Università di Roma Tor Vergata

Department of Mathematics

University of Rome Tor Vergata

MATH@TOV

Excellence Project 2018-2022

NEWSLETTER

N°4 - January -March 2019

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Presentation

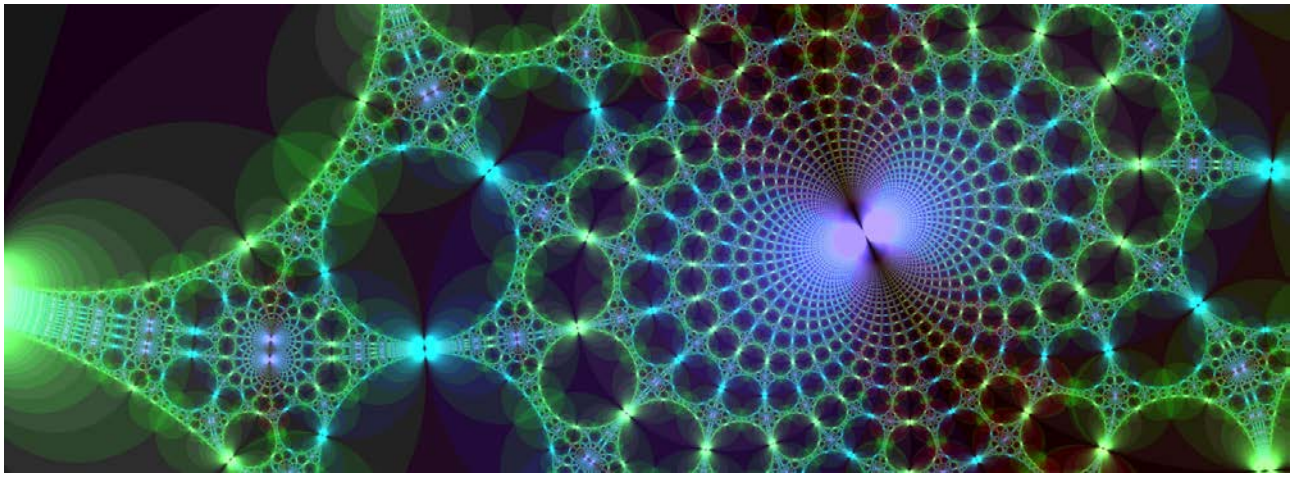
The Department of Mathematics of the University of Rome Tor Vergata is distinguished by first class research, often motivated by applications from theoretical physics, astronomy, aerospace, finance, technology and medical science, a high level educational system, and the organization of events in the context of the so-called third mission of the University. For details we refer to the Department's website, http://www.mat.uniroma2.it

The Department aims to increase its leading role in research, math education and math culture. The recently awarded national Excellence Project 2018-2022, denoted by MATH@TOV, offers the opportunity to face new challenges, and its main objectives are:

- foster new collaborations between staff members on advanced research themes
- hire excellent staff members, able to participate in multiple research projects
- stimulate the interaction with excellent math groups, both in public research institutions and industry, and transform the Department into a strategic asset for the development of highly advanced mathematics and its application to specific problems
- increase the international visibility of the Department
- improve the Master and PhD Programs in Mathematics
- intensify the spreading of Math Culture.

See the web page of the projectMATH@TOV: http://www.mat.uniroma2.it/Progetto/

Recruitment



The MIUR Excellence Grant (CUP E83C18000100006, 2018-2022), awarded by the Mathematics Department of the University of Rome Tor Vergata (project MATH@TOV), provides funds for Assistant and Associate Professorships as well as for Postdoc Positions.

Professorships

- In January 2019, Central Administration of the University confirmed 2 "Tenure-Track" Assistant Professorships (RTD-B) as follows:
  - 1 position in Probability and Mathematical Statistics (Settore concorsuale 01/A3-Settore Scientifico Disciplinare MAT/06) http://www.uniroma2.it/ammin/cda/2019/29-01-19/10_8.pdf

  - 1 position in Mathematical Physics (Settore concorsuale 01/A4-Settore Scientifico Disciplinare MAT/07) http://www.uniroma2.it/ammin/cda/2019/29-01-19/10_9.pdf

  Both positions are for three years and, after evaluation, can be converted in tenured Associate Professorships; they will be opened soon and will be awarded through a public competition.
  Applicants must have at least three years of experience after PhD completion, and an already established research record.

