at the gathering. Other than that I have been active as a science communicator in various programs of IMAGINARY.

ABSTRACT

Visualization of mathematical concepts plays a very important role in learning and understanding the abstract ideas encountered daily in mathematics. On top of that, visually appealing images and animations may help to inspire people to learn more about certain topics – or even pursue a career in mathematical oriented fields.

These are just some of the reasons why the voluntary developers of our open-source community invest their time to build, expand and maintain a very powerful Python library to do exactly that: Visualize and Animate Mathematics! The name of the software is Manim (short for Mathematical Animation Engine), and it was originally created by Grant “3Blue1Brown” Sanderson as a private project to produce animations for his YouTube channel.

Some advantages of an animation engine built on top of a programming language is the precision to convey technical concepts accurately. Built-in features include plotting functions with tangents and Riemann rectangles to explain derivatives and integrals, linear transformations of 2D or 3D vectors and planes and much more. If you can describe your objects in a mathematical way, there is probably a way to illustrate them with Manim.

An integral idea of our community is the creation of documentation and tutorials such that all aspiring or accomplished math-communicators can utilize this powerful tool to engage their audience in a modern and very compelling way.

https://www.manim.community/

“One for all, All for one”

SPEAKER

Riccardo Moschetti *(Curvilinea, Milan, Italy)*

ABOUT THE SPEAKER

I am a researcher in Mathematics at the University of Turin, and one of the founders of Curvilinea, which has been creating since 2014 exhibitions and hands-on experiences about Mathematics for schools and scientific festivals.

ABSTRACT

“One for all, all for one”, is an experiment about multiple-user real-time computer-based interaction. It was born to answer a simple question: is it possible to develop an experience which allows more users (like 30 people or more) to interact together in real time? At its core there is a piece of hardware which handles up to 64 custom-designed gamepad, and a web-based software where the interaction is built. In our test-exhibit we talk about game theory, decision theory, up to generating random numbers. The experiences consist of small games, where the first interaction occurs, and where the people are free to play as they wish. Then, a discussion about what happened in the game, and then a final run, to see if something changed after discovering some tricks about interactions, payoff, winning strategies.

Math games for real

SPEAKER

Gaston Ibarburu *(Universidad de la República, Montevideo, Uruguay)*

ABOUT THE SPEAKER

Gastón Ibarburu teaches Math and Project at the School of Architecture in the University of the Republic in Uruguay. He is an Architect, doing his master in Engineering Physics, and explores the potential of merging maths and science with the creative visual way of thinking of architects.

ABSTRACT

This project is about making games with math. This may not seem too innovative, but rather than making games to learn math, or even disguise math learning activities as games, it is about breaching the gap between math and all the other playing skills usually taken into account when designing good games (the fun ones).

This idea started at one of our courses that deals with the math behind structures of static beams, which is mostly calculus and the accumulation of variables to determine the different stresses in each point of a beam, and we came up with two games to put some of these ideas into practice. The first one was a card game with a function graph as a board, in which players need to find a set of cards that match the extremes and value of an integral below the graph. The other one is a set of jenga-like pieces, with which players have to build horizontal beams, adding tape on only one face of the beam.

Regardless of how these particular cases affected the results of the course itself, we noticed something else when we took the games to the classroom. When playing, students were calculating areas, but they were also measuring the emotions of other players. They were reasoning about tractions and

compressions in beams, but they were using their hands to craft wood structures. Math was just naturally integrated with the flow of the game, and people were having a good time.

Since then, our conviction that math and joy should not imply a contradiction for anybody has grown, and we want to spread and enforce this idea. It is necessary to insist that this is not meant to be a gamification process of traditional math exercises. We are talking about making games, real entertaining games, that do not fear math skills but rather use them as part of the flow. They are not, after all, any less fun than the rest.

https://playingcards.io/dy4nh6/

Bugbottle

SPEAKER

Beau Janzen *(Gnomon School of Visual Effects, Los Angeles, CA, USA)*

ABOUT THE SPEAKER

Beau Janzen teaches math and digital art at the college level and currently serves as the head of the Visual Effects department at the Gnomon school in Hollywood. To this, be brings of 25 years of experience as a computer graphics supervisor on numerous feature film and television projects including X-Men, Life of Pi, Batman vs. Superman, Game of Thrones, Stranger Things, and the vfx Emmy-Award winning shows Westworld and Gotham.

