



Shaping Europe's Digital Future

HPC for Extreme Scale Scientific and Industrial Applications

Sofia Digital Forum 2018

19 April 2018, National Palace of Culture, Sofia, Bulgaria

<https://eu2018bg.bg/en/events/1572>

The event is part of the Bulgarian Presidency events and is organised in close cooperation with the European Commission, DG Connect.

The main objectives are twofold:

1. Raise awareness on the role of High Performance Computing (HPC) to transform Europe's digital future. The event will discuss how HPC, combined with state-of-the-art mathematical models, algorithms, and software techniques, provides solutions to a wide range of societal, scientific, and industrial challenges, enables breakthrough science, and increases the competitiveness and innovation of industry and in particular of SMEs
2. Present the European strategy on HPC. The event will address how the proposal of the European Commission on the EuroHPC Joint Undertaking will impact the European scientific, economic and societal developments -including digital skills, focusing on the wider area of South and Eastern Europe.

The event will illustrate the key role of HPC for highly challenging scientific applications by focusing on the human brain as one of the most complex systems, but also on personalised health and medicine. It will showcase the link between HPC and other emerging computing paradigms, such as quantum computing.

The event will target scientists and industrialists as well as representatives of ministries from the South and Eastern Europe and beyond.

Programme

Opening

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| 9:00 to 9:15 | Creating Bulgaria's Digital Future Bulgarian high-level governmental Representative |
| 9:15 to 9:45 | The EuroHPC strategic initiative for Europe Mariya Gabriel, European Commissioner for Digital Economy and Society |
| 9:45 to 9:55 | Digital connectivity "EU – West Balkans", priorities of the Bulgarian presidency Prof. Ivan Dimov, Deputy Minister for Education and Science |
| 9:55 to 10:15 | Coffee Break |

HPC for extreme scale scientific applications

Aim of the session: *Ground-breaking results have been achieved by using supercomputers in various areas of scientific and industrial activity, including medicine, biology, geology, engineering and social sciences. They strikingly demonstrate the enormous influence of the leadership-class supercomputers, provided by the Partnership for Research on Advanced Computers in Europe (PRACE), on European science. The European Commission has supported the development of the PRACE infrastructure through a series of five pan-European implementation projects, which unite competence and efforts of experts from the 26 Member States of PRACE. The session speakers will provide some representative examples of ground-breaking results achieved when using HPC in extreme scale scientific applications.*

Moderators Prof. Stoyan Markov, NCSA, Bulgaria and Prof. Thomas Lippert, Jülich Supercomputing Centre, Germany

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| 10:15 to 10:50 | Boosting Scientific Leadership in Europe through HPC – HPC Applications and their impact in Europe Prof. Stoyan Markov and Thomas Lippert |
| 10:50 to 11:10 | Disentangling the Properties of Nucleons by Large Scale Computation Prof. Constantia Alexandrou, University of Cyprus and The Cyprus Institute, Cyprus |

11:10 to 11:30

Tailoring Properties of Nanostructures through Atomic Scale Computational Design
Prof. Joseph Kioseoglou, Aristotle University of Thessaloniki, Greece

Panel discussion on HPC and Future Computing Paradigms

Aim of the session *To discuss emerging computing strategies in the next five to ten years, based on existing and future computing platforms such as exascale computing, quantum computing, neuromorphic computing or others; to discuss their possible competition and/or complementarities and synergies; and their concrete application perspectives and impact on science and economy; and to draw conclusions about the possible future emerging computing infrastructure landscape to build in Europe and beyond.*

Moderator Prof. Thomas Lippert - Jülich Supercomputing Centre, Germany

11:35 to 12:35

Panellists Prof. Heike Riel, IBM Research Frontiers Institute, Switzerland

Prof. Harry Buhrman, CWI, University of Amsterdam, QuSoft, The Netherlands

Prof. Kristel Michielsens, Jülich Research Centre, Germany

Prof. Ilian Todorov, Science & Technology Facilities Council, United Kingdom

Dr. Jean-Marc Denis, ATOS-BULL, France

12:40 to 13:40 **Lunch Break**

The growing role of HPC in Neuroscience – the Human Brain Project FET Flagship

Aim of the session: *This session will show the coupling of scientific progress in brain research with advances in extreme-scale computing. Simulation and data analytics in neuroscience, but also brain medicine illustrate the successful application of HPC in this field. Methodical progress in handling and analysing large amounts of data, e.g., by deep learning, open new perspectives to address highly complex systems such as the brain.*

Moderator Prof. Katrin Amunts, Institute of Neuroscience and Medicine (INM-1) Jülich Research Centre, Germany

13:40 to 13:55 | Understanding the brain through modelling and simulations
Prof. Jeannette Hellgren Kotaleski, KTH Royal Institute of Technology, Sweden

13:55 to 14:10 | From HPC Brain Models to Clinical Applications
Prof. Viktor Jirsa, Marseille University, France

14:10 to 14:25 | A young investigator's perspective: Neural Networks - main pillars of machine learning
Dr. Kristina Kapanova, NCSA, Bulgaria

14:25 to 14:45 | The Big Data Challenge of Multilevel Brain Organisation
Prof. Katrin Amunts

14:45 to 15:00 **Coffee Break**

Panel discussion on The Future of Personalised Health and Medicine

Aim of the session: *Increasingly more data is being generated from patient studies, including those covering a large period of time as well as from cohort studies including many thousands of participants. Medicine has become highly data-intensive and new concepts and tools are necessary to make full use of these data as well as to ensure it is used in the most beneficial way for the individual patient.*

Moderator Prof. Emrah Düzel, Otto-von-Guericke University Magdeburg, Germany

15:00 to 16:00 | **Panellists**

- Prof. Hilleke Hulshoff Pol, UMC Utrecht, The Netherlands
- Prof. Kostadin Kostadinov, Advisor to the Minister of Education and Science, Bulgaria
- Prof. Giulia Rossetti, RWTH Aachen University, Germany
- Prof. Gitte Knudsen, Copenhagen University Hospital, Denmark
- Prof. Patrice Boyer, University Paris 7, France

16:00 to 16:15 **Coffee Break**

Panel Discussion on the role of HPC in the South and Eastern Europe

Aim of the session: *To discuss concrete perspectives, challenges and collaborations of HPC development, including skills development, in Eastern and South European countries under EuroHPC, the European strategic initiative on High Performance Computing.*

Moderator Dr. Thomas Skordas, Director, DG CONNECT, European Commission

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| 16:15 to 17:00 | Panellists | Prof. Svetozar Margenov, Director IICT - BAS, Bulgaria Prof. Constantia Alexandrou, the Cyprus Institute, Cyprus Dr. Vit Vondrak, VSB-Technical University of Ostrava, Czech Republic Prof. Panayiotis Tsanakas, National Technical University of Athens, Greece Prof. Zlatan Car, University of Rijeka, Croatia |
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Closing Key note speech

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| 17:00 to 17:30 | Towards European exascale computing Dr. Thierry Breton, CEO Atos, France |
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Closing Remarks

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| 17:30 to 17:45 | Mariya Gabriel, European Commissioner for Digital Economy and Society |
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