- In December 2018, Central Administration of the University of Rome Tor Vergata confirmed 1 position of Associate Professor as follows:
  - 1 position in Mathematical Analysis (Settore concorsuale 01/A3-Settore Scientifico Disciplinare MAT/05) http://www.uniroma2.it/ammin/cda/2018/17-12-18/10_3.pdf

  The position will be awarded through a public competition.
  Applicants should have an established track-record of publications in top international journals and evidence of leadership and recognition in the international academic community, including grant applications and project management. Standards of excellence in teaching are also expected.
  More information will appear on http://www.mat.uniroma2.it/Progetto/recruitment.php

- The following 2 “Tenure-Track” Assistant Professorships (RTD-B) selection procedures are in progress:
  - 1 position in Geometry (Settore concorsuale 01/A2-Settore Scientifico Disciplinare MAT/03)

http://web.uniroma2.it/module/name/Content/newlang/italiano/action/showpage/navpath/CON/content_id/68633/section_id/6206

  - 1 position in Numerical Analysis (Settore concorsuale 01/A5-Settore Scientifico Disciplinare MAT/08).

http://web.uniroma2.it/module/name/Content/newlang/italiano/action/showpage/navpath/CON/content_id/68776/section_id/6206

Both positions are for three years and, after evaluation, can be converted in tenured Associate Professorships; they will be awarded through a public competition.
More information will appear on http://www.mat.uniroma2.it/Progetto/recruitment.php

Early stage researcher positions

As part of the Marie Curie Initial Training Network, STARDUST-R, the Department of Mathematics of the University of Rome Tor Vergata offers 2 fully funded ESR positions on the following subjects:

UTV-ESR 1) Dynamics of space debris within different orbital elements regions;

UTV-ESR 2) Proper elements for Space Debris.

At the time of appointment applicants must not hold a PhD, should have no more than 4 years experience after graduation and should not have resided in Italy for more than 12 months in the last 3 years immediately before the appointment.

The selection will be on the basis of the CV and an interview (possibly via skype).

More information are available at: http://www.stardust-network.eu/about/jobs/

Postdoc positions

The Central Administration of the University of Rome Tor Vergata confirmed the following Postdoc positions (Assegni di Ricerca - III Fascia):

- 1 position (one-year) in Numerical Analysis (Settore Scientifico Disciplinare MAT/08) - Title: "Spline approximation for isogeometric analysis in aerospace design";

- 1 position (one-year) in Mathematical Analysis (Settore Scientifico Disciplinare MAT/05) - Title: "P.D.E." ;

http://web.uniroma2.it/module/name/Content/newlang/italiano/action/showpage/navpath/RIC/content_id/68688/section_id/4992

More information will appear soon on http://www.mat.uniroma2.it/Progetto/recruitment.php

We also congratulate:

- Dr. Anna Vidotto, winner of the two –years position in Probability and Statistics (Settore Scientifico Disciplinare MAT/06) - Title: "Geometry of random fields and astrostatistical applications";

- Dr. Eslami Peyman, winner of the one-year position in Mathematical Physics (Settore Scientifico Disciplinare MAT/07) - Title: "Statistical properties of dynamical systems".

Research

External Research Partnership

A meeting with external research partners has been held on January 17th 2019. Invited companies and research institution were: ASI, Igg-CNR, Thales Alenia Space, IaC/CNR and Deep Blue. Several activities and research project were planned.

Thematic Semesters

During the period October 2018 - March 2019, MATH@TOV organizes a thematic semester with a series of seminar talks on the following main areas (cf. also http://www.mat.uniroma2.it/Progetto/short-visit.php):

Operator Algebras and Quantum Field Theory

- Among others, we mention the following speakers: Gwyn Bellamy (Scotland),Pierre Bieliavsky (Louvain, Belgium), Detlev Buchholz (Gottingen, Germany), Ken Dykema (Texas, USA), Ghislain Fourier (Germany), Klaus Fredenhagen (Hamburg, Germany), Benoit Fresse (France), Michael Magee (UK), Ryszard Nest (Copenhagen, Denmark), Nicola Pinamonti (Genova, Italy), Wolfgang Soergel (Germany), Layla Sorkatty (Sudan).

