

# ISC 2018 Research Papers

The ISC research paper sessions provide world-class open forums for engineers and scientists in academia, industry, and government to present and discuss issues, trends, and results that will shape the future of high performance computing.

## Chair - Prof. Dr. David Keyes

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From all Research Papers submitted to the conference, the ISC 2018 Research Papers Committee, which is headed by Prof. Dr. David Keyes, Kaust, Saudi Arabia, with Carsten Trinitis, TU Munich, Germany, as Deputy Chair, has selected the following Research Papers for presentation at ISC 2018:

## Monday, June 25

### [Research Paper Award Session](#)

- Hans Meuer Award Finalist 1: [Chebyshev Filter Diagonalization on Modern Manycore Processors and GPGPUs](#)
- Hans Meuer Award Finalist 2: [Compiler-assisted Source-to-Source Skeletonization of Application Models for System Simulation](#)
- GAUSS Award Winning Paper: [On the accuracy and usefulness of analytic energy models for contemporary multicore processors](#)

## Tuesday, June 26

### Research Paper Session 02 - [HPC Applications / Architectures & Networks](#)

- [Performance Optimization and Evaluation of Scalable Optoelectronics Application on Large Scale KNL Cluster](#)
- [Megafly: A Topology For Exascale Systems](#)
- [Packetization of Shared-Memory Traces for Message Passing Oriented NoC Simulation](#)

### Research Paper Session 03 - [AI & Machine Learning / HPC Algorithms](#)

- [Bayesian Optimization of HPC Systems for Energy Efficiency](#)
- [Distributed Deep Reinforcement Learning: learn how to play Atari games in 21 minutes](#)
- [Combining HTM with RCU to Speed Up Graph Coloring on Multicore Platforms](#)

## Research Paper Session 04 - [Programming Models and System Software](#)

- [Heterogeneity-aware Resource Allocation in HPC Systems](#)
- [A Survey of Programming Tools for D-Wave Quantum-Annealing Processors](#)
- [DTF: an I/O arbitration framework for multi-component data processing workflows](#)

## [Hans Meuer Award Ceremony](#)

## Wednesday, June 27

### Research Paper Session 05 - [Performance Modelling and Measurement I](#)

- [The Pitfalls of Provisioning Exascale Networks: A Trace Replay Analysis for Understanding Communication Performance](#)
- [Zeno: A Straggler Diagnosis System for Distributed Computing Using Machine Learning](#)
- [Hardware Performance Variation: A Comparative Study using Lightweight Kernels](#)

### Research Paper Session 06 - [Performance Modelling and Measurement II](#)

- [Applicability of the ECM Performance Model to Explicit ODE Methods on Current Multi-Core Processors](#)
- [Machine Learning Based Parallel I/O Predictive Modeling: A Case Study on Lustre File Systems](#)
- [A novel multi-level integrated roofline model approach for performance characterization](#)

### Research Paper Session 07 - [Programming Models and System Software](#)

- [TaskGenX: A Hardware-Software Proposal for Accelerating Task Parallelism](#)
- [Classifying Jobs and Predicting Applications in HPC systems](#)

## Publication

The publication of the papers is managed by Proceedings Chair **Dr. Rio Yokota**, Tokyo Institute of Technology with **Dr. Michèle Weiland**, EPCC, as Proceedings Deputy Chair.

All accepted research papers will be published in the [Springer's Lecture Notes in Computer Science \(LNCS\)](#) series. For the camera-ready version, authors are automatically granted one extra page to incorporate reviewer comments. The publication is free of charge. The papers can be downloaded from Springer's website for a limited time after ISC 2018. The proceedings are indexed in the ISI Web of Science, EI Engineering Index, ACM Digital Library, dblp, Google Scholar, IO-Port, MathSciNet, Scopus, and Zentralblatt MATH.

