Department of Mathematics
University of Rome Tor Vergata

MATH@TOV
Excellence Project 2018-2022
NEWSLETTER
N°18 July – September 2022

Edited by: D. Bartolucci and M. Abundo, L. Arosio, L. Caramellino, T. D'Aprile, F. Flamini, E. Gandola, C. Garoni.

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/

MIUR final evaluation of the project

Matematica - Accettato SI

Eccellenti risultati e eccellente impatto bibliografico. Reclutamenti numerosi e di molto buona qualità in varie aree. Impatto importante del progetto sul futuro del dipartimento. Il progetto ha notevolmente innalzato il prestigio scientifico del dipartimento (vedasi la Fisica Matematica). Il progetto è in linea con gli obiettivi prefissati. Notevoli le attività per la terza missione. Ottime prospettive di sostenibilità.

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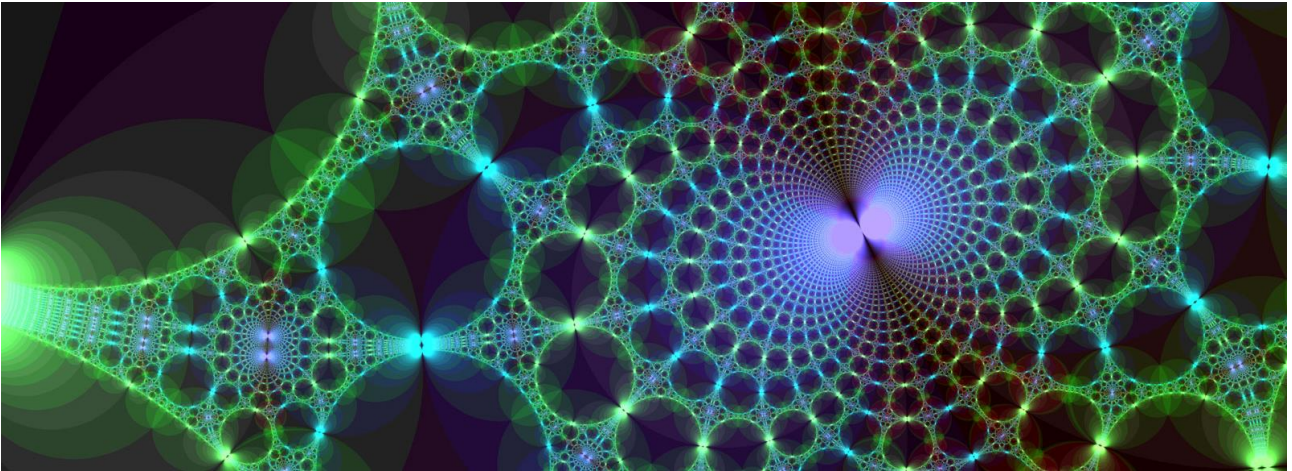
The MIUR Excellence Grant (CUP E83C18000100006, 2018-2022), awarded by the Mathematics Department of the University of Rome Tor Vergata (project MATH@TOV), provides funds for Assistant and Associate Professorships as well as for Postdoc Positions.

Postdoc positions

The following Postdoc positions selection procedure is 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: "Modelli e Metodi PDE nello studio di problemi di diffusione, trasporto e controllo dinamico"

See http://concorsionline.uniroma2.it.

We also congratulate:

• Dr. Salah Eddargani, winner of the (one-year) Postdoc position (Assegni di Ricerca - III Fascia) in Numerical Analysis (Settore concorsuale 01/A5 - Settore Scientifico Disciplinare MAT/08) – Title: "Metodi Isogeometrici veloci e accurati basati su discretizzazioni compatibili"

• Dr. Riccardo Walter Maffucci, winner of the (two-year) Postdoc position (Assegni di Ricerca - III Fascia) in Probability (Settore concorsuale 01/A3 - Settore Scientifico Disciplinare MAT/06) – Title: "Probabilità e sue applicazioni"

