



Department of Mathematics  
University of Rome Tor Vergata



MATH@TOV  
Excellence Project 2018-2022  
NEWSLETTER  
N°17 April – June 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

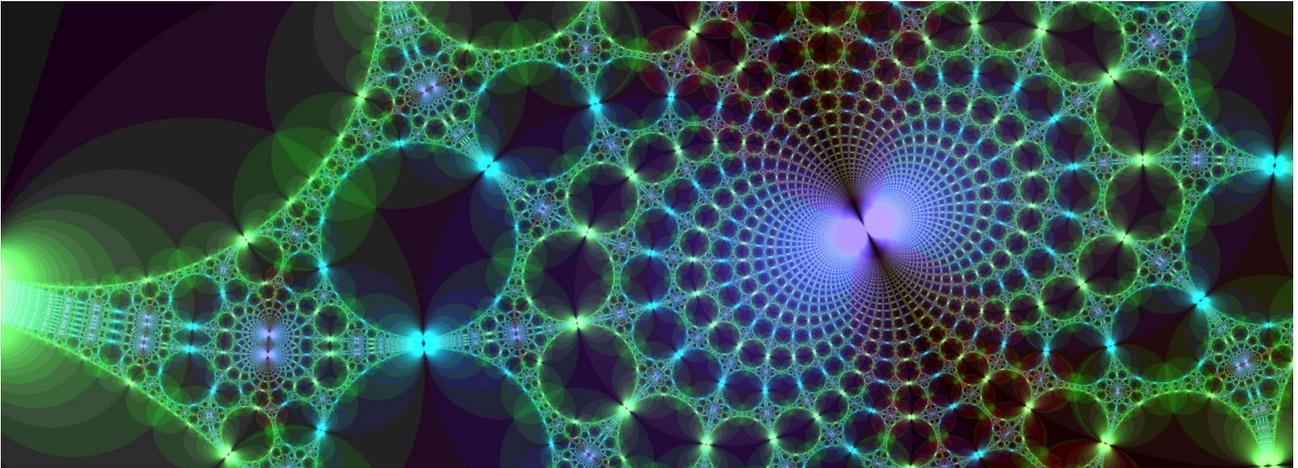
See the web page of the project MATH@TOV: <http://www.mat.uniroma2.it/Progetto/>

## 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 procedures are in progress:

- 1 (two-years) Postdoc position (Assegni di Ricerca - IV Fascia) in Mathematical Physics (Settore concorsuale 01/A4 - Settore Scientifico Disciplinare MAT/07) – Title: “Sistemi dinamici”
- 1 (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”
- 1 (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”
- 1 (two-years) Postdoc position (Assegni di Ricerca - III Fascia) in Probability (Settore concorsuale 01/A3 - Settore Scientifico Disciplinare MAT/06) – Title: “Probabilità e sue applicazioni”

See: <http://concorsionline.uniroma2.it>.

We also congratulate:

- Dr. Jacopo Bassi, 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: “Algebre di Operatori e Teoria Quantistica dei Campi”
- Dr. Marco Pozza, 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: “Metodi variazionali e PDE per lo studio di sistemi Hamiltoniani e dell'equazione di Hamilton-Jacobi”
- Dr. Veronica Tora, winner of the (one-year) Postdoc position (Assegni di Ricerca - II Fascia) in Mathematical Analysis (Settore concorsuale 01/A3 - Settore Scientifico Disciplinare MAT/05) – Title: “Equazioni di reazione-diffusione e applicazioni: modellistica matematica e simulazione numerica”.

# 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 courses (<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>

## **Inauguration Colloquium**

- **Lorenzo Rosasco**  
Title: A guided tour of machine learning (theory)  
Date: May 9<sup>th</sup> 2022

## **Thematic Semesters**

During the period January 2022 - June 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).

### **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. As-senza (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").

## 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 Degra-si (Università di Verona), A. Apple (Università di Parma), P. Fiebig (Friedrich-Alexander-Universität), L. Gordon (University of Edinburgh).

## 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.).

## **Conferences and Workshops**

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

- **Calcolo scientifico e modelli matematici**  
Date: April 6<sup>th</sup> - 8<sup>th</sup> 2022  
Organizers: M. Falcone (Roma Sapienza), L. Lopez (Bari), C. Manni (Roma Tor Vergata), R. Natalini (IAC-CNR, Roma).  
<https://www1.mat.uniroma1.it/ricerca/convegni/2022/CS2022/>
- **May12: Celebrating women in mathematics**  
Date: May 13<sup>th</sup> 2022  
Organizers: M. Lanini, D. Marinucci, A. Sorrentino, E. Strickland (Roma Tor Vergata).  
<http://www.mat.uniroma2.it/may12.php>
- **A day on Random Graphs**  
Date: May 30<sup>th</sup> 2022  
Organizers: A. Clementi, D. Marinucci, M. Salvi, S. Vigogna (Roma Tor Vergata).  
<https://www.mat.uniroma2.it/~rds/graphs.php>