Holomorphic dynamics and geometry of complex manifolds and spaces, and their interplay

- Amongothers, we mention the talks of Marco Abate (Pisa, Italy), Alberto Abbondandolo (Germany), Cinzia Bisi (Ferrara, Italy), Manuel Contreras (Spain), Eleonora Di Nezza (France), Hakan Samuelsson Kalm (Sweden), Likas Kosinski (Poland), Frank Kutzchebausch (Switzerland), Fulvio Ricci (SNS Pisa, Italy), Tatsuo Suwa (Japan), Adriano Tomassini (Parma, Italy), Erlend Wold (Norway), Andrew Zimmer (USA).

Mathematical techniques for Earth and Space Science

- Among others, we mention the following speakers: Anna Maria Cherubini (Italy), Cristel Chandre (France), Guido Ciraolo (France), Yabebal Fantaye (South Africa), Helene Frankowska (France), Catalin Gales (Romania), M. Patrick Martinez (France), Sokol Ndreca (Brazil), Rocio Isabel Paez (Italy), Alicia Simon-Petit (France), Espen Sande (Norway), Giovanna Tinetti (UK).

PDE's of Liouville type in Physics and Geometry

- Within MATH@TOV we mention, among others, Marcello Lucia (CUNY New-York, USA), Zheng Huang (CUNY New-York, USA), Masayasu Mimura (Japan), Jingang Xiong (Beijing Normal Univ.). They will deliver seminars on the immersion problem for minimal surfaces.

Conferences and Workshops

MATH@TOV is funding a wide activity of conferences/workshops/advanced lecture series/schools. Recent and next events are listed below.

1) **Mini Workshop - Symulations of Plasma Dynamics in Tokamaks.**
   Link: http://www.mat.uniroma2.it/Progetto/Eventi/2019/Ideas2019/ideas2019.php
   Venue and Period: Department of Mathematics, University of Rome Tor Vergata, January 23, 2019

   Invited Speakers
- Cristel Chandre (U. Aix-Marseille, France)
  - Title: "A brief introduction to gyrokinetics"
- Philippe Ghendrih (Commissariat à l'énergie atomique - Institut de Recherche sur la Fusion par confinement Magnétique, Cadarache, France)
  - Title: "Kinetics and gyrokinetics to understand turbulent heat transport in burning thermo-nuclear plasmas"
- Ahmed Ratnani (Max Planck Institute for Plasma Physics, Germany)
  - Title: "Challenges in the numerical simulation of MHD"

   Scientific and Organizing Committee
   M. Bertsch, U. Locatelli, C. Manni, F. Pelosi, H. Speelers

2) **Mini Workshop - The Geometry of Random Fields**
   Venue and Period: Department of Mathematics, University of Rome Tor Vergata, January 25, 2019

   Invited Speakers
- Dmitry Belyaev (Oxford University, UK)
  - Title: “Geometry of smooth Gaussian fields and percolation”
- Igor Wigman (King's College London, UK)
  - Title: “Points on nodal lines with given direction”
- Anne Estrade (U. Paris Descartes, France)
  - Title: “On Berry's dislocation lines in 3D framework”
- Maurizia Rossi (Università di Pisa, Italy)
  - Title: “Nodal lengths of random spherical harmonics”

3) **Workshop - DYNAMICAL SYSTEMS: FROM GEOMETRY TO MECHANICS**
   Link:http://www.mat.uniroma2.it/Progetto/Eventi/2019/Bridge2019/bridge2019.php
   Venue and Period: Department of Mathematics, University of Rome Tor Vergata, February 5-8, 2019

This workshop aims to provide a forum for discussion, exchange and collaboration on the most recent advances in dynamical systems, from different perspectives. Addressed topics include: Complex Dynamics, Ergodic Theory, Hamiltonian and Symplectic Dynamics, Smooth dynamics, Topological Dynamics.

