



EUROPEAN ACADEMY OF SCIENCES

IN SUPPORT OF EXCELLENCE IN SCIENCE AND TECHNOLOGY

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Editorial by Rodrigo Martins EurAsc President

Dear fellows,

First, my apologies for all this delay concerning our 2022 newsletter, but COVID and some internal restructuration we did postpone all.

As our first great news is that finally we will have a front-to-front symposia this year where we aim to deliver personally all the prizes and awards so far accumulated since 2020 (Blaise Pascal Medal and Leonardo da Vinci Prize), besides delivering in person the diploma to all new fellows.

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Newletter n°13

Editorial by Rodrigo Martins

EurASc President

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First, my apologies for all this delay concerning our 2022 newsletter, but COVID and some internal restructuration we did postpone all. As our first great news is that finally we will have a front-to-front symposia this year where we aim to deliver personally all the prizes and awards so far accumulated since 2020 (Blaise Pascal Medal and Leonardo da Vinci Prize), besides delivering in person the diploma to all new fellows.

For this event, which we call EURASC CEREMONY 2022, to be held from October 24th to 25th, 2022 in the Fondation Universitaire, Brussels, Belgium, following the programme we annex, all are invited to attend. It will an exciting moment, not only to year the speech of our awardees, namely the Leonardo da Vinci winners, but also to hear the strategy envisaged by our divisions concerning our prospect towards a future where we can contribute to the roots of science and technology, not only in Europe but globally.

Apart from that, we will have outstanding speakers to present their vision concerning the grounds of science line up with breakthroughs and innovations we required, for better knowledge that will sustain all expected future developments. For this, outstanding scientists have been invited (still requiring a confirmation). Here, we outline our fellow Professor Maria Leptin, president of the European Research Council. We hope to have the final version of the programme by July and so the final corrected version will appear on our webpage.

Finally, I would like to thank the contributions given by our fellows, namely from Chemistry, Earth and Environmental, Engineering, Material Sciences, and Mathematics Divisions for the contributions given and challenge all of you to give contributions to our newsletter, involving all perspectives you believe to be relevant for all of us! Indeed, if we want to go further, we need to count on all of us.





EUROPEAN ACADEMY OF SCIENCES
IN SUPPORT OF EXCELLENCE IN SCIENCE AND TECHNOLOGY

EURASC CEREMONY 2022

OCTOBER 24TH & 25TH
FONDATION UNIVERSITAIRE, BRUSSELS

Invitation & Registration

On behalf of the President of the European Academy of Sciences, Professor Rodrigo Martins, and the Organizing Committee, we invite you to attend the EurASc Ceremony 2022 that will take place on October 24th and 25th, 2022 at the “Fondation Universitaire” in Brussels.

