





MARS

Models, Algorithms, Computers and Systems



Series of Talks SS 2023

A cooperation with SMC

Department of Mathematics Department of Computer Science

Paris Lodron University Salzburg





Mathematics

Computer Science

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MARS – Models, Algorithms, Computers, and Systems

Modern high tech research in science and technology requires to a great extent an interdisciplinary approach. This applies particularly to wide areas of the methodological sciences mathematics and computer science, where generally one or more aspects of a chain of consecutive closely interlocked fields of research are considered. These start with a mathematical model, continue with algorithmic problems and finally cover aspects of the implementation on computers or high performance computing environments and therefore also issues on the efficiency of computer systems.

MARS is a doctoral programme at the Doctorate School PLUS (DSP Programme), which is organized by the departments of mathematics and computer sciences of the Paris Lodron University Salzburg. Its objective is to educate doctoral students in the research fields models, algorithms, computers, and systems and also to achieve new insights and research findings especially with regard to the inter-dependency of these fields of research. The focus will be on important topics relevant for the Salzburg research site. MARS fields of research form particularly from a methodological point a cohesive and closely linked line of research and cover a wide spectrum of scientific interests.

Joint activities constitute the structured doctoral program in MARS. These include seminars with external guest speakers, one day workshops with external guests and multi day retreats away from the university, as well as summer schools on the topics of MARS.

Programm

Thursday, 15:00-15:45 Lecture room 414, 1st floor

Optimization in discrete geometry. Frank Vallentin (Köln), May 25, 2023

How densely can one pack given objects into a given container? Such packing problems are fundamental problems in discrete geometry. Next to being classical mathematical challenges there are many applications in diverse areas such as information theory, materials science, physics, logistics, approximation theory.

Studying packing problems, one is facing two basic tasks: Constructions: How to construct packings which are conjecturally optimal? Obstructions: How to prove that a given packing is indeed optimal?

For the first basic task researchers in mathematics and engineering found many heuristics which often work well in practice. In the talk I want to explain computational tools for the second basic task. These tools are a blend of tools coming from infinite-dimensional semidefinite optimization and harmonic analysis, together with computational techniques coming from real algebraic geometry and polynomial optimization. I will report on computational results, which are frequently the best-known.

Coming...

Singularity formation for the threedimensional Keller-Segel model Birgit Schörkhuber (Innsbruck) June 29, 2023