• Dr. Chaona Zhu, winner of the (one-year) Postdoc position (Assegni di Ricerca - III Fascia) in Mathematical Analysis (Settore concorsuale 01/A3 - Settore Scientifico Disciplinare MAT/05) – Title: "Problemi differenziali non lineari e Analisi geometrica in Geometria e Fisica"

• Dr. Bernardo Carvalho, winner of the (two-year) Postdoc position (Assegni di Ricerca - IV Fascia) in Mathematical Physics (Settore concorsuale 01/A4 - Settore Scientifico Disciplinare MAT/07) – Title: "Sistemi dinamici"

• Dr. Riccardo Mariani, winner of the (one-year) Postdoc position (Assegni di Ricerca - III Fascia) in

Mathematical Physics (Settore concorsuale 01/A4 - Settore Scientifico Disciplinare MAT/07) – Title: "Aspetti Numerici nei sistemi a molti gradi di libertà"

• Dr. Veronica Danesi, winner of the (one-year) Postdoc position (Assegni di Ricerca - III Fascia) in Mathematical Physics (Settore concorsuale 01/A4 - Settore Scientifico Disciplinare MAT/07) – Title: "Analisi di sistemi Hamiltoniani soggetti a perturbazioni dissipative e stocastiche"

Research

RoMaDS

(Rome Center on Mathematics for Modeling and Data ScienceS)

Recently founded by MATH@TOV project, the aim of the center is to contribute to the development of mathematical research in the field of modeling and data science through the organization of seminars, conferences and doctoral coursers (https://www.mat.uniroma2.it/~rds/events.php).
Even more important is the possibility of establishing a permanent forum for the interaction between mathematical research and actual applications. In particular, the interdisciplinary nature of the center allows the creation of stable interactions between those involved in mathematical techniques of data analysis in different departments of the University. At the same time, our goal is to foster interactions with other research centers and even outside the strictly academic sphere.
https://www.mat.uniroma2.it/~rds/about.php

Thematic Semesters

During the period January 2022 - September 2022, MATH@TOV organized 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 F. Fidaleo (University of Rome "Tor Vergata"), H. Bostelmann (H.B. University of York), D. Cadamuro (University of Leipzig), K.H. Rehren (University of Göttingen)

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

- Among others, we mention the talks of E. Di Nezza (Ecole Polytechnique de Paris).

Mathematical techniques for Earth and Space Science

- Among others, we mention the talks of N. Augier (CNRS-LAAS, Toulouse), C. Mendico (University of Rome "Sapienza") P. Cardaliaguet (Université Paris Dauphine), M. Tanzi (Courant).

PDE's of Liouville type in Physics and Geometry

- Among others, we mention the talks of R. Ruggiero (PUC Rio De Janeiro), A. Della Torre (University of Rome "Sapienza"), A. M. Candela (University of Bari), P. Montecchiari (Università Politecnica delle Marche), D. Cassani (Università degli Studi dell'Insubria), L. Battaglia (University of Rome III), V. Assenza (Heidelberg University), Q. Han (Notre Dame University), F. Gazzola (Politecnico di Milano), M. Procesi (University of Rome III), C. Zhu (University of Rome "Tor Vergata"), M. Calanchi (Università di Milano), A.C. Lai (University of Rome "Sapienza"), J. Dolbeaut (Université Paris Dauphine - PSL).

Algebraic Geometry

- Among others, we mention the talks of J. Eberhardt (University of Bonn), A. Bianchi (University of Copenhagen), R. Fioresi (University of Bologna), M. A. de Cataldo (Stony Brook), L. Rubio y Degrassi (Università di Verona), A. Apple (Università di Parma), P. Fiebig (Friedrich-Alexander-Universität), L. Gordon (University of Edinburgh), T. de Fernex (University of Utah), D. Valeri (University of Rome "Sapienza"), A. Khare (Indian Inst. of Science).

Numerical analysis - aeronautic and aerospace design

- Among others, we mention the talk of L. De Feo (IBM Research Europe), M. Knez (University of Ljubljana), T. Lyche (University of Oslo).

