ICMS 2016

Conference Program

We thank the following institutions for their kind support:

GAMS Development Corp

DFG-Forschungszentrum MATHEON
Mathematik für Schlüsseltechnologien

Venue

Conference Venue

The ICMS 2016 conference will be held at the Zuse Institute Berlin (ZIB). ZIB is an interdisciplinary research institute for applied mathematics and data-intensive high-performance computing. Its research focuses on modeling, simulation and optimization with scientific cooperation partners from academia and industry.

Location of ZIB

ZIB is located on the campus of FU Berlin. The following map shows the surroundings of ZIB.

Committees

Executive Committee

- General Chair: Gert-Martin Greuel, University of Kaiserslautern
- Program Chairs:
  - Peter Paule, Johannes Kepler University Linz and RISC, Austria
  - Andrew Sommese, University of Notre Dame, USA
- Local Chair: Thorsten Koch, Zuse Institute Berlin, Germany

Program Committee

- Peter Paule, Johannes Kepler University Linz and RISC, Austria
- Andrew Sommese, University of Notre Dame, USA
- Session Organizers

Local Committee

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- Hoon Hong, NC State University, USA
- Masayuki Noro, Kobe University, Japan
- Deok-Soo Kim, Hanyang University, South Korea

Invited Speakers

- **Prof. Wolfram Decker** (University of Kaiserslautern)
  Current Challenges in the Development of Open Source Computer Algebra Software

  Abstract: Computer algebra is facing new challenges as more and more of the abstract concepts of pure mathematics are made constructive, with interdisciplinary methods playing a significant role. On the mathematical side, while we wish to provide cutting-edge techniques for applications in various areas, the implementation of an advanced and more abstract computational machinery often depends on a long chain of more specialized algorithms and efficient data structures at various levels. On the software development side, for cross-border approaches to solving mathematical problems, the efficient interaction of systems specializing in different areas is indispensable. In this talk, I will report on ongoing collaboration between groups of developers of several well-established open source computer algebra system specializing in commutative algebra and algebraic geometry, group and representation theory, convex and polyhedral geometry, and number theory. The ultimate goal of this collaboration is to integrate the systems, together with other packages and libraries, into a next generation computer algebra system surpassing the combined mathematical capabilities of the underlying systems.

- **Prof. Jack Dongarra** (University of Tennessee)
  With Extreme Scale Computing the Rules Have Changed

  Abstract: In this talk we will look at the current state of high performance computing and look at the next stage of extreme computing. With extreme computing there will be fundamental changes in the character of floating point arithmetic and data movement. In this talk we will look at how extreme scale computing has caused algorithm and software developers to change their way of thinking on how to implement and program certain applications.

- **Prof. Vladimir Voevodsky** (IAS Princeton)
  UniMath - a library of mathematics formalized in the univalent style

  Abstract: The univalent style of formalization of mathematics in the type theories such as the ones used in Coq, Agda or Lean is based on the discovery in 2009 of a new class of models of such type theories. These “univalent models” led to the new intuition that resulted in the introduction into the type theory of the concept of h-level (homotopy level). This most important concept implies in particular that to obtain good intuitive behavior one should define propositions as types of h-level 1 and sets as types of h-level 2. Instead of syntactic Prop one then *defines* a type hProp(U) - the type of types of h-level 1 in the universe U and the type hSet(U) - the type of types of h-level 2 in U. With types of h-level 1 and 2 one can efficiently formalize all of the set-theoretic mathematics. With types of h-level 3 one can efficiently formalize mathematics at the level of categories etc. Univalent style allows to directly formalize constructive mathematics and to formalize classical mathematics by adding the excluded middle axiom for types of h-level 1 and the axiom of choice for types of h-level 2. UniMath is a growing library of constructive mathematics formalized in the univalent style using a small subset of Coq language.