## Presentation Slides for Attendees

The ISC organizers will make the presentation slides available online a week after the event, provided as PDF files. ISC 2018 attendees will receive an e-mail with the access link. Research Papers presenters are kindly requested to provide a PDF version of their presentation slides to Ms. Iris Stöhr at [program-support@isc-group.com](mailto:program-support@isc-group.com) by **Friday, June 29, 2018** at the latest.

**Please note that the call for Research Papers is now closed!**

Submitted research papers will be reviewed by the **ISC 2018 Research Papers Committee**, which is headed by **Prof. David Keyes**, KAUST, as Chair and **Dr.-Ing. Carsten Trinitis**, TU Munich, as Deputy Chair and **Professor Rio Yokota**, Tokyo Institute of Technology, as Proceedings Chair and **Dr. Michèle Weiland**, EPCC, as Proceedings Deputy Chair.

The research paper sessions will be held from Monday, June 25, through Wednesday, June 27, 2018. Attendance will require a **Conference Pass**.

The ISC organizers as well as the German Gauss Center for Supercomputing will again sponsor the call for research papers with two awards for outstanding research papers: the **Hans Meuer Award** and the **GAUSS Award**.

## Important Dates

### Full Submission Deadline

<b>Author Rebuttals</b>	<b>Closed</b> <b>Monday, February 19 – Thursday, February 22, 2018</b>
<b>Notification of Acceptance</b>	<b>Monday, March 5, 2018</b>
<b>Camera-Ready Submission</b>	<b>Monday, April 2, 2018</b>
<b>Research Paper Sessions</b>	<b>Monday, June 25 – Wednesday, June 27, 2018</b>
<b>Final Presentation Slides in PDF due</b>	<b>Friday, June 29, 2018</b>

## Areas of Interest

We encourage the submission of high-quality papers reporting original work in theoretical, experimental, and industrial research and development. The ISC submission process will be divided into seven tracks this year for better manageability:

### Architectures & Networks

- Future design concepts of HPC systems
- Multicore/manycore systems
- Heterogeneous systems
- Network technology
- Domain-specific architectures
- Memory technologies

### Data, Storage & Visualization

- From big data to smart data
- Memory systems for HPC & big data
- File systems & tape libraries
- Data intensive applications
- Databases
- Visual analytics
- In-situ analytics

- Trends in the HPC chip market
- Exascale computing

### **HPC Applications**

- Highly scalable applications
- Convergence of simulations and big data
- Scalability on future architectures
- Workflow management
- Coupled simulations
- Industrial simulations
- Implementations on SIMT accelerators

### **Programming Models & Systems Software**

- Parallel programming paradigms
- Tools and libraries for performance and productivity
- Job management
- Monitoring & administration tools
- Productivity improvement
- Energy efficiency

### **Performance Modeling & Measurement**

- Performance models
- Performance prediction and engineering
- Performance measurement
- Power consumption

### **HPC Algorithms**

- Innovative algorithms, discrete or continuous
- Algorithmic-based fault tolerance
- Communication-reducing algorithms
- Synchronization-reducing algorithms
- Time-space trade-offs in algorithms

### **Artificial Intelligence & Machine Learning**

- Neural networks and HPC
- Machine learning and HPC
- AI and machine learning-oriented hardware
- Devising benchmarks for machine learning

**Note: Submissions on other innovative aspects of high performance computing are also welcome.** You will be asked to pick a primary and a secondary track from the seven above for your submission.

## **Submission & Review Process**

- Papers need to be submitted via the ISC 2018 submission site at [https://ssl.linklings.net/conferences/isc\\_hpc/](https://ssl.linklings.net/conferences/isc_hpc/) by **Saturday, December 30, 2017**.
- We accept only submissions which are formatted correctly in LNCS style (single column format) using either the LaTeX document class or Word template. For details on the author guidelines, please refer to [Springer's website](#). Incorrectly formatted papers will be excluded from the reviewing process.
- Paper submissions are required to be within 18 pages in the above mentioned LNCS style. This includes all figures and references.
- Each paper will be peer-reviewed **double-blind** (see [ISC 2018 Double-Blind Review Guidelines](#)) by at least 4 reviewers and **should be submitted in a form suitable for anonymous review**. Papers will be evaluated by reviewers based on their novelty, fundamental insights and potential for long-term contribution.

