Doctorate School PLUS

uni-salzburg.at/doktorat

PARIS LODRON UNIVERSITÄT SALZBURG

MARS

Models, Algorithms, Computers and Systems

Series of Talks
SS 2025

Start: 3 pm

Location: Lecture room 414, 1st 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

June 05, 2025
Thursday, 15:00-15:45
Lecture room 414, 1^{st} floor

Kaluza-Klein theories without a priori fibration hypotheses
Frédéric Hélein (Université Paris Diderot)

I will present a Lagrangian action on fields, the critical points of which lead to solutions of the Einstein-Yang-Mills equations, in the spirit of Kaluza-Klein theories. The novelty is that the a priori fiber bundle structure hypothesis is not required: fields are defined on a "space-time" Y of dimension $4+r$ without any a priori principal bundle structure, where r is the dimension of the structure group. If the latter group is compact and simply connected, to each solution of the Euler-Lagrange equations it corresponds a 4-dimensional pseudo-Riemannian manifold X (which can be interpreted as our usual space-time) in such a way that Y acquires a principal bundle structure over X equipped with a connection.

Moreover the metric on X and the connection on Y are solutions of the Einstein-Yang-Mills system. If the structure group is $U(1)$ (the case which corresponds to the Einstein-Maxwell system) the situation is slightly degenerated and supplementary hypotheses are necessary.

Coming...