- **Prof. Stephen M. Watt** (University of Waterloo)
  Toward an International Mathematical Knowledge Base

  Abstract: The notion of a comprehensive digital mathematics library has been a dream for some decades. More than in many other areas, results in mathematics have lasting value–once proven, always true. It is not uncommon for a research article to have primary references to work decades earlier. Another quality of mathematics is its precision; there is a clarity to mathematical definitions and results. This makes mathematics an ideal subject for mechanized treatment of knowledge. This talk shall outline the challenges and opportunities in transforming the complete mathematical literature into a knowledge base to be used by mathematicians and software systems alike.

Sessions at ICMS 2016

The congress is organized in sessions, addressing different aspects of mathematical software. Read here about the aim and scope of several sessions. There will be also demos, tutorials and posters.

1. **Univalent Foundations and Proof Assistants**
   Organizer:
   Vladimir Voevodsky, IAS, Princeton
   vladimir@ias.edu

   Aim and Scope
   The goal of the session is to bring together people in the proof assistant community working on the ideas inspired by the current activity surrounding the Univalence Axiom and, more generally, univalent foundations of mathematics and homotopy type theory. We expect to have representatives from several existent proof assistants as well as people working on the development of new type theories that will or may become the basis of proof assistants in the future. We consider the problem of developing the infrastructure that will allow formal specification and eventually verification of new proof assistants to be an important and possibly the most important one that is facing the community as the complexity of the type theories underlying the proof assistants grows and hope to also have talks from people and teams working in this direction.

2. **Software for Mathematical Reasoning and Applications**
   Organizers:
   Bruno Buchberger, Tudor Jebelean, Temur Kutsia, Wolfgang Windsteiger (session manager)
   all: Research Instute for Symbolic Computation
   Johannes Kepler University, Linz / Schloss Hagenberg, 4232 Hagenberg, Austria
   Wolfgang.Windsteiger@jku.at

   Aim and Scope
   In addition to traditional software for numerics and symbolics (in algebra, analysis, combinatorics, etc.), more and more software for automated reasoning based on sophisticated general and special reasoning techniques with nice user interfaces enriches the possibilities of working mathematicians, computer scientists and engineers. For this session we welcome reports on:

   - new versions of automated reasoning software
   - user interfaces for automated reasoning software
   - new implementations of general and special reasoning techniques
   - interaction of automated reasoning software with numerical and algebraic software
   - applications of automated reasoning in mathematics, computer science, natural sciences, engineering, education
   - the use of automated reasoning in the build-up of formal mathematical knowledge bases
   - and related subjects.

3. **Computational Number Theory meets computational Algebraic Geometry**
   Organizers:
   Wolfram Decker, University of Kaiserslautern, Department of Mathematics
   decker@mathematik.uni-kl.de
   Claus Fieker, University of Kaiserslautern, Department of Mathematics
   fieker@mathematik.uni-kl.de

Sessions at ICMS 2016

Aim and Scope
Both number theory and geometry have a lot of common algorithmic tasks, albeit hidden behind different languages. For example, while geometers compute normalizations, number theorists are interested in integral closures or maximal orders. As diverse as the languages are the techniques that are traditionally applied — although recently the algorithms seem to converge. In this workshop we aim to bring together experts in computational algebraic geometry and algorithmic number theory in order to facilitate a strong exchange of ideas. We expect synergy effects for the design of algorithms by bringing both worlds together.

4. Algebraic Geometry in Applications

Organizer:
Gerhard Pfister, University of Kaiserslautern
pfister@mathematik.uni-kl.de

Aim and Scope
The aim of the section is to show how algebraic geometry can be applied outside algebraic geometry in many different areas, using the basic tools such as factorization, Gröbner bases techniques, symbolic-numeric techniques and others. We want to present applications in:

- Kinematics
- Cryptology
- Algebraic Statistics including applications in Biology
- Electronics
- Computer vision.

The section is open for all kinds of applications. It includes also software from non-commutative algebraic geometry.