ABSTRACT

Math is an abstract discipline, and therefore it offers a bigger challenge to communicate to an audience. Beyond the concepts themselves being abstract, the surrounding structure that imbues them with life such as the personal relevance or broad application of an idea or the aesthetic quality it holds can also appear complex or ephemeral. Too often the life behind ideas is ignored, and the curriculum dissolves into a series of rote, passive empirical components. I see a filmmaker's ability to engage and communicate to an audience on a deeper level as being an essential tool in conveying these concepts as well as supplying them with a rich context. In my short film Bugbottle, I took on the challenge of depicting the construction of a Klein bottle, a crosscap, and a Boy's surface in a way that would engage a novice audience. In creating this film, I had to rely heavily on my experience as an animator and filmmaker to connect with the viewer and lead them through the deconstruction of a seemingly impossible predicament to understand the world beyond our immediate experience.

SESSION

Lightning talks III

Pooled testing

SPEAKER

Lauren Siegel *(MathHappens Foundation, Austin, TX, USA)*

ABOUT THE SPEAKER

I created a pooled testing demo of overlapping pools with just 3 samples. The challenge of "math busking" that was given for IDM 2020 (that was cancelled) put this presentation concept into my mind. The idea is to show how you can know something specific about 3 samples if you only test 2 pools or groupings of these samples. So the presentation is kind of like a magic trick where the audience has to figure out how the trick works and if it will work every time. Here's the video. I am using this with some collaborators from COMAP to try to encourage math teachers to connect their content with a real world problem. The concept is especially attractive because pooled testing is being used now in very innovative ways, there are numerous new papers being written, as well as algorithms for robots and more by countries worldwide to fight Covid. Also nice for Americans, as it was literally invented by an American. The widespread use by other countries and relatively limited use by the US is another topic of interest, but we don't focus on that as much depending on the audiencce as the statistics, binomial distributions, connections to pascal's triangle, graph theory and combinatorics that can be applied to the questions of which grouping strategy to use and what the expected savings will be.

ABSTRACT

In just 4 minutes I think I would probably record a speeded up version of this video, or possibly speed this one up or have a still slide and/or show this other video I made that shows the original Dorfman technique with a brief introduction and a word at the end about our efforts to encourage math teachers to use this demonstration. We have some evidence from a 3 hour camp for 7th graders that kids can do this experiment and some pretty sophisticated thinking about grouping strategies without the mathematics. You can see some info on the camp here: https://www.mathhappens.org/pooled-testing-at-camp-with-stem-santa-fe/

Revising the visualisation of the “Poincaré homology sphere”

SPEAKER

Renate C.- Z. Quehenberger *(Vienna, Austria)*

ABOUT THE SPEAKER

Philosopher & SciArt researcher and media artist based in Vienna (AT); developed a digital Hyper-Euclidean geometry based on her finding, the 3D representation of the Penrose Kites & Darts tiling; publications in the fields of Earth sciences, Archeology, Geometry & Quantum physics: Entropy Best Poster Award at the Linnaeus Conference Towards Ultimate Quantum Theory (UQT) 2018.

ABSTRACT

Pretty much happened since the 3D representation of the Kites & Darts Penrose tiling (Epitahedron, E±) was presented in the film Epita-dodecahedron, at IMAGINARY and discussed as new representation of the Poincaré homology sphere at the ICM SEOUL 2014.

The 4 min presentation will comprise a glimpse into the SciArt project GAIA 5.0 (commissioned by the Resonances III Datami Festival JRC-Ispra of the European Commission (EC), 2019/20) where the epita-dodecahedron, the dynamic geometry of the 5-dimensional space was redered as a model for the Earth’s complex living system and as a model for the formation of aerosol particles.