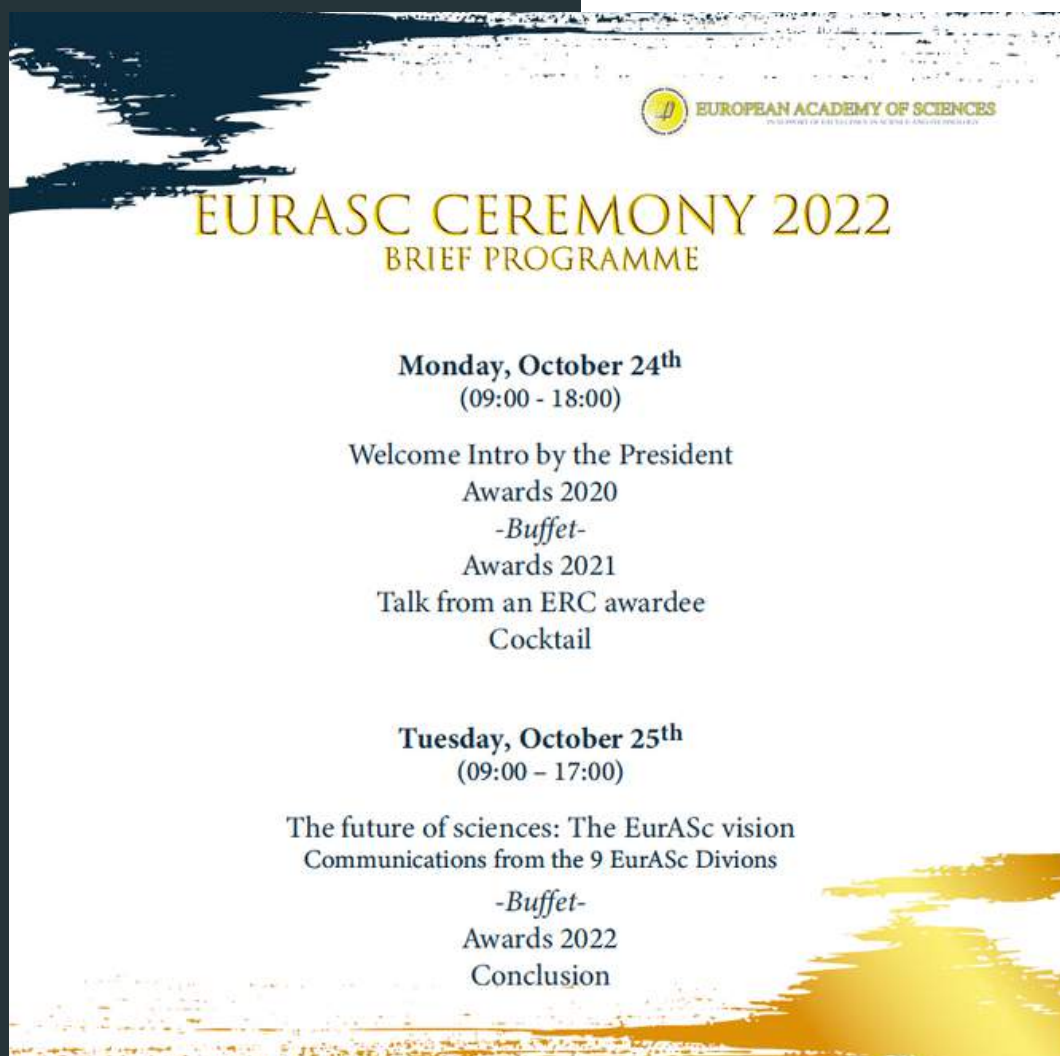
Save the date in advance.

[REGISTER HERE](#)



EurASc CEREMONY 2022

Brief Program Presentation



Detailed information about event and program will be sent to all and published in our website very soon.

Please be aware:

www.eurasc.org

Chemistry Division



Paul Raithby

Officer at Chemistry Division of EurASc,
Centre for Sustainable and Circular Technologies (CSCT), Centre for Nanoscience and
Nanotechnology, Department of Chemistry, University of Bath, UK

With the improving pandemic situation, the number of face-to-face and hybrid mode conferences in Europe is increasing and Fellows will be pleased to be able to participate in the renewed enthusiasm for meetings discussing chemistry. A selection of upcoming meetings is listed below:

12th International Conference on Chemical Structures

June 12, 2022 to June 16, 2022 – Venue: Noordwijkerhout, The Netherlands

Web link: <https://iccs-nl.org/>

The event covers all aspects of cheminformatics and molecular modeling, including structure-activity relationships, virtual screening, modeling metabolite networks, etc. Participants discuss research as well as relevant technological and algorithm developments in handling and visualization of chemical structure data, workflows for complex cheminformatic analysis and machine learning. The conference aims to foster cooperation among organizations and researchers involved in the increasingly interwoven fields of cheminformatics and bioinformatics.

Lithium Battery Chemistry Symposium

June 13 to June 14, 2022 – Venue: A hybrid event, Hilton Mainz, Mainz, Germany, and online

Web link: <https://www.advancedautobat.com/aabc-europe/battery-chemistry/>

New electric vehicle batteries must increase their performance through improved chemistries while remaining cost-competitive with conventional internal combustion engine automobiles. By creating safe and reliable long-range batteries through improved chemistries, automotive electrification goals can be achieved.

