Doctorate School PLUS

uni-salzburg.at/doktorat

PARIS LODRON UNIVERSITÄT SALZBURG

# MARS

**Models, Algorithms, Computers and Systems**

**Series of Talks**

**SS 2024**

Start: 3 pm

Location: Lecture room 414, 1$^{st}$ floor
Hellbrunner Straße 34

**A cooperation with SMC**

Department of Mathematics
Department of Computer Science

## Contact

Department of Mathematics
Hellbrunner Str. 34
5020 Salzburg, Austria

e-mail: barbara.babacek@plus.ac.at
https://www.plus.ac.at/mathematik

PARIS LODRON UNIVERSITÄT SALZBURG | Mathematics

PARIS LODRON UNIVERSITÄT SALZBURG | 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

March 14, 2024
Thursday, 15:00-15:45
Lecture room 414, $1^{\text{st}}$ floor

### Extending rational diophantine quadruples
Michael Stoll (Universität Bayreuth)

A *diophantine* $m$-*tuple* is an $m$-tuple $(a_1, \ldots, a_m)$ of distinct nonzero integers such that $a_i a_j + 1$ is a square for all $1 \leq i < j \leq m$. A *rational diophantine* $m$-*tuple* is an $m$-tuple of distinct nonzero rational numbers with the same property. Fermat found the diophantine quadruple $(1, 3, 8, 120)$. It was a long-standing conjecture that no diophantine quintuples exist; this was proved a few years ago. Euler found the first rational diophantine quintuples. The existence of infinitely many rational diophantine sextuples is known, but it is an open problem whether rational diophantine septuples exist.

We will consider the question how many ways there are to extend a given rational diophantine quadruple to a rational diophantine quintuple. Concretely, we will show that Fermat's quadruple can be extended in exactly one way (by a number already discovered by Euler). The problem can be reduced to that of determining the set of rational points on a certain algebraic curve of genus 2, which in turn can be reduced to finding all points with rational $x$-coordinate on certain elliptic curves over some quartic number fields. I will explain this in some detail.

## Coming...

**Barycentric algebras and barycentric coordinates**
Anna Zamojska-Dzienio (TU Warsaw)
June 20, 2024