Moreover Henri Poincaré’s original ideas on the fundamental polyhedron as considered in his seminal Analysis Situs Papers (1899-1904) compared to the unit cell of the 5-dimensional space,–which Poincaré himself found appropriate for group theory (Poincaré, 1899, p.19) shall be reconsidered. Some open questions concerning our visualisation (after the description of Threlfall and Seifert, 1933 with twists of opposite lying faces but not by 3/5 radians but by π/5 radians as in the case of spherical dodecahedron space) shall be discussed.

Finally the proposal for the installation of a hologram projection of the geometry film on the Poincaré Homology sphere in the math exhibition planned by the Poincaré Institute shall be presented with a short video excerpt.

Infinite Fun: Inventing and Exploring with Mobies

SPEAKERS

Alexey V. Ivchenko *(Volgograd State Technical University, Russian Federation)*
and Yana Mohanty, *(Imathgination LLC, San Diego, CA, USA)*

ABOUT THE SPEAKERS

Alexey Ivchenko is a design engineer who has been gaining wide recognition for his expertise in reconfigurable structures. His design of an adaptive, reconfigurable airplane wing was recognized as one of the Top 10 innovations at the international air show MAKS-19 held biannually near Moscow. In recognition of his innovations, Alexey was selected to be a juror at the All Russia Engineering competition in Crimea in December 2019.

Yana Mohanty, Ph.D., is an educator, mathematician and inventor. She is the founder of Imathgination LLC, whose award-winning product Geometiles has gained popularity in schools, universities and math festivals all over the United States. A former mathematics lecturer at the University of California in San Diego, Yana has also taught at the local Math Circles, coached children of age 10 and up in school math clubs, and given workshops for the community, including at the National Museum of Mathematics.

ABSTRACT

This story started with our desire to expand the capability of the Geometiles® construction set to make transformable hinged constructions. In particular, we were interested in making flexagons using the equilateral and square Geometiles tiles. Flexagons are polygons typically made of paper, which can be folded to expose certain faces and hide others. They were invented by Arthur Stone in 1939, and he formed a “Flexagon Committee” along with Richard Feynman, John Tukey and Bryant Tuckerman to further explore their properties. Flexagons were later popularized by Martin Gardner, and they still mesmerize children and adults alike. The rich and varied history of flexagons and related transformable structures, some of which is described in this article, makes them a good subject for a future interactive workshop or exhibit.

It seemed that all we needed was a small spacer with connections that mates with the existing pieces. This turned out to be largely correct. The spacer needed to be topologically equivalent to a Moebius strip (rather than a cylinder) in order to make the hexaflexagon possible. It turns out that the Moebius-like spacers, which we call Mobies, provided a much richer collection of structures than the hexaflexagon and tetraflexagon for which they were originally designed. We can now do a nice demonstration of ”splitting” the Moebius strip.

Most notably, we were able to build hinged rings of polyhedra which admit cyclical rotations. One was the infinity cube, and the other, a rotating ring of 12 square antiprisms. The latter is a modification of the rotating ring of 14 gyroelongated square bipyramids found on page 94 of the book Mathematical Tapestry by Peter Hinton and Jean Pedersen.

This brings us to the natural question: what other constructions can be made possible with the Mobies? We invite the audience to explore the usefulness of the system for modeling of other types of structures. We are eager to see how this story evolves!

Alternative Perspectives

SPEAKER

Anton Bakker *(USA)*

ABOUT THE SPEAKER

Anton Bakker is a contemporary artist specializing in sculpture and its digital possibilities. He has been influenced by the people and experiences of his life in the Netherlands, France, and in the United States, where his artistic practice has been based for more than 30 years.

ABSTRACT

As a sculptor creating digital and physical forms, I strive to take viewers on a journey of truth and discovery by asking them to engage with various perspectives. Using custom-built technology, I create paths by connecting points in space. The curved and polyline paths that I compose are not arbitrary; rather, they are patterns derived from nature’s archetypes.

The human attraction to symmetry extends deep into the unconscious realms of our minds.

Natural patterns and symmetries also play a key role in present-day technology. For 40 years, I have used technology both in my artistic explorations with my mentor, Koos, and in my business to analyze patterns. I now use technology solely to discover the beauty that hides in the minuscule yet vast world of atomic lattices.