Invited Speakers

- Marie-Claude Arnaud (Université d'Avignon, France)
- Viviane Baladi (IMJ-PRG, Sorbonne Université, France)
- Eric Bedford (Stony Brook University, United States of America)
- Pierre Berger (Université Paris 13, France)
- Rafael de la Llave (Georgia Institute of Technology, United States of America)
- Santiago Diaz Madrigal (Universidad de Sevilla, Spain)
- Christos Efthymiopolus: (Academy of Athens, Greece)
- Nuria Fagella (Universitat de Barcelona, Spain)
- Albert Fathi (Georgia Institute of Technology, United States of America)
- John Erik Fornaess (Norwegian University of Science and Technology, Norway)
- Vadim Kaloshin (University of Maryland, United States of America)
- Stefano Luzzatto (Abdus Salam International Centre for Theoretical Physics (ICTP), Italy)
- Stefano Marmi (Scuola Normale Superiore di Pisa, Italy)
- Gabriella Pinzari (Università degli Studi di Padova, Italy)
- Jasmin Raissy (Université de Toulouse, France)
- David Sauzin (CNRS-IMCCE, France)
- Tere M-Seara (Universitat Politécnica de Catalunya, Spain)
- Amie Wilkinson (University of Chicago, United States of America)

Scientific and OrganizingCommittee

F. Bracci, A. Celletti, C. Liverani, A. Sorrentino

4) Workshop - 43RD LQP. FOUNDATIONS AND CONSTRUCTIVE ASPECTS OF QFT.

Link: https://sites.google.com/view/43-lqp

Venue and Period: Galileo Galilei Institute, Florence, Italy, February 20-22, 2019

The workshop is particularly directed to young researchers and PhD students; it will be held at the *Galilei Institute* in Florence, within the collaboration frame between the *Center for Mathematics and Theoretical Physics* of our Department and the *National Institute for Nuclear Physics.*

Scientific and Organizing committee

M. P. Lombardo (INFN, Florence), R. Longo (Rome Tor Vergata), V. Morinelli (Rome Tor Vergata), G. Morsella (Rome Tor Vergata), G. Ruzzi (Rome Tor Vergata)

5) Workshop - MATHEMATICAL MODELS AND METHODS IN EARTH AND SPACE SCIENCES

Link: http://www.mat.uniroma2.it/Progetto/Eventi/2019/Mmmess19/mmmess19.php

Venue and Period: Department of Mathematics, University of Rome Tor Vergata, March 19-22, 2019

The workshop aims to provide a forum for discussion, exchange and collaboration on the most recent mathematical developments in earth and space sciences. Addressed topics include: mathematical models for space debris and air traffic stability of planets and satellites data analysis in cosmology, numerical techniques in plasma physics, uncertainty quantification, mathematical models in climatology

Invited Speakers

- Ethan Anderes (University of California at Davis, USA)
- Annalisa Bracco (Georgia Institute of Technology, USA)
- Camilla Colombo (Politecnico di Milano, Italy)
- Tor Dokken (SINTEF, Norway)
- Giovanni Gronchi (Università di Pisa, Italy)
- Àngel Jorba (Universitat de Barcelona, Spain
- Angela Kunoth (Universität zu Köln, Germany)
- Daniela Mansutti (IAC-CNR, Roma, Italy)
- Patrick Martinez (Université Toulouse III - Paul Sabatier, France)
- Jason McEwen (University College, London, UK)
- Salvatore Miccichè (Università di Palermo, Italy)
- Gianluca Polenta (Agenzia Spaziale Italiana, Italy)
- Antonello Provenzale (IGG-CNR, Pisa, Italy)
- Eric Sonnendrücker (IPP, Garching, Germany)
- Jean-Luc Starck (CEA, Paris-Saclay, France)
- Emmanuel Trélat (Sorbonne Université - Paris 6, France)
- Massimiliano Vasile (University of Strathclyde, Glasgow, UK)

Scientific and OrganizingCommittee
M. Bertsch, P. Cannarsa, A. Celletti, C. Manni, D. Marinucci, M. Picardello, B. Scoppola, A. Sorrentino, H. Speleers

Advanced Lecture Series, Scientific Schools

1) **School (Advanced Lectures) - "The Interplay of Geometric Modelling and Numerical Analysis of PDEs. A short course by Annalisa Buffa"**
   Link: http://www.mat.uniroma2.it/~dott/Buffa.html
   Venue and Period: Department of Mathematics, University of Rome Tor Vergata, January 25-26, 2019

2) **School (Advanced Lectures) - "Variational Approaches in PDE's"**
   Link: http://www.mat.uniroma2.it/~ricerca/analis/Scuola_Marzo_2019/
   Venue and Period: Department of Mathematics, University of Rome Tor Vergata, March 13-14, 2019

