ERC information session

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Platform Wiskunde Nederland, Centrum Wiskunde & Informatica
Agenda

1. ERC programme
2. Data on Dutch projects
3. ERC evaluation process
The ERC: funding from and for researchers

Scientific freedom
- Bottom-up frontier research in all fields of science and humanities (no predetermined subjects)
- Support to the individual scientist (no consortia)
- Scientific excellence is the sole criterion (societal/economic impact not necessary)

Scientific governance
- Independence: Scientific Council with 22 members with full authority over strategy
- Community engagement: international peer-review (Evaluation Panels and Remote Reviewers)
- ERC Executive Agency employs Officers with research background for admin roles
The PE1 Team

2/3 speak Dutch (Vlaams)

3/3 love math
ERC grant schemes

**Starting Grant**
- 2-7 years after PhD
- Up to € 1.5 Mio for 5 years

**Consolidator Grant**
- 7-12 years after PhD
- Up to € 2 Mio for 5 years

**Advanced Grant**
- Significant track-record in the last 10 years
- Up to € 2.5 Mio for 5 years

**Synergy Grant**
- 2 – 4 Principal Investigators
- 1 PI can be based outside EU/Associated Countries
- Up to € 10.0 Mio for 6 years

**Proof-of-Concept**
- For ERC grant holders
- Bridging gap between research - earliest stage of marketable innovation
- Lump sum €150,000
ERC budget 2007 – 2027: EUR 36.5 billion

17% of the entire Horizon Europe budget
ERC in figures

Over 13,000 top researchers funded since the ERC creation in 2007

Over 90,000 researchers and other professionals employed in ERC research teams

Over 2,400 patents and other IPR applications generated by ERC funding

Over 400 start-ups identified as founded or co-founded by ERC grantees

Over 220,000 articles from ERC projects published in scientific journals

Fields Medals 2022

• Hugo Duminil-Copin: StG 2017
• James Maynard: StG 2019
• Maryna Viazovska: former Panel Member
• June Huh

14 Nobel Prizes, 6 Fields Medals, 11 Wolf Prizes and other prizes awarded to ERC grantees
ERC-funded projects by country of Host Institution
Success rate by country of Host Institution
### NL PE1 grantees

<table>
<thead>
<tr>
<th>Call</th>
<th>PI</th>
<th>Project Title</th>
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<tbody>
<tr>
<td>ERC-2022-COG</td>
<td>MARTIJN KOOL</td>
<td>SURFACES ON FOURFOLDS</td>
<td>UNIVERSITEIT UTRECHT</td>
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<tr>
<td>ERC-2022-STG</td>
<td>STÉPHANIE VAN DER PAS</td>
<td>HIGH-DIMENSIONAL NONPARAMETRIC BAYESIAN CAUSAL INFERENCE</td>
<td>STICHTING VUMC</td>
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<tr>
<td>ERC-2022-STG</td>
<td>JAN VONK</td>
<td>GEODESICS AND GEOMETRIC-ARITHMETIC INTERSECTIONS</td>
<td>UNIVERSITEIT LEIDEN</td>
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<tr>
<td>ERC-2020-STG</td>
<td>GIJS HEUTS</td>
<td>CHROMATIC HOMOTOPY THEORY OF SPACES</td>
<td>UNIVERSITEIT UTRECHT</td>
</tr>
<tr>
<td>ERC-2019-COG</td>
<td>LENNY TELMAN</td>
<td>ZETA FUNCTIONS AND FOURIER-MUKAI TRANSFORMS</td>
<td>UNIVERSITEIT VAN AMSTERDAM</td>
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### Latest news – COG 2023 grantees

<table>
<thead>
<tr>
<th>PI</th>
<th>Project Title</th>
<th>Country</th>
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<tbody>
<tr>
<td>Anselm Johannes SCHMIDT-HIEBER</td>
<td>From A to B: Generalizing the mathematics of artificial neural networks (ANNs) to biological neural networks (BNNs)</td>
<td>NL</td>
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<tr>
<td>Jason MILLER</td>
<td>Analysis in Random Planar Fractals</td>
<td>UK</td>
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<tr>
<td>Filip RINDLER</td>
<td>Concentration Phenomena in Nonlinear PDEs and Elasto-plasticity Theory</td>
<td>UK</td>
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<td>Justin SALEZ</td>
<td>Elucidating the cutoff phenomenon</td>
<td>FR</td>
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<tr>
<td>Andrea SEPPPI</td>
<td>Geometry and analysis for (G,X)-structures and their deformation spaces</td>
<td>FR</td>
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<tr>
<td>Alberto MASPERO</td>
<td>Generating Unstable Dynamics in dispersive Hamiltonian fluids</td>
<td>IT</td>
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<tr>
<td>Evgeny SHINDER</td>
<td>Motivic invariants and birational geometry of simple normal crossing degenerations</td>
<td>DE</td>
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<tr>
<td>Michael FEISCHL</td>
<td>New Frontiers in Optimal Adaptivity</td>
<td>AT</td>
</tr>
<tr>
<td>Eleonora DI NEZZA</td>
<td>SinGular Monge-Ampère equations</td>
<td>FR</td>
</tr>
<tr>
<td>Xavier ROS-OTON</td>
<td>Stable solutions and nonstandard diffusions: PDE questions arising in Mathematical Physics</td>
<td>ES</td>
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Evaluation panel structure