20th National Meeting of the Spanish Society of Medicinal Chemistry

June 19 to June 22, 2022 – Venue: Santiago de Compostela, Spain

Web link: <https://congresoseqt2022.es/>

The event will provide a forum for scientific discussions and a great opportunity to highlight the advances of research in medicinal chemistry. It will cover hot topics in drug discovery with a focus on translational medicinal chemistry.

Unimolecular Reactions – Faraday Discussion

June 22 to June 24, 2022 – Venue: Oxford, UK

Web link: <http://rsc.li/unimolecular-fd2022>

The theme of the meeting involves gas phase unimolecular reactions that are central to the complex chemistry of numerous processes, such as those occurring in the atmospheres of Earth and other planets, combustion for transportation and power generation, and industrial manufacturing of advanced chemicals and materials. Improved understanding of the fundamental chemistry of these processes is a pressing concern not only in the context of atmospheric pollution and climate change, but also designing more efficient industrial processes and fuels that can help attenuate this impact.

XXXVIII Biennial Meeting of the Spanish Royal Society of Chemistry, RSEQ

June 27 to June 30, 2022 - Venue: Granada Convention Center, Granada, Spain

Web link: <https://bienal2022.com/index.php/en/>

The conference will consist of specialized symposia that will provide a fresh view of the most cutting-edge research lines of current chemistry.

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Earth and Environmental Sciences Division

Paul Tréguer

Member of the Earth and Environmental Division and member of the Presidium of EurASc
Laboratoire LEMAR, University of Brest, France



The Earth and Environmental Sciences Division of the European Academy of Sciences (EurASc) and the Earth Sciences Division of the Chinese Academy of Sciences (CAS), in association with the European Institute for Marine Studies (IUEM) of the University of Brest (UBO) organize a second on-line Frontier Forum on the Progress in Ocean Science and Technology (FF POST 2). This on-line Frontier Forum is to be held on 28-29 September 2022.

Themes: Ocean-based climate actions, Big data management for ocean science and technology, Digital Twin of the Ocean (DITTO) component of the Digital Earth Initiatives, The Global Coastal Ocean.

Scientific committee:

- EurASc : Paul Tréguer (IUEM-UBO, France), Louis Legendre (LOV, Sorbonne U., France), Jean-Pierre Gattuso (LOV, CNRS, France), Martin Visbeck (Geomar, Germany), Nadia Pinardi (UNIBO, Italy).
- CAS : Dake Chen (WGs 2), Huadong Guo (IRSDE), Nianzhi Jiao (U. Xiamen), Rixiang Zhu (Earth Sciences Division of CAS) and Jing Zhang (ECNU).

Organising committee :

- Paul Tréguer (IUEM-UBO), Xavier Carton (IUEM-UBO), Lionel Guidi (LOV, CNRS), Jing Zhang (ECNU).

Contacts: Paul Tréguer (paul.treguer@univ-brest.fr), Jing Zhang (jzhang@sklec.ecnu.edu.cn)

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Engineering Division



Alberto Carpinteri

Head of the Engineering Division of EurASC
Chair Professor of Solid and Structural Mechanics at the Politecnico di Torino, Italy

Fellows publications



Saffa Riffat

Fellow since 2018

Supercooled PCM storage in a solar assisted heat pump unit to eliminate daily solar variation on heating for short to mid-term period

Cagri Kutlu, Yanan Zhang, Ziwei Chen, Saffa Riffat

Department of Architecture and Built Environment, Faculty of Engineering, University of Nottingham, University Park, NG7 2RD, Nottingham, UK

Latent heat storage units have been developed for years because their high energy density allows storing large amounts of energy in relatively small volumes. However, for long-term storage, heat losses of conventional PCM systems are still a considerable problem where heat is lost continuously to the ambient environment and is thus wasted, even when the system is not in use. Supercooled PCMs offer a solution to this; latent heat is only released when triggered to induce crystallisation, even when stored at ambient temperature. This special feature thus provides a PCM installation that can be beneficially integrated with intermittent renewable energy sources such as solar thermal collectors and a heat pump unit. To control the release of heat, the installation will be constructed as a group of PCM "cells" each with its own trigger, which can be activated according to the heating demands of the building perhaps over several days. The proposed PCM energy storage system can play an essential role in synchronizing energy demand and supply, on a short to mid-term basis (hours/weeks).

