



# MARS

Models, Algorithms, Computers and Systems

Series of Talks  
WS 2023/24

Start: 1 pm

Location: HS T01, ground floor  
Jakob-Haringer-Straße 2

## Contact

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Department of Mathematics  
Department of Computer Science

## 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.

## Program

Tuesday, 13:00-13:45  
Lecture room T01, ground floor

### **Efficiently Maintaining and Applying Dynamic Out-Orientations.**

Aleksander Bjørn Grodt Christiansen (Denmark),  
Oktober 17, 2023

A bounded out-orientation is an orientation of the edges of a graph such that the maximum out-degree is bounded. Dynamically maintaining such orientations with a close to optimal bound on the out-degrees is an important sub-procedure in the currently fastest known algorithms for well-studied problems such as dynamic densest subgraph, dynamic maximal matching, and dynamic graph colouring.

In this talk, we will show how to efficiently maintain such out-orientations in dynamic graphs, and how to apply them as sub-procedures to design efficient dynamic algorithms for densest subgraph and colouring.

The talk is based on a combination of joint work with Chandra Chekuri, Jacob Holm, Ivor van der Hoog, Krzysztof Nowicki, Kent Quanrud, Eva Rotenberg, and Chris Schwiegelshohn..

## Coming...

**Polynomials over  $\mathbb{Z}$  and  $\mathbb{Q}$ : counting and freeness**

Timothy Browning (ISTA Klosterneuburg)  
November 15, 2023