- Papers will go through a rebuttal phase to give authors the chance to respond to reviewer comments and to discuss them with the **Research Papers Committee**. During this phase, the reviews of your paper would be made available to you and you will have the opportunity to address any questions from the reviewers or aspects that you feel the reviewers might have misunderstood. The rebuttal will be in written format, and further instructions will be emailed to the authors. After the rebuttal period has closed, the **Research Papers Committee** members and chairs will have an opportunity to look through the author rebuttals and would be able to change their reviews based on this information. Final decisions will be made taking the reviews and rebuttals into consideration.
- At an in-person **Research Papers Committee** meeting, each paper will be discussed before the acceptance decisions are made.

## Terms & Conditions

- By submitting a paper, you agree to present the paper at ISC 2018 in Frankfurt, Germany.
- Paper presenters need to be registered ISC 2018 participants. The ISC organizers will grant a 100% discount on the conference day pass to one presenter per paper for the day of their presentation.
- Travel, accommodation, registration fees and other such costs will not be covered by the ISC organizers.

## Publication

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ISC 2018 Research Papers Committee

The Research Papers Committee sets up the research paper sessions, based on a call-for-papers procedure.

- **David Keyes**, KAUST, Saudi Arabia (Research Papers Chair)
- **Carsten Trinitis**, TU Munich, Germany (Research Papers Deputy Chair)

## Architectures & Networks

- **Martin Schulz**, Technical University of Munich, Germany (Track Chair for Architectures & Networks)
- **Holger Fröning**, University of Heidelberg, Germany
- **Pedro J. Garcia**, University of Castilla-La Mancha, Spain
- **Georgios Goumas**, National Technical University of Athens, Greece
- **Wolfgang Karl**, Karlsruhe Institute of Technology, Germany
- **Sébastien Rumley**, Columbia University, United States of America

- **Federico Silla**, Technical University of Valencia, Spain
- **Peter Ziegenhein**, The Institute of Cancer Research, United Kingdom

## Artificial Intelligence and Machine Learning

- **Yu Wang**, Leibniz Supercomputing Centre, Germany (Track Chair for Artificial Intelligence and Machine Learning)
- **Christoph Angerer**, NVIDIA, United States of America
- **Gonzalo Hernandez**, USACH, Department of Industrial Engineering, Chile
- **Janis Keuper**, Fraunhofer ITWM, Germany
- **Romeo Kienzler**, IBM, Switzerland
- **Chuan Lu**, Department of Computer Science, Aberystwyth University, United Kingdom
- **Lukas Lukas**, Universitas Katolik Indonesia Atma Jaya, Faculty of Engineering Indonesia
- **Hayk Shoukourian**, Leibniz Supercomputing Centre, Germany
- **Michael Steyer**, Intel Corporation, Germany
- **Johan Suykens**, KU Leuven, Belgium
- **Marcel Tilly**, Microsoft, United States of America
- **Edward Zimmermann**, NONMONOTONIC Networks, Germany

## Data, Storage & Visualization

- **Timo Bremer**, Lawrence Livermore National Laboratory, United States of America (Track Chair for Data, Storage & Visualization)
- **Mahdi Bohlouli**, Institute of Web Science and Technologies, University of Koblenz, Germany
- **Matthieu Dorier**, Argonne National Laboratory, United States of America
- **Steffen Frey**, University of Stuttgart, Germany
- **Hideyuki Kawashima**, University of Tsukuba, Center for Computational Sciences, Japan
- **Jay Lofstead**, Sandia National Laboratories, United States of America
- **Valerio Pascucci**, University of Utah, United States of America
- **John Patchett**, LANL, United States of America
- **Shinji Sumimoto**, Fujitsu, Japan
- **Ryousei Takano**, AIST, Japan
- **Osamu Tatebe**, University of Tsukuba, Center for Computational Sciences, Japan
- **Venkatram Vishwanath**, Argonne National Laboratory, United States of America