While supercooling is generally considered a significant disadvantage in conventional PCM heat storage systems, the versatile PCM system turns the problem into an asset by controlled activation. Several supercooled materials' properties and triggering methods have been investigated and tested by many researchers and the most well-known is supercooled sodium-acetate-trihydrate. Its melting point is 58 °C and the latent heat of crystallisation is 247 kJ/kg in a certain concentration level where the melting temperature depends on salt-water concentration. The heat is released by activating the triggering device and exothermic crystallisation allowing temperatures of 58 °C to be reached in minutes. Electrical nucleation method has been successfully applied at the laboratory of the University of Nottingham as it is the best method to allow automation of the system. The PCM containers can be activated one by one using a triggering controller. Figure 1 shows the electrical triggering of the PCM sample in the laboratory and the layout of the PCM storage tank.

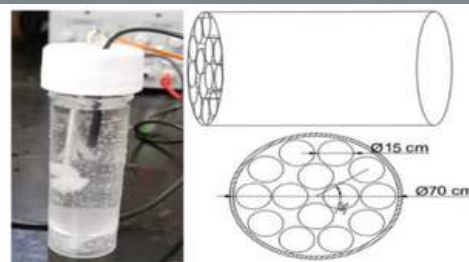


Figure 1: Electrical nucleation of the supercooled PCM and storage tank layout for field tests

Figure 2 shows the schematic view of the solar-assisted heat pump with the PCM storage system. Solar collectors utilize solar energy and store it in the buffer tank. A heat pump uses collected useful heat to boost condenser heat output in an efficient way. High-temperature water (70°C) is circulated between the H.P. condenser and PCM cell and the PCM is charged (melted) by the circulating high-temperature water. When a cell is charged, if there is still solar energy available, the circulating water is driven into the next PCM cell for charging by the control valve. When heating is requested by the building, the remote-controlled triggering device activates the PCM cells. PCM starts to crystallize immediately and its temperature increases to phase changing temperature. Cold circulating water comes from the building enters the PCM cell and its temperature is increased. Heated relatively high-temperature water goes into the building to be used for space heating or hot water requirements. Auxiliary heating equipment can be used to avoid legionella (around 65°C) for DHW. When heating demand is too high; another PCM cell can be used by being automatically triggered.

In this work, a feasibility study of versatile PCM in building applications has been conducted to address the "heating on-demand" energy issue in building applications. The flexibility in the amount of heat release and available time of storage makes the system is suitable for regions with high variability in weather conditions such as the UK.

Acknowledgement

We would like to acknowledge Engineering and Physical Sciences Research Council (EP/T02318X/1) for the financial support to this research.

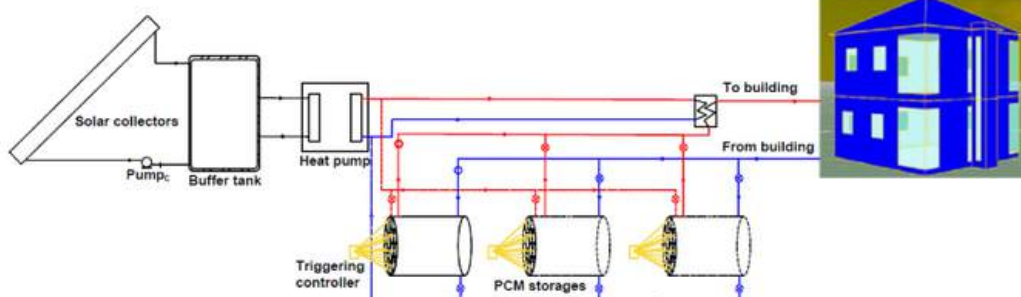


Figure 2: Schematic of solar assisted heat pump unit with PCM storage system



Soteris Kalogirou

Fellow since 2019

The Energy Crisis of Europe

Soteris Kalogirou

Department of Mechanical Engineering and Materials Science and Engineering of University of Cyprus

The ongoing war in Ukraine brought to the surface the problem of energy supply of Europe and its dependence on the fuel imports.

