TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

Department of Mathematics
University of Rome Tor Vergata

MATH@TOV
Excellence Project 2018-2022
NEWSLETTER
N°13 April – June 2021

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Due to the Covid-19 emergency some scheduled activities have been suspended/postponed.
We will promptly report about these activities in the next newsletters.
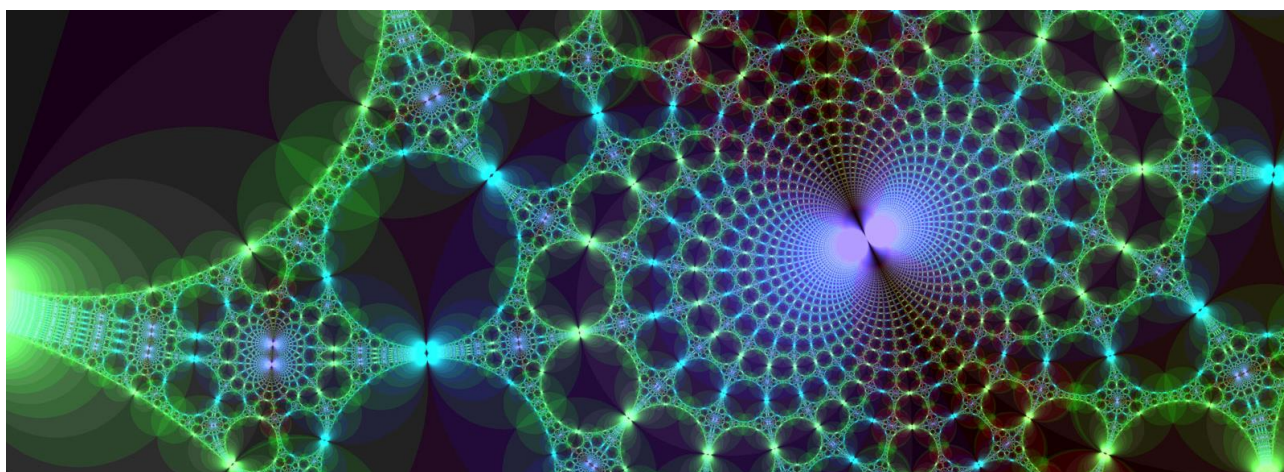
Presentation

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 project MATH@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

• The following "Tenure-Track" Assistant Professorships (RTD-B) selection procedure is in progress:

   – 1 position in Algebra (Settore concorsuale 01/A2 - Settore Scientifico Disciplinare MAT/02)

https://web.uniroma2.it/it/percorso/ufficio_concorsi/sezione/procedure_ricercatori

The position is for three years and, after evaluation, can be converted in tenured Associate Professorships; it 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. Selection procedures are in progress. More information will appear soon on http://www.mat.uniroma2.it/Progetto/recruitment.php

Postdoc positions

The following Postdoc positions selection procedures are in progress:

• 1 (one-year) Postdoc position (Assegni di Ricerca - III Fascia) in Mathematical Analysis (Settore concorsuale 01/A3 - Settore Scientifico Disciplinare MAT/05) – Title: "Algebre di Operatori e Teoria Quantistica dei Campi"

• 1 (one year) Postdoc position (Assegni di Ricerca - III Fascia) in Mathematical Analysis (Settore concorsuale 01/A3 - Settore Scientifico Disciplinare MAT/05) – Title: "Metodi variazionali, geometrici e PDE per lo studio di sistemi Hamiltoniani e dell'equazione di Hamilton-Jacobi"

See http://concorsionline.uniroma2.it

We also congratulate:

• Dr. Veronica Danesi, winner of the (one-year) Postdoc position (Assegni di Ricerca - I Fascia) in Mathematical Physics (Settore concorsuale 01/A4 - Settore Scientifico Disciplinare MAT/07) – Title: "Teoria KAM sulla stabilità dei sistemi planetari caratterizzati da ampie eccentricità"

• Dr. Claudio Onorati, winner of the (one-year) Postdoc position (Assegni di Ricerca - II Fascia) in Geometry (Settore concorsuale 01/A2 - Settore Scientifico Disciplinare MAT/03) – Title: "Geometria Algebrica"

• Dr. Van Tu Le, winner of the (one-year) Postdoc position (Assegni di Ricerca - II Fascia) in Geometry (Settore concorsuale 01/A2 - Settore Scientifico Disciplinare MAT/03) − Title: "Dinamica olomorfa e iperbolicità di Gromov"

• Dr. Lorenzo Guerra, winner of the (one-year) Postdoc position (Assegni di Ricerca - II Fascia) in Geometry (Settore concorsuale 01/A2 - Settore Scientifico Disciplinare MAT/03) − Title: "Struttura algebrica della coomologia di alcune rappresentazioni dei gruppi di Coxeter"

Research

Thematic Semesters

During the period October 2020 - June 2021, MATH@TOV organized 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 talks of V. Morinelli (University of Rome "Tor Vergata"), B. Wegener (University of Rome "Tor Vergata"), A. Stottmeister (University of Hannover), L. Panebianco (University of Rome "Tor Vergata"), N. Pinamonti (University of Genova), D. Buchholz (University of Goettingen), L. Zsido (University of Rome "Tor Vergata"), F. Cipriani (Politecnico di Milano), N. Pinamonti (University of Genova), D. Guido (University of Rome "Tor Vergata").