## HPC Algorithms

- **Philipp Neumann**, German Climate Computing Center, Germany (Track Chair for HPC Algorithms)
- **Ilkay Altintas**, San Diego Supercomputing Center, United States of America
- **Yuefan Deng**, Stony Brook University, United States of America
- **Harald Köstler**, FAU Erlangen-Nuremberg, Germany
- **Miriam Mehl**, University of Stuttgart, Germany
- **Marek Michalewicz**, ICM, University of Warsaw, Poland
- **Kengo Nakajima**, The University of Tokyo, Japan
- **Lena Oden**, Forschungszentrum Juelich, Germany
- **Daniel Ruprecht**, University of Leeds, United Kingdom
- **Ana Lucia Varbanescu**, University of Amsterdam, Netherlands

- **Tobias Weinzierl**, Durham University, United Kingdom

## HPC Applications

- **Antonino Tumeo**, Pacific Northwest National Laboratory, United States of America (Track Chair for HPC Applications)
- **Vassil Dimitrov**, University of Calgary and Computer Modelling Group, Canada
- **Hubertus Franke**, IBM Research, United States of America
- **Guido Juckeland**, HZDR, Germany
- **Gokcen Kestor**, Oak Ridge National Laboratory, United States of America
- **Scott Klasky**, Oak Ridge National Laboratory, United States of America
- **Axel Klawonn**, Universität zu Köln, Germany
- **Miquel Moretó**, Universitat Politècnica de Catalunya, Spain
- **Gabriel Noaje**, NVIDIA, Singapore
- **Miquel Pericas**, Chalmers University of Technology, Sweden
- **Michela Taufer**, University of Delaware, United States of America

## Performance Modeling & Measurement

- **Saday Sadayappan**, Ohio State University, United States of America (Track Chair for Performance Modeling & Measurement)
- **Christos Antonopoulos**, University of Thessaly, Greece
- **Suren Byna**, Lawrence Berkeley National Lab, United States of America
- **Yuefan Deng**, Stony Brook University, United States of America
- **Jan Eitzinger**, Erlangen Regional Computing Center, Germany
- **Allen Malony**, University of Oregon, United States of America
- **Marek Michalewicz**, ICM, University of Warsaw, Poland
- **Dimitrios Nikolopoulos**, Queen's University Belfast, United Kingdom
- **Fabrice Rastello**, INRIA, Grenoble, France
- **Aravind Sukumaran-Rajam**, Ohio State University, United States of America
- **Josef Weidendorfer**, Leibniz Supercomputing Centre / Technical University of Munich, Germany

## Programming Models & Systems Software

- **Sven-Bodo Scholz**, Heriot-Watt University, United Kingdom (Track Chair for Programming Models & Systems Software)
- **Ilkay Altintas**, San Diego Supercomputing Center, United States of America
- **Alexandru Calotoiu**, TU Darmstadt, Germany
- **Bradford L. Chamberlain**, Cray Inc., United States of America
- **Clemens Grellck**, University of Amsterdam, Netherlands
- **Christian Lengauer**, Universität Passau, FIM, Germany
- **Simon McIntosh-Smith**, University of Bristol, United Kingdom
- **Miriam Mehl**, University of Stuttgart, Germany
- **Richard Membarth**, DFKI & Saarland University, Germany
- **Marek Michalewicz**, ICM, University of Warsaw, Poland

- **Lawrence Mitchell**, Imperial College London, United Kingdom
- **Bernd Mohr**, Juelich Supercomputing Centre, Germany
- **Antoni Pop**, The University of Manchester, United Kingdom
- **Alex Shafarenko**, University of Hertfordshire, United Kingdom
- **Hans Vandierendonck**, Queen's University Belfast, United Kingdom
- **Tobias Weinzierl**, Durham University, United Kingdom