The tread of cutting the supply of natural gas piped from Russia is a possible reality that could create a lot of problems and secondary consequences to the European Union as there are no immediate actions that can be taken to get over a possible problem.

The supply of liquified shale gas from the USA is not a feasible solution because the price is 3-fold, at least, the price of the Russian gas and there will be a need to build expensive infrastructure to deliquefy the gas and to connect it to the existing gas network.

The more secure solution would be the use of renewables which is, in addition to the fact that the energy is produced locally without independence from anyone else and need of imports, friendly to the environment. This is a declared policy of EU but the target horizon to decarbonise Europe is set to 2050, which is 28 years from now.

Furthermore, it would be impossible to build very soon the required infrastructure to produce more renewables and storage facilities, to get over the problems related to the intermittency and variability of supply to avoid grid instabilities, but it is something that we need to plan and do it much sooner than the 2050 target.

In this respect, members of EurASc with appropriate expertise need to consider their more intensive involvement towards carrying out research in renewable energy fields and suggest solutions that will make Europe energy independent the soonest possible.

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Materials Sciences Division



Federico Rosei

Head of Materials Science Division of EurASc
Nano Femto LAB, Institut National de la Recherche Scientifique, Canada

New Members

In recent months our division has received very few nominations, so I would like to take this opportunity to encourage our Members to nominate worthy candidates.

I should actually correct this statement and be more accurate: we have mostly received nominations of non-European candidates. As we have reached saturation for this category, since we are at the 80% European / 20% non-European ratio that is determined by our bylaws, we cannot consider new non-European candidates until we have elected more European ones – four for each non-European candidate that was nominated, to be precise. As such, I had to send a depressing reply to all recent nominators of non-European candidates: unfortunately, they will have to wait because we cannot process those nominations.

In addition, as we have a clear imbalance in terms of very few women and visible minorities, I would particularly welcome candidates from these underrepresented groups.

The only candidate that was recently elected in our Division is, in fact, truly outstanding; we were recently honoured and fortunate to welcome **Professor Cato Laurencin** from the University of Connecticut in the Division of Materials Science of the European Academy of Sciences. Professor Laurencin is a highly distinguished scholar, widely decorated and already Member of numerous major Academies. He is considered as a pioneer of a new field of research, Regenerative Engineering. He is also a practicing physician.



As the pandemic seems to have (hopefully) subsided and perhaps reached its endemic stage, meetings are increasingly being held in hybrid mode or even in the traditional in person mode. I hope to meet many of you, in person, soon!

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Mathematics Division

Jose Carrillo

Head of Mathematics Division of EurASc
Mathematical Institute of Oxford University, UK



New Members



Professor Pavel Exner is currently Scientific Director of the Doppler Institute at the Charles University in Prague. He has done his whole scientific career in mathematical physics at this university having worked on quantum Schrodinger related problems and their applications. His main scientific contributions lie in spectral theory applied to quantum mechanics in graphs and manifolds, spectral and scattering properties of quantum waveguides and decay and resonance effects. He is in the editorial board of a good number of mathematical physics journals including some top journals of that area. He has published more than 250 articles in the subject with an h-index of 33.

His service to the community is even more impressive. He has been secretary 2006-08 and president 2009-11 of the Mathematical Physics Society. Furthermore, he has acted as President and Vice-President of the European Mathematical Society (EMS). The realm of EMS comprises 500 mill people and it has 54 corporate members, and about 3000 individual members. Prof. Exner also served on the first Scientific Council of the European Research Council (ERC). The great success of the ERC is to a large extent due to the wise decisions made by the Council during the initial phases. He also served as a Vice-President of the Council. He is now Section Chair of the Academia Europaea since 2018. His service to the mathematical and scientific community at large at the European scale makes his experience invaluable to our Academy.