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

- Among others, we mention the talks of O. Roth (University of Wuerzburg), A. Aleman (Lund University), A. Baranov (St. Peterburg State University), A. Bufetov (CNRS Marseille), P. Mozolyako (St. Peterburg State University), M. Calzi (University of Milano), A. Monguzzi (University of Milano-Bicocca), W. Zwonek (Jagiellonian University), L. Kosinski (Jagiellonian University), M. Abate (University of Pisa), D. Girela (University of Malaga), S. Mongodi (Politecnico di Milano), A. Nicolau (UAB Barcelona), D. Betsakos (Aristotle University of Thessaloniki), A. Dayan (Washington University at St. Louis), I. Chalendar (University Paris-Eiffel), A.M. Benini (University of Parma), H. Gaussier (University of Grenoble Alpes).

Mathematical techniques for Earth and Space Science

- Among others, we mention the talks of A.P. Bustamante (Georgia I.T.), S. Daneri (G.S.S.I.), B. Kumar (Georgia I.T.), E. Marchini (Politecnico di Milano), G. Benedetti (Ruprecht-Karls Universität), G. Pucacco (University of Rome "Tor Vergata"), L. Valvo (University of Rome "Tor Vergata"), T. Vartolomei (University of Rome "Tor Vergata"), D. Serra (University of Pisa), M. Saillenfest (IMCCE, Observatoire de Paris), M. Sansottera (University of Milano), C. Bellettini (University College London), F.C. Chittaro (University of Toulon), S. Ferraz Mello (University of Sao Paulo) .

- Mini-series of seminars on topological data analysis: S. Vigogna (University of Genova), A. Troiani (University of Padova), N. Otter (University of California at Los Angeles).

PDE's of Liouville type in Physics and Geometry

- Among others, we mention the talks of C. Alvez (Universidade Federal de Campina Grande), V. Moroz (Swansea University), M. Muratori (Politecnico di Milano), A. Pluda (University of Pisa), L. Martinazzi (University of Padova), J. Bellazzini (University of Pisa), W. Ao (Wuhan University), M. Ahmedou (Geißen University), M. Santilli (University of Augsburg), M. Caponigro (University of Rome "Tor Vergata"), L. Jeanjean (Bourgogne Franche-Comté), R. Ghezzi (University of Rome "Tor Vergata"), A. Jevnikar (University of Udine), M. Nolasco (University of L'Aquila), S. Secchi (University of Milano-Bicocca), G. Molica Bisci (University of Urbino), F. Palmurella (ETH Zurich).

Algebraic Geometry

- Among others, we mention the talks of A. Okounkov (Columbia University), T. Kobayashi (University of Tokio), F. Catanese (University of Bayreuth), J. Bassi (University of Rome "Tor Vergata"), R. Fringuelli (University of Rome "Tor Vergata").

Probability theory and statistics - data analysis in cosmology

- Among others, we mention the talk of E. Persichetti (Florida Atlantic University).

Conferences and Workshops

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

- **May 12: Celebrating Woman in Mathematics**
  An initiative in memory of Maryam Mirzakhani.
  Online event: www.mat.uniroma2.it/may12/12.php
  May 14th: M. Colombo (Swiss Federal Institute of Technology).
  Organizers: M. Lanini, D. Marinucci, A. Sorrentino, E. Strickland

- **Entropy and QFT**
  Date: May 19th and 20th 2021
  https://sites.google.com/view/entropy-qft
  Organizers: G. Ruzzi, R. Longo, V. Morinelli

- **Dimension of multivariate splines: an algebraic approach**
  Date: May 31th 2021
  Organizers: C. Manni, H. Speleers

- **Machine learning and computer-assisted techniques in Celestial Mechanics and Astrodynamics**
  Date: June 18th and 25th 2021
  Organizers: C. Lhotka, U. Locatelli

- **Seminal interactions between mathematics and physics. II**
  Date: September 28th - October 1th 2021
  Organizers: F. Ciolli, C. de Concini, A. De Sole, S. Doplicher, G. Gallavotti, A. Giuliani, G. Jona-Lasinio, R. Longo, G. Morsella, C. Procesi, A. Pizzo, G. Ruzzi

- **Algebraic Combinatorics and Mathematical Physics**
  Date: January 13th and 14th 2022

Organizer: F. Brenti

- **Dynamic programming methods in aerospace engineering**
  Date: tba
  Organizers: P. Cannarsa, L. Mazzini (Thales)

Colloquia

The seminars are online. We use the Teams platform.