5. Computational aspects of homological algebra, group, and representation theory

Organizers:
Mohamed Barakat, University of Siegen
mohamed.barakat@uni-siegen.de
Max Horn, University of Giessen
max.horn@math.uni-giessen.de

Aim and Scope
Homological algebra is a universal language with an established presence in many fields of mathematics. The session will focus on modern applications of computational homological methods to the representation theory of groups and algebras. These methods range from the computability of group, Lie algebra, and Hochschild cohomology to the constructivity of Morita, tilting, and various other equivalences of derived and differentially enriched categories. Such equivalences also connect the representation theory to equivariant coherent sheaves on varieties admitting a tilting object and hence to algebraic geometry.

6. Software of Polynomial Systems

Organizers:
Chenqi Mou, School of Mathematics and Systems Science
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Dongming Wang, School of Mathematics and Systems Science
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and
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Aim and Scope
Polynomial systems appear in commutative algebra, algebraic geometry, geometric reasoning, cryptography, coding theory, biology, and many other areas of science and engineering. The study of structures, properties, and representations of mathematical objects defined by polynomial systems may involve heavy computations, for which advanced software needs be developed and used.

This session aims at bringing together interested researchers, software developers, and software users to present and to discuss recent work and progress on the design, implementation, analysis, and application of software for computations with polynomial systems. Specific topics for the session include, but are not limited to:

- Software for fast arithmetic with polynomials
- Software for polynomial root finding
- Software for polynomial system solving
- Software for parametric polynomial systems
- Software for polynomial systems over the reals
- Databases related to polynomial systems
- Special-purpose software for applications
- Software development paradigms and methodologies
- Case studies, experiments, and comparisons.

7. Software for the Symbolic Study of Functional Equations

Organizers:
Moulay A. Barkatou,
Thomas Cluzeau,
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123, Avenue Albert Thomas, 87060 Limoges, France
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Aim and Scope

The aim of this session is to present softwares or packages dedicated to the symbolic or symbolic-numeric treatment of (systems of) functional equations such as ordinary or partial differential equations, (q-)difference equations, differential time-delay equations, discrete-time equations, ... The presentations are expected to enhance interactions between developers and potential users on the one hand, and amongst developers/ researchers on the other hand.

Survey talks of research groups, reviews of the state of the art, works which make substantial use of such existing softwares for miscellaneous applications, and demonstrations of softwares under development are also welcome. The topics include but are not limited to:

- Symbolic resolution of linear or nonlinear functional equations or systems
- Symbolic manipulation of functional operators
- Qualitative study of functional systems
- Applications.

8. Symbolic Integration

Organizer:
Christoph Koutschan
RICAM, Austrian Academy of Sciences,
Altenberger Strasse 69
A-4040 Linz, AUSTRIA
christoph.koutschan@ricam.oeaw.ac.at

Aim and Scope

The symbolic evaluation of integrals is a classic topic in computer algebra. This refers to indefinite integrals, i.e., finding the antiderivative of a given function, as well as to definite integrals. In the past decades tremendous progress has been made in this field, and the capabilities of today's computer algebra systems are truly impressive.

As these capabilities are particularly based on table-lookup, there is still a considerable interest in algorithmic approaches to symbolic integration, which also nowadays is a very active field of research. In this session we want to discuss recent developments concerning the algorithmic evaluation of integrals, either in closed form or using some implicit representation, e.g., in terms of a differential equation satisfied by a given parametric integral.

9. Symbolic computation and elementary particle physics

Organizers:
Carsten Schneider
Research Institute for Symbolic Computation (RISC)
Johannes Kepler University
Altenberger Strasse 69, A-4040 Linz, Austria
Carsten.Schneider@risc.jku.at
Johannes Bluemlein
Deutsches Elektronen–Synchrotron, DESY
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Aim and Scope
In the research area of elementary particle physics and in the research areas of symbolic computation and of computer algebra in particular, there is the following very strong common interest: How can one simplify expressions represented in terms of multiple-sums and multiple-integrals or in terms coupled difference/differential equations, and how can one extract analytic properties of these expressions by symbolic manipulations? In the last decades very efficient algorithms and tools have been developed that address these problems. Especially in the last few years, new algorithms have been worked out that are inspired by the different techniques of both communities. In this session we will present the newest technologies from both research communities that can be used to evaluate complicated massive Feynman integrals coming from calculations in quantum chromodynamics (QCD). In particular, we aim at pushing forward these very promising interdisciplinary developments.