Professor Anna Marciniak-Czochra is Full (W3) Professor of Applied Analysis at the Faculty of Mathematics and Computer Sciences, and an Associate Member of the Interdisciplinary Center of Scientific Computing (IWR), Heidelberg University, Germany. She began her education at the University of Warsaw, before gaining her Dr. rer. nat. from Heidelberg University. She was then a postdoctoral project leader and an Independent Research Group Leader at Heidelberg, before her present appointment. She was a Visiting Faculty Member at the Mathematical Biosciences Institute (MBI), Columbus Ohio, USA in 2008, and a Visiting Professor, Department of Mathematics, University of Lyon, France in 2011.

She has gained a number of honours and awards, including being on the Emmy-Noether-Programme of the German Research Council (DFG); winning an ERC Starting Grant, two appointments as a Simons Professor, Mathematical Institute, Polish Academy of Sciences, Poland; AcademiaNet Portal for Outstanding Female Scientists and Scholars of the Robert Bosch Foundation (nominated by DFG); Kollegiat of Heidelberg Academy of Sciences and Humanities; Fellow of the Marsilius-College, Heidelberg University.

Professor Marciniak-Czochra is recognised internationally as a leading mathematical biologist, and a hallmark of her research is that she takes modelling to the next level by including phenomena that require significant extension of existing mathematical techniques to analyse, leading to novel results that advance the field (publishing in the very top journals in mathematics and in biology). She has made novel advances in the field of pattern formation, developed a new model for pattern formation that couples chemical signalling with mechanics and, more recently, her research has branched out into integrating mathematical models with experimental/medical data so that her models are being used now to investigate diseases such as acute myeloid leukemia and multiple myeloma, in collaboration with clinicians.





Professor Eitan Tadmor is a Distinguished University Professor at the University of Maryland (UMd), College Park. He holds a PhD from Tel-Aviv University. After postdoctoral positions at CalTech, NASA Langley Research Center, and Tel-Aviv, he moved to the US. From 1995–2004 he was professor at UCLA, and from 2004 he has been a professor at the University of Maryland, where he currently is Distinguished University Professor. Tadmor is an outstanding scientific leader, organizer, and initiator in addition to being a world-leading mathematician. He was Director of the Sackler Institute of Scientific Computation at Tel-Aviv University. He was the founding co-director of the NSF- funded Institute for Pure and Applied Mathematics (IPAM) at UCLA. Finally, he was the Director of the Center for Scientific Computation and Mathematical Modeling at the University of Maryland. All these institutions are world-leading institutions. Tadmor's area of research is the rigorous interplay between scientific computing, numerical analysis, and hard results for nonlinear differential equations. Here one can mention his groundbreaking results for hyperbolic conservation laws, with focus on high-resolution numerical methods and the kinetic reformulation of the equation. More recently he has focused on collective phenomena with applications to flocking and opinion dynamics.

His accomplishments have been well recognized by the community, we mention here the Gibbs Lecture in 2022, the 2022 AMS-SIAM Norbert Wiener prize, invited speaker at ICIAM (2019) and ICM (2002), the premier conferences worldwide in applied and pure mathematics, respectively, SIAM and AMS Fellow. Tadmor's connections to Europe have always been strong – at his centers he has always had a substantial number of European scientists. Furthermore, he is a regular long-term visitor to various European institutions.

He gave the J.L. Lions lectures (Paris, 2016), and received the Peter Henrici Prize (ETH, 2016), and gave the Plenary Lecture Equadiff 13 in Prague.

Professor Tao Tang started his career in Canada in early 90s. In 1998 he moved to Hong Kong Baptist University where he was promoted to Chair Professorship in 2003. In 2018 he was appointed as a Provost at the Southern University of Science and Technology . In 2019 Prof. Tang became the President of Beijing Normal University – Hong Kong Baptist University United International College.

Professor Tang has received numerous scientific awards including Leslie Fox prize in Numerical Analysis, Fenk Kang prize in Scientific Computing and Membership of the Chinese Academy of Sciences. Tao Tang's research works in the field of Numerical Analysis and Scientific Computing has demonstrated both remarkable depth and breadth. They have profound impact on the understanding of numerical schemes for hyperbolic conservation laws, and on the development of adaptive and high order numerical methods. Professor Tang has strong research ties with the European Applied Mathematics community.