April 26th: T. J.R. Hughes (The University of Texas at Austin)

Link: http://www.mat.uniroma2.it/Progetto/seminars.php

Joint Seminars Series A.S.I. – Mathematics Department

The Department of Mathematics and the Italian Space Agency organize a joint seminar series in the frame of Excellence Project.

May 21th: B. Negri (A.S.I.), A. Celletti (University of Rome "Tor Vergata").

Complex Analysis Seminars

The seminars are online. We use the Teams platform.
Link: https://sites.google.com/view/complex-analysis-seminar/home-page

Organizers:

Filippo Bracci (University of Rome "Tor Vergata")
Marco Peloso (University "Statale di Milano")
Nicola Arcozzi (University of Bologna)

Publications

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

High level teaching activities

PhD Courses – Advanced Lecture Series

MATH@TOV is funding a wide activity of Ph.D. courses/advanced lecture series

- **Canonical metrics and Kähler-Ricci flow**
  V. Guedj (Institut de Mathématiques de Toulouse)
  Period: April 2021

- **Structure-preserving methods: finite element exterior calculus and isogeometric generalizations**
  D. Toshniwal (Delft Institute of Applied Mathematics), E. Sande (University of Rome "Tor Vergata")
  Period: April 2021

- **Graph-complexes, operads and embedding spaces**
  V. Turchin (Max Planck Institut Bonn/Kansas State University)
  Period: April-May 2021

- **Questioni e metodi di storia della scienza**
  L. Russo.
  Period: April-May 2021

- **Optimal transport and applications**
  F. Santambrogio (University of Lyon)
  Period: May 2021, http://www.mat.uniroma2.it/~dott/Santa.html

- **Topological data analysis and applications**
  Anibal Medina-Mardones (Max-Planck-Institut Bonn)
  Period: May-June 2021

- **On rationality of complex algebraic varieties**
  T. de Fernex (University of Utah)
  Period: May-June 2021, http://www.mat.uniroma2.it/~ricerca/geomet/Lect2021_de_Fernex.html

- **Weak KAM theory and Hamilton-Jacobi equations**
  Albert Fathi (Georgia Tech)
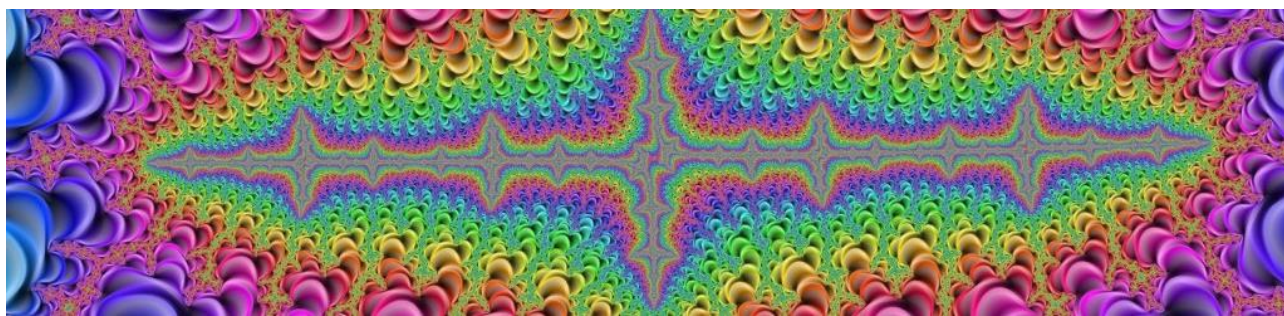 Period: June 2021

- **Modern Classical and Statistical Mechanics**
  G. Gallavotti
  Period: June-July 2021

- **An introduction to Liouville Equations with Applications**
  D. Bartolucci (University of Rome "Tor Vergata"), D. Ruiz (University of Granada),
  R. Soriano-Lopez (University of Granada), A. Jevnikar (University of Udine).
  Period: October-November 2021

- **Thermodynamics and Statistical Mechanics of the Climate System**
  V. Lucarini (University of Reading)
   Period: Autumn 2021

- **Weak KAM on Wasserstein spaces**
  Wilfrid Gangbo (UCLA)
  Period: November 2021

- **Topics on Bridgeland stability conditions**
  E. Macrì (University Paris-Sud)
  Period: February-March 2022

- **Mean field games**
  D. Gomes (KAUST)
  Period: tba

Grants and Curriculum of Excellence

- Some MATH@TOV funds have been employed to tackle the economic and social emergency caused by the COVID-19 pandemic. More precisely, the Department has financed the following grants:

  - special prizes for a total of 10,000 euros for students enrolled in the AY 2020/21 of the Bachelor's Degree Course in Mathematics;
  - special prizes for a total of 15,000 euros for students enrolled in the AY 2020/21 of the Master's Degree Course in Pure and Applied Mathematics;
  - special prizes for a total of 6,400 euros for all students enrolled in the AY 2020/21 of the Bachelor's Degree in Science and Technology for the Media.