   Registration is necessary for organizational purposes; applicants should use the web-page:
   http://www.mat.uniroma2.it/~ricerca/analis/Scuola_Marzo_2019/home.html

Courses:
- Thomas Bartsch(Universität Gießen, Germany)
  - Title: "Normalized solutions of nonlinear Schrödinger equations and systems"
- Tristane Riviere (ETH Zurich, Switzerland)
  - Title: "Minmax methods for the area of surfaces"

Short talks:
- Dario Mazzoleni (U. Cattolica di Brescia, Italy)

- Title: “Asymptotic spherical shapes in some spectral optimization problems”

- Roberta Musina (U. Udine, Italy)
  - Title: “Some advances on Arnold's problem about the existence of multiple geodesics”
- Alessandro Pigati (ETH Zurich, Switzerland)
  - Title: TBA
- Pieralberto Sicbaldi (U. Granada, Spain)
  - Title: “Overdetermined elliptic problems in exterior domains”

Scientific and OrganizingCommittee
R. Molle, G. Tarantello, G. Verzini

Publications

Publications realized, within the excellence Department project MATH@TOV, by members of the Department and their co-authors during the first year of the project have been listed in the web-page http://www.mat.uniroma2.it/Progetto/publications.php

High level teaching activities

Curriculum of Excellence

MATH@TOV provided funds for students enrolled in the Curriculum of Excellence of the Master Programme in Pure and Applied Mathematics at “Tor Vergata”. The following students have been admitted to the Curriculum of Excellence:

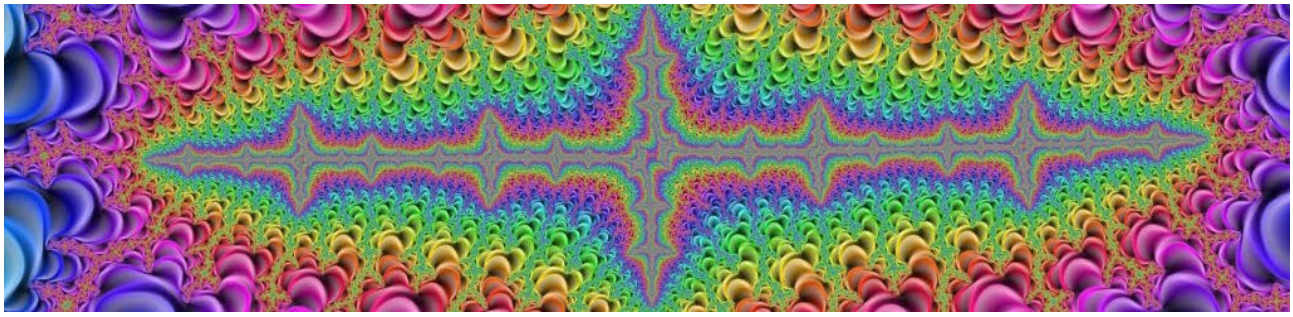
- Denis DELL'ARA (INdAM scholarship winner);
- Giacomo GIORGIO (INdAM scholarship winner);
- Roberta RELLA.

PhD School in Mathematics - Courses

Special courses for the Ph.D. School in Mathematics, to be held in the period April-October 2019, organized within the excellence Department project MATH@TOV are the following:

- Vlad Bally (Université Paris-Est, France)
  - Title: “Malliavin calculus and regularity properties” (Probability theory and Statistics, PDE)
- Barbara Bolognese (University of Sheffield, UK)
  - Title: “Introduction to Bridgeland stability and applications” (Algebraic Geometry)
- Sylvain Cappell (New York University, USA)
  - Title: “Theories of characteristic classes for singular varieties and their roles and computations in geometrical topology and algebraic geometry” (Algebraic Geometry)
- DejanSlepcev (Carnegie-Mellon University, USA)
  - Title: “Variational problems of Machine Learning and their continuum limits” (PDE)

General Activities



MATH@TOVis also meant to fund renovations of rooms/laboratories of the Department, acquisition of modern equipment, research books, etc. The list below covers some of the activities in the first year of the project.