One way that I explore perspectives is by constructing objects at vastly different scales and in multiple dimensions. The viewer's relationship with my work changes whether they walk around a sculpture in a home, as part of an outdoor installation, or in a virtual landscape. My sculptures reveal dynamic symmetries that ask the viewer to reflect on the beauty and multiplicity of perspectives inherent in all things.

Experience Workshop STEAM Network

SPEAKERS

Kristóf Fenyvesi, Christopher Brownell and Zsolt Lavicza *(University of Jyväskylä, Finland)*

ABOUT THE SPEAKERS

Kristóf Fenyvesi, Ph.D., is a Researcher of STEAM Learning & Contemporary Culture Studies at the Finnish Institute for Educational Research, University of Jyväskylä (Finland). He is a founder of the Experience Workshop STEAM Network (www.experienceworkshop.org) and the Children and Youth Math-Art Exhibitions, which are running since 2012 on various digital and physical locations.

Christopher Brownell, Ph.D. is an Associate Professor, and the Mathematics and STEM Education Program Director at Fresno Pacific University (USA), and a core member of Experience Workshop STEAM Network's math&art curatorial and research team.

Zsolt Lavicza, Ph.D., Professor of Linz School of Education, STEM Education Centre, Johannes Kepler University, Linz, Austria. A core member of Experience Workshop STEAM Network's math&art curatorial and research team.

ABSTRACT

The Experience Workshop GLOBAL STEAM Learning Network (www.experienceworkshop.org) curates and facilitate online and physical exhibitions of mathematical art created by children and youth around the globe. The goal of the exhibits is to explore new sources of connecting mathematics and art education and engaging children, teachers, and parents in transdisciplinary activities. The Children and Youth Mathematical Art Exhibits were initiated in 2012 by Kristóf Fenyvesi (University of Jyväskylä – Experience Workshop) and John A. Hiigli (1943-2017), New York-based painter and educator, founder of the Jardin Children's Art Galerie in New York. Based on this concept, several local children and youth MathArt exhibits have been organized worldwide with members of the Experience Workshop STEAM Network (www.experienceworkshop.org), and the MathArt-works have been collected and shown at international exhibitions.

The goals of the Math-Art Children and Youth exhibits are

- supporting both the participants and the audience to actively explore new sources of mathematics and art education through transdisciplinary artworks, created by children and youth to express various connections between mathematics and arts;
- motivating and engaging children and teachers in transdisciplinary mathematics and art learning activities as part of educational MathArt events.

In the past few years, the Nelson Mandela University's Govan Mbeki Mathematics Development Centre (GMMDC) in South Africa successfully launched a national educational development program based on this concept, see: http://www.MathArt.co.za/# . In 2021, the Assam Valley School Network in India with more than 40 schools and 200 children devoted their Art and Design Festival to the topic of mathematical art and launched an exhibition too.

Fundapromat

SPEAKER

Jeanette Shakalli *(Fundapromat, Panama)*

ABOUT THE SPEAKER

Jeanette Shakalli is a Panamanian mathematician with a Bachelor of Science in Mathematics and Chemistry from the University of Notre Dame and a PhD in Mathematics from Texas A&M University. Dr. Shakalli is the Executive Director of FUNDAPROMAT and has organized more than 400 math outreach events.

ABSTRACT

I would like to take this opportunity to present FUNDAPROMAT. The mission of this private non-profit Foundation is to promote the study of mathematics in the Republic of Panama and in the world. So far we have organized more than 350 virtual events with more than 35,000 participants, including Panamanians and people from all over the world. Our virtual events are free and open to the general public, which means that kids and adults of all ages are welcome to attend. We organize several virtual events per week, including Virtual Origami Classes, Math Jamborees, Webinars on Recreational Mathematics, and Virtual Encounters with Outstanding Mathematicians. The purpose of this talk is to promote FUNDAPROMAT's math outreach efforts and encourage others to get involved.

https://www.fundapromat.org/en/

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ONLINE GATHERING

SEPTEMBER 8-9, 2021

Paris/Berlin Time:
16h to 21h each day
(GMT+2, Central European Summer Time)

NY Time:
10 AM to 3 PM each day
(GMT-4, Eastern Daylight Time)

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APRIL 4-6, 2022

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