Physical Sciences & Engineering

- **PE1 Mathematics**
- **PE2 Fundamental Constituents of Matter**
- **PE3 Condensed Matter Physics**
- **PE4 Physical and Analytical Chemical Sciences**
- **PE5 Synthetic Chemistry and Materials**
- **PE6 Computer Science and Informatics**
- **PE7 Systems and Communication Engineering**
- **PE8 Products and Processes Engineering**
- **PE9 Universe Sciences**
- **PE10 Earth System Science**
- **PE11 Materials Engineering**

Life Sciences

- **LS1** Molecules of Life: Biological Mechanisms, Structures and Functions
- **LS2** Integrative Biology: From Genes and Genomes to Systems
- **LS3** Cell Biology, Development, Stem Cells and Regeneration
- **LS4** Physiology in Health, Disease and Ageing
- **LS5** Neuroscience and Disorders of the Nervous System
- **LS6** Immunity, Infection and Immunotherapy
- **LS7** Prevention, Diagnosis and Treatment of Human Diseases
- **LS8** Biological, Environmental and Clinical Genetics
- **LS9** Biodiversity and Evolution

Social Sciences and Humanities

- **SH1** Individuals, Markets and Organisations
- **SH2** Institutions, Governance and Legal Systems
- **SH3** The Social World and Its Interactions
- **SH4** The Human Mind and Its Complexity
- **SH5** Texts and Concepts
- **SH6** The Study of the Human Past
- **SH7** Human Mobility, Environment, and Space
- **SH8** Studies of Cultures and Arts

**PE1 scope:** All areas of mathematics, pure and applied, plus mathematical foundations of computer science, mathematical physics and statistics
PE1 Mathematics descriptors

PE1_1 Logic and foundations
PE1_2 Algebra
PE1_3 Number theory
PE1_4 Algebraic and complex geometry
PE1_5 Lie groups, Lie algebras
PE1_6 Geometry and global analysis
PE1_7 Topology
PE1_8 Analysis
PE1_9 Operator algebras and functional analysis
PE1_10 ODE and dynamical systems
PE1_11 Theoretical aspects of partial differential equations
PE1_12 Mathematical physics
PE1_13 Probability
PE1_14 Mathematical statistics
PE1_15 Generic statistical methodology and modelling
PE1_16 Discrete mathematics and combinatorics
PE1_17 Mathematical aspects of computer science
PE1_18 Numerical analysis
PE1_19 Scientific computing and data processing
PE1_20 Control theory, optimisation and operational research
PE1_21 Application of mathematics in sciences
PE1_22 Application of mathematics in industry and society
Evaluation panel composition

- Nomination: responsibility of the Scientific Council
- Well before submission deadline
- Typically 14 – 16 Panel Members
- Aim: maximize expertise coverage
- Constraints to ensure diversity
- Panel Members from other calls and years can support if needed
Evaluation criteria

Excellence is the sole evaluation criterion

Excellence of the Research Project
- Ground-breaking nature
- Ambition
- Feasibility of the research project

Excellence of the Principal Investigator
- Intellectual capacity
- Creativity
- Commitment

with a focus on the extent to which the PI has the required scientific expertise and capacity to successfully execute the project
Evaluation process
For individuals calls: a single submission but a two-step evaluation

**STEP 1**
Remote assessment by **Panel members**
see ONLY section 1: Synopsis and CV (Part B1)

- Panel meeting
  - Proposal Rejected (resubmission restrictions may apply)
  - Proposal Retained

**STEP 2**
Remote assessment by **Panel members**
and **Remote Reviewers** of full proposals (Part B1+B2)

- Panel meeting + remote interview StG, CoG and AdG
  - Ranked list of proposals for funding

Feedback to applicants

**Difference for Synergy Grants: three steps and interview in person**
Examples of applied mathematics beyond PE1

Panel: StG 2021 PE7
Title: Higher-Order Hodge Laplacians for Processing of multi-way Signals

Panel: CoG 2020 PE8
Title: Mathematical and Numerical Modelling of Process-Structure Interaction in Fractured Geothermal Systems

Panel: StG 2021 PE11
Title: Beyond Representative Volume Elements for Random Heterogeneous Materials

Panel: AdG 2016 PE6
Title: Large-Scale Formal Proof for the Working Mathematician

Panel: AdG 2021 PE1
Title: Stochastic dynamics of single cells: Growth, Emergence and Resistance

Panel: PoC 2022 (from a CoG PE1)
Title: Advanced Reduced order modelling: Online computational web server for complex parametric Systems

Panel: SyG 2019
Title: Stochastic Transport in Upper Ocean Dynamics
...where is the boundary?

Panel: **CoG 2021 PE2**  
**Title:** Loop Corrections from the Theory of Motives  
**Descriptor:** *PE1_12 Mathematical physics*

Panel: **AdG 2018 PE3**  
**Title:** Non-Markovian Memory-Based Modelling of Near- and Far-From-Equilibrium Dynamical Systems  
**Descriptor:** *PE1_19 Scientific computing and data processing*

Panel: **StG 2021 SH4**  
**Title:** A New Bayesian Foundation for Psychometric Network Modelling  
**Descriptor:** *PE1_19 Scientific computing and data processing*

Panel: **StG 2020 LS7**  
**Title:** Directed networks as a novel approach for improving the management of cardiac arrhythmias  
**Descriptor:** *PE1_21 Application of mathematics in sciences*
Where can you find more information?

Videos - ERC Classes
- What to consider before applying
- How to fill in the application
- The interview
- How the evaluation works

ERC Research Information System (ERIS)
- App for exploration and visualization of ERC projects and their outputs
Thank You!

More information: erc.europa.eu

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