Probability theory and statistics - data analysis in cosmology

- Among others, we mention the talk of A. Caponera (EPFL), D. Bianchi (Harbin I.T.), E. Alòs (Universitat Pompeu Fabra, RoMaDS Seminars).

Conferences and Workshops

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

- **INdAM Meeting: Approximation Theory and Numerical Analysis meet Algebra, Geometry, Topology**
  Date: September 5th - 9th 2022
  Place: Cortona
  Organizers: M. Lanini, C. Manni (Roma Tor Vergata), H. Schenck (Auburn University).
  https://sites.google.com/view/splinescortona2022/

- **Analysis and control of (bi)linear PDE's**
  Date: September 7th - 9th 2022
  Place: Cortona
  Organizers: M. Caponigro, R. Ghezzi, C. Mendico (Roma Tor Vergata).

https://sites.google.com/view/analysisandcontrolpdes/home

- **Topology of data in Rome** (in partnership with RoMaDS)
  Date: September 15th - 16th 2022
  Organizers: P. Salvatore, S. Scaramuccia (Roma Tor Vergata).
  https://www.mat.uniroma2.it/Eventi/2022/Topoldata/topoldata.php

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

- **Phythagorean-hodograph curves: Theory and Applications**
  R.T. Farouki (University of California, Davis)
  Period: September 02 – September 09, 2022
  https://www.mat.uniroma2.it/dottorato/Docs/CorsoFarouki.pdf

- **Introduction to Loewner theory in one complex**
  P. Gumenyuk (Politecnico di Milano).
  Period: November 08 – December 20, 2022
  https://www.mat.uniroma2.it/dottorato/Docs/Programme.pdf

- **Applicazioni dell'algebra lineare numerica allo studio di reti e sistemi complessi**
  D. Fasino, E. Bozzo (University of Udine)
  Period: November 22 – November 24, 2022
  https://www.mat.uniroma2.it/dottorato/Docs/Fasino-Bozzo.pdf

General Activities
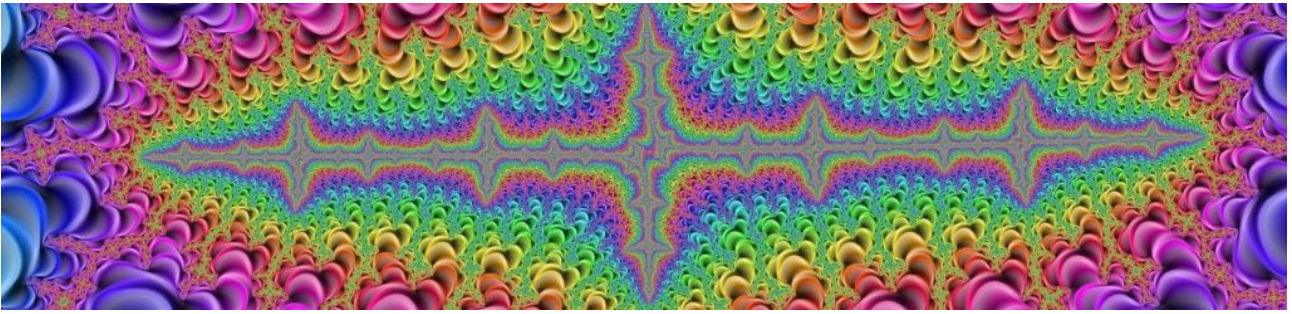
MATH@TOV is also meant to fund renovations of rooms/laboratories of the Department, acquisition of modern equipment, research books, etc.

- COMPUTATIONAL EQUIPMENT:
  We completed the installation of the two additional chassis for the Server HPE Super Dome Flex in our computing center. The first two chassis were purchased about four years ago.
  The current intervention has therefore doubled the computational capacity that amounts now to 16 processors which include 288 core, which can be used in parallel. The purchase of the Server HPE Super Dome Flex is the result of a collaboration with the Department of Economics and Finance, whose members will have access to this computing resource as well as the staff of our Department.