- All prizes have variable amounts starting from 400 euros. As for the similar awards funded by MATH@TOV in 2020, the competition closed recently and the following students were awarded:

  - for the Master's Degree Course in Pure and Applied Mathematics: Letizia Ambrosetti, Marina Canalis, Manuel Capozzi, Edoardo Ferraro, Alessandro Filippo, Dario Ghigiarelli, Lorenza Gobbi, Giulia Iezzi, Alice Ippoliti, Francesco Malizia, Simone Marrocco, Antonio Martucci, Gilda Masi, Daniele Milana, Denise Novelli, Gabriele Salvadei, Maria Ludovica Sarandrea, Edoardo Scrima, Alessandro Trasatti

  - for the second year of the Master's Degree Course in Pure and Applied Mathematics: Marina Canalis, Manuel Capozzi, Edoardo Ferraro, Dario Ghigiarelli, Lorenza Gobbi, Daniele Milana, Denise Novelli, Gabriele Salvadei, Edoardo Scrima, Alessandro Trasatti;

- for the Bachelor's Degree Course in Mathematics: Valentina Altamura, Marco Aragona, Tiziano Bigazzi, Andrea Cecconi, Mattia D'Andrea, Giorgia Di Luzio, Leonardo Federici, Aurora Iovine, Elisa Martuscelli, Matteo Pacitto, Ilaria Papazzo, Gianluca Pastorini, Dario Pelone, Marco Riccardi, Michela Rossi, Fabrizio Tomeo;

- for the Bachelor's Degree in Science and Technology for the Media: Barbara Brighel, Davide Di Pietro, Arianna Martinelli, Letizia Pennè, Jacopo Proietti Savina, Federica Raule, Lidia Rugiero, Sara Santilli, Martina Stivala, Irena Urbanetti, Stefano Vinaccia.

General Activities

Some MATH@TOV funds have been employed to tackle the economic and social emergency caused by the COVID-19 pandemic.
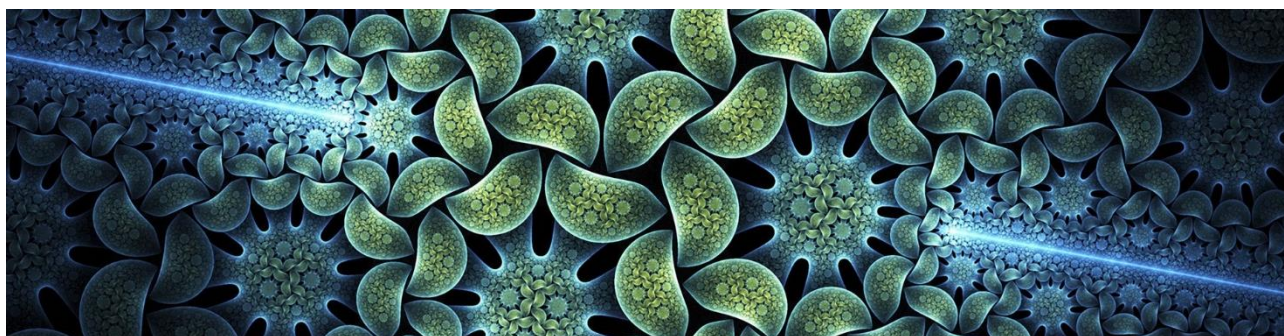10 new laptop computers have been bought for the on-line students activities.

We completed the procedure for the assignment of hardware supplies and related contracts for assistance and training, which are aimed at the expansion of the computer centre of the department.
Asystel Italia SpA delivered and installed a server computer which is a clone of the one we called Ipazia.
Both will be equipped with two GPGPU cards each, thus quadrupling the computing power available to us on this particular type of peripheral unit.
Asystel will organize various training activities specifically dedicated to High Performance Computing addressed to the members of the department.

Third mission

On April 10th and 24th 2021, a course for secondary school teachers was held electronically. The course was attended by 45 teachers. The training activities took place in a workshop format and were completely designed by teachers who participated in previous Autumn School or other training activities.

The first cycle of the Liceo Matematico has been completed, with three classes of students passing their final secondary school exams.

The ten Pathways for Transversal Skills and Orientation (PCTO) run by the Department were completed.