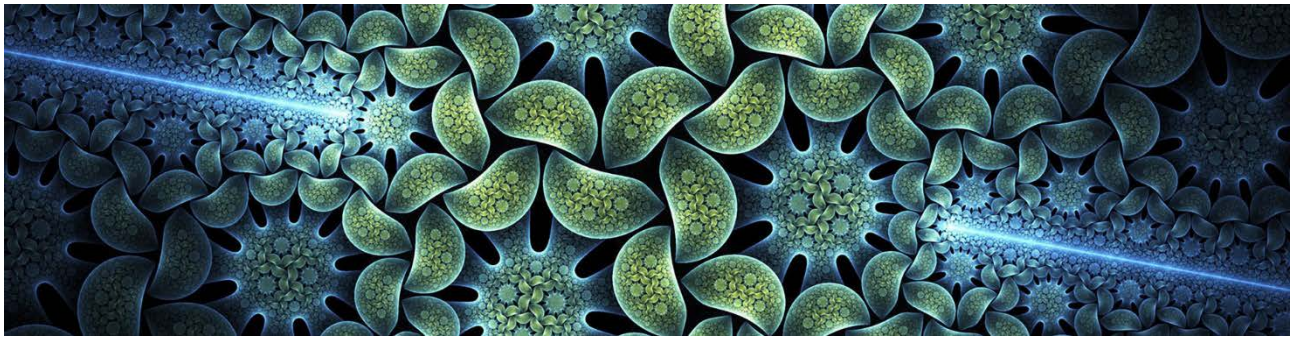
- BUILDING:
  During the period Jan-March 2019 the following renovation works has been completed.

  - Extension of "Dal Passo" room, with sliding panels;
  - "Photographic Laboratory"renovation;
  - “Computing Center Area"renovation, where the multi-core "Single System Image" will be located for CPU parallel computing;
  - Realization of a "Department Common Room".

- SOFTWARE:
  it is now possible to install and use *Mathematica* on desktops or laptops connected to the University network. The procedure is still under experimental evaluation, however installation on PCs of an IT laboratory classroom have been worked.

- COMPUTATIONAL EQUIPMENT:
  2 chassis, each of which equipped with 4 processors, for a total of 144 cores, which can be used in parallel. It is reasonable to expect that this new resource will be fully available for the end of April/ early May. The architecture of the "single system image" machine is absolutely modular and can be expanded in the future by purchasing other chassis with similar characteristics of the first two.

Third mission



- Comitato Unico di Garanzia (CUG) of the University of Rome Tor Vergata has organized the series of conferences and laboratory activities "*STEM UP!",* dealing with approach to secondary school of children, with particular attention to gender issues. Schools involved are Liceo Lucrezio Caro and Liceo Augusto in Rome. Part of the activities are structured in a project of "*Alternanza Scuola-Lavoro*" with Liceo Augusto in Rome, started on December 19, 2018 with interventions on the professional career in Mathematics and Biology.
  The activities "*Alternanza scuola lavoro*" with Liceo Scientifico Gullace Talotta, Liceo Classico Orazio and Liceo Scientifico Levi Civita in Rome started on February 2019.

- Meetings with teachers are going on as part of the initiatives "*Con la Mente e con le Mani*" and "*Curriculum verticale*", organized in collaboration with *Accademia Nazionale dei Lincei* in Rome. Prof. A. Celletti gave a lecture in Latina in the framework of "I Lincei per la scuola" (link). Prof.C. Ciliberto organizes initiatives, in collaboration with D. Pasquazi, B.Scoppola and F. Tovena. The activities related to the "*Liceo Matematico*" and "*Rete 33*" are in progress with students attending the first and second cycle schools.

- The event "*Scienza Orienta 2019*" has been held from February 25th to March 1st. This meeting aimed to present the didactic and research offer of the Science Macroarea to students and teachers of high schools. On each day, students participated in popular conferences and practical activities on mathematics, computer science, biology, material sciences, chemistry.

- On February 1, 2019 Prof. D. Marinucci organized a meeting between companies, research institutions and students of the Master's Degree in Pure and Applied Mathematics. At the end of the presentation of the Master's Degree, the invited organizations presented their work project and the main features of new job profiles. The students had the opportunity to directly interface organizations asking questions and clarifications.

- On March 14, 2019 the working group coordinated by Emanuele Callegari organized the selection competitions during the *Mathematics Olympics*, in order to select the teams that can participate in the national final which will take place in Cesenatico. Teams from 36 schools participated in the selection. The race was replicated online for another 147 teams.