

# **EGPGV 2018**

## **18th Eurographics Symposium on Parallel Graphics and Visualization**

**Brno, Czech Republic  
June 4, 2018**

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## Preface

This book contains the proceedings of the 18th Eurographics Symposium on Parallel Graphics and Visualization (EGPGV), which took place in Brno in the Czech Republic, on the 4th of June, 2018.

In this day and age, high-performance graphics and visualization solutions are required in a variety of domains, ranging from making sense of the huge amounts of data coming out of simulations and sensing devices, to delivering real-time immersive experiences that simulate virtual worlds. Such systems are implemented on hardware platforms that are rapidly increasing in complexity, in terms of increasing concurrency, heterogeneity, and depth of memory and storage hierarchies. These factors present unique challenges, to which our community responds with novel methods and approaches for parallel and high-performance graphics and visualization. The EGPGV Symposium aims at fostering the exchange of experiences and knowledge exploiting and defining new trends in this important computer science area.

The papers program presents contributions that introduce novel parallel systems and techniques. This year, we received a total of 23 high-quality submissions, each of which underwent extensive review by a diverse International Program Committee, consisting of 23 persons from around the world having broad and deep expertise in parallel graphics and visualization. Each contribution was independently reviewed by at least three IPC members, selected by the chairs according to their preferences, expertise, and conflicts. The members were assigned as either primary or secondary reviewers. After all the reviews were completed, the primary reviewer of each contribution led an online discussion among all co-reviewers and was responsible for writing a summary review and recommendation. This active discussion clarified issues with the papers and helped develop consensus about decisions. Based on the reviewers' recommendations, the individual reviews, the online discussions, and after a thorough deliberation by the program co-chairs, 10 of the 23 submissions were selected for inclusion in the final program, which corresponds to an acceptance rate of 43%.

This year's papers program covers a variety of subjects, including applications and optimizations of ray-tracing, flow visualization and particle advection, spatial search structures, and more.

This year's keynote was delivered by Markus Hadwiger of the King Abdullah University of Science and Technology (KAUST). He presented on large-scale visualization and multi-resolution GPU data structures, which is an important topic for microscopy volumes from neuroscience and large-scale particle data from molecular dynamics simulations.

We would like to thank Stefanie Behnke (Eurographics) and Meghan Haley (IEEE) for their help with handling the publications and invaluable assistance with the reviewing system, respectively. We would also like to thank Kristi Belcher of the University of Oregon, who served as the Student Program Chair. Finally, we would like to thank all the members of the IPC, the external reviewers, our sponsor Intel, the authors, and the keynote speaker without whom this symposium would not have been possible.

Hank Childs, Fernando Cucchietti, and Bernd Hentschel  
Brno, Czech Republic, June 2018

## Keynote

### Large-Scale Visualization and Multi-Resolution (GPU) Data Structures

*Markus Hadwiger*

King Abdullah University of Science and Technology (KAUST)

#### **Abstract**

The rapidly increasing amount of data acquired or computed in data-driven science presents a tremendous challenge to visualization and analysis. Nevertheless, for exploring, analyzing, and understanding large-scale data it is crucial to enable interactive visualization. Well-established basic approaches to tackling this challenge are on the one hand using multi-resolution representations, while often on the other hand exploiting the processing power of GPUs. However, scaling to extreme-scale data requires going beyond standard approaches. This talk will give an overview of some of our work on multi-resolution methods for very large data, such as microscopy volumes from neuroscience or large-scale particle data from molecular dynamics simulations, and designing data structures and visualization algorithms that are well-suited to the characteristics of GPU architectures.

#### **Short Biography**

Markus Hadwiger is an Associate Professor in computer science and the Visual Computing Center (VCC) at King Abdullah University of Science and Technology (KAUST) in Saudi Arabia, which he joined in 2009. He leads the High-Performance Visualization research group at VCC, where his research interests in the area of scientific visualization include extreme-scale visual computing and visualization, volume visualization, medical visualization, large-scale image and volume processing, multi-resolution techniques, data streaming and out-of-core processing, interactive segmentation, and GPU algorithms and architecture. He is a co-author of the book *Real-Time Volume Graphics* published in 2006 and has been involved in many courses and tutorials about volume rendering and visualization at ACM SIGGRAPH, ACM SIGGRAPH Asia, IEEE Visualization, and Eurographics. Prof. Hadwiger has co-authored more than 70 refereed articles.

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