- **INdAM Meeting: Approximation Theory and Numerical Analysis meet Algebra, Geometry, Topology**  
Date: September 5<sup>th</sup> - 9<sup>th</sup> 2022  
Place: Cortona  
Organizers: M. Lanini, C. Manni (Roma Tor Vergata), H. Schenck (Auburn University).  
<https://sites.google.com/view/splinescortona2022/>
- **Topology of data in Rome** (in partnership with Romads)  
Date: September 15<sup>th</sup> - 16<sup>th</sup> 2022  
Organizers: P. Salvatore, S. Scaramuccia (Roma Tor Vergata).  
<https://www.mat.uniroma2.it/Eventi/2022/Topoldata/topoldata.php>

## Colloquium LEVI-CIVITA

- **Slava Rychov**  
Title: "Bootstrap" method in physics and mathematics  
Date: 10<sup>th</sup> May 2022

## 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

- **On some classes of nonlinear and nonlocal elliptic PDE's in  $\mathbb{R}^N$**   
R. Molle (University of Rome "Tor Vergata"), C. Mercuri (Swansea University).  
Period: May 15 – June 09, 2022  
<https://www.mat.uniroma2.it/dottorato/Docs/MERCURI-MOLLE.pdf>
- **Stability spaces from an algebraic viewpoint**  
J. Woolf (University of Liverpool)  
Period: June 06 – June 09, 2022  
[http://www.mat.uniroma2.it/dottorato/Docs/Woolf\\_course.pdf](http://www.mat.uniroma2.it/dottorato/Docs/Woolf_course.pdf)
- **Introduction into Neural Networks and Deep Learning**  
D. Koroliouk (National Academy of Sciences of Ukraine)  
Period: May 11 – June 30, 2022  
[http://www.mat.uniroma2.it/dottorato/Docs/Woolf\\_course.pdf](http://www.mat.uniroma2.it/dottorato/Docs/Woolf_course.pdf)
- **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>

### 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:

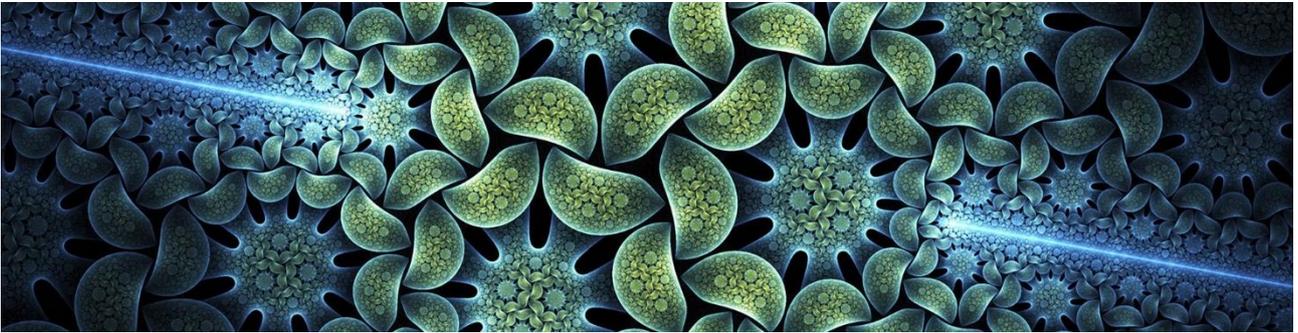
- 4 special prizes, each of 1,000.00 euros, for students enrolled in the AY 2022/23 of the Degree Course in Mathematics;
- 6 special prizes, each of 1,500.00 euros, for students enrolled in the AY 2022/23 of the Master's Degree Course in Pure and Applied Mathematics;
- 4 special prizes, each of 1,000.00 euros, for students enrolled in the AY 2022/23 of the Bachelor's Degree in Science and Technology for the Media.

As for the similar awards funded by MATH@TOV in 2021, the competition closed recently and the rankings are available at the following links:

- for the Master's Degree Course in Pure and Applied Mathematics: <https://www.mat.uniroma2.it/didattica/Borse/GraduatorieDefinitive-Incentivi-LM21-22.pdf>
- for the Bachelor's Degree Course in Mathematics: <https://www.mat.uniroma2.it/didattica/Borse/GraduatorieDefinitive-Incentivi-LT21-22.pdf>
- for the Bachelor's Degree in Science and Technology for the Media: <http://www.mat.uniroma2.it/scienzamedia/Docs/Bando/GraduatoriaBando2812.pdf>

Finally, as MATH@TOV provides funds for students enrolled in the Master's Curriculum of Excellence in Pure and Applied Mathematics at Tor Vergata, during the 2021/2022 academic year, Aurora IOVINE has been admitted to the Curriculum of Excellence.

## Third mission



Organized in collaboration with “Centro Studi di Antichità Matematica Filosofia”:

- Presentation of the book:

“Il tracollo culturale. La conquista Romana del mediterraneo.”

meeting with the author Prof. Lucio Russo, April 28, 2022

<http://sapereantico.uniroma2.it/eventi/>

- Conference:

“Perché la matematica bizantina è più interessante di quella Greca Antica”

Prof. Fabio Acerbi, June 09, 2022

<http://sapereantico.uniroma2.it/eventi/>

As the school year came to an end, 15 PCTO (Percorsi per le Competenze Trasversali e per l'Orientamento) programs were concluded in cooperation with 7 different educational institutions. The one-year Liceo Matematico routes were also concluded (5 school institutions involved, 20 total years). Similarly, the program for the first year of middle school, in which one school institution is involved, was concluded.

At the same time, the collaboration with a network of comprehensive schools began, based on a project funded by the Ministry of Education.