Professor Athanasios (Thanos) Tzavaras is Professor of Applied Mathematics and Computational Science at the King Abdullah University of Science and Technology, Saudi Arabia (KAUST). Thanos started his career in the USA, where he was Professor first in the Department of Mathematics of the University of Wisconsin-Madison, and later in the Department of Mathematics in the University of Maryland. He moved to his native Greece where he served as Professor in the Department of Applied Mathematics, University of Crete, Greece, and set up a very successful program that attracted back to Greece a number of Applied Mathematicians. He was appointed by KAUST in 2014, where he served as Chair of Applied Mathematics and Computational Science. He held visiting positions at many leading Institutions worldwide and has always kept very strong ties with the European Applied Mathematics community.

The research interests of Thanos lie at the interface of nonlinear partial differential equations and applied mathematics for problems in the physical sciences. His emphasis is on Analysis of Nonlinear Partial Differential Equations, with a specific interest in the structure and emergence of continuum models from kinetic and particle models, the analysis of models at multiple scales, and the analysis of phenomena that test the limits of continuum modelling.

Professor Anna Wienhard holds a PhD (2004) from the University of Bonn. After that she went to US, holding positions at the Institute for Advanced Study, University of Chicago, and University of Princeton, before she returned to Europe and Heidelberg in 2012 to her current Chair. In Heidelberg she has formed her own, and very successful, research group at Heidelberg Institute of Theoretical Studies. Since 2020, she is Director of the Research Station Geometry and Dynamics in Heidelberg. Anna Wienhard is an outstanding mathematician working in an area that can be described in rough terms as in the intersection between differential geometry and group theory, and she holds the Chair in Differential Geometry in Heidelberg. Her research is published in the premier journals worldwide, like Annals, Duke, Crelle, Inventiones. Furthermore, she has received both an ERC Consolidator Grant and an Advanced Grant. She gave an invited lecture at the International Congress of Mathematicians (2018) and the Whittmore Lectures at Yale (2019). She is elected member of Berlin-Brandenburg Academy of Science (2019) and Heidelberg Academy of Science (2017). She chairs the Scientific Committee of the Heidelberg Laureate Forum (HLF). At HLF all winners of the Abel Prize, Fields Medal, Abacus Medal, the Turing Award, and the ACM Prize in Computing – the most prestigious prizes in mathematics and computer science – are invited to Heidelberg for a week in September every year together with 200 young researchers from all over the world.





Professor Jinchao Xu is full Professor of Mathematics at Penn State University, where he moved as an Assistant Professor in January 1989, soon after receiving his Ph.D. from Cornell University in 1988. He has published over 200 papers, most of them in high level journals in Applied Mathematics, mainly dedicated to the use of finite elements of various kinds for the solution of boundary value problems for PDEs of interest for several applications. His contributions go from theoretical results to more computational aspects. His results for multigrid solvers and preconditioners are a reference for the solution of large systems of equations.

He has received numerous recognitions and awards. Among them: he received the von Humboldt Research Award for senior US scientists in 2005, he was nominated fellow of the Society for Industrial and Applied Mathematics (SIAM) in 2011, and fellow of the American Mathematical Society (AMS) in 2012. He was invited speaker to many international conferences, including the International Congress of Mathematicians in 2010. He took part of numerous scientific committees, has an important editorial activity, and was advisor of many PhD and postdoc students.

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SOCIAL NETWORK

The European Academy of Sciences - EurASc is improving its capacity to communicate with its members and also with the general public.

In this way, we have made positive efforts to solve problems previously found on our website, and we have started our presence in the social networks where it makes sense to be present, and where we can reach a larger number of target people in order to make ourselves known on the right platforms.

As such, you can now find us on **LinkedIn** and **Twitter**, and our Facebook page has been removed.

We would like to count on everyone's support, so please follow us on:



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