10. Software for numerically solving polynomial systems

Organizers:
Daniel Bates, Colorado State University
Department of Mathematics, Colorado State University
bates@math.colostate.edu
Jonathan Hauenstein, U. of Notre Dame
Department of Applied and Computational Mathematics and Statistics, University of Notre Dame
hauenstein@nd.edu

Daniel Brake, U. of Notre Dame
Department of Applied and Computational Mathematics and Statistics, University of Notre Dame
dbrake@nd.edu

Aim and Scope
This session will bring together researchers and practitioners related to solving polynomial systems using numerical and hybrid symbolic-numeric methods. This session will consider new algorithmic and computational approaches as well as applications. The topics include algebraic geometry, applications of algebraic geometry, computational algebra, computer algebra systems, hybrid symbolic-numeric methods, and numerical algebraic geometry.

11. High-precision arithmetic, effective analysis and special functions

Organizer:
Fredrik Johansson
INRIA Bordeaux-Sud-Ouest and Institut de Mathématiques de Bordeaux
fredrik.johansson@gmail.com

Aim and Scope
High-precision methods have become an important tool to get reliable results when solving numerical problems of increased size and complexity. The goal of this session is to present advances in software for high-precision or certified numerical methods, particularly in the context of effective complex analysis and computation of transcendental functions.

Possible subjects include but are not limited to:

- Arbitrary-precision and mixed-precision arithmetic
- Interval arithmetic and Taylor methods
- High-precision or rigorous computation of D-finite functions, L-functions and modular forms
- Certified numerical integration and solution of ODEs
- Applications, for instance in number theory, combinatorics, and mathematical physics.

Work in these areas combining numerical methods with computer algebra is particularly welcome.

12. Mathematical Optimization

Organizers:
Ambros M. Gleixner, Zuse Institute Berlin
gleixner@zib.de
Christian Kirches, IWR Heidelberg/TU Braunschweig
christian.kirches@iwr.uni-heidelberg.de
John Mitchell, Rensselaer Polytechnic Institute
mitchj@rpi.edu
Ted Ralphs, Lehigh University, ted@lehigh.edu

Aim and Scope
One out of four mathematical software packages listed in the database swMATH.org is categorized under the search term "optimization". This indicates the prominent role of computational research in the field of optimization, and vice versa. This session aims at spanning the broad range of mathematical optimization software from algorithms for continuous, convex optimization that exploit strong duality theory to solver software for nonconvex problem classes, including packages that support the modeling process.
Recent developments that deserve special, though not exclusive attention are the integrated handling of nonconvex constraints from discrete and continuous optimization, the exploitation of increasingly available parallel hardware architecture, and arithmetically exact methods that render optimization a tool for mathematical theory exploitation. The session shall provide a forum for discussing common and distinct challenges and future trends. An overview talk will provide an introduction to a general audience in mathematical computation.

13. Interactive operation to scientific artwork and mathematical reasoning

Organizers:
Setsuo Takato, Toho University, Japan, takato@phar.toho-u.ac.jp
Mastaka Kaneko, Toho University, Japan, masataka.kaneko@phar.toho-u.ac.jp
Ulrich Kortenkamp, University of Potsdam, Germany, ulrich.kortenkamp@uni-potsdam.de

Aim and Scope
Because of the spectacular innovations in interactive computer tools, we are shocked by the paradigm shift in mathematical reasoning in a way we have never experienced. Among the innovations, the development of tools for interactively generating and visualizing mathematical artwork, including dynamic geometry software and computer algebra systems, has had a great influence especially on education. These tools help educators to make simulations, to formulate conjectures, to verify mathematical facts, and to observe mathematical mechanisms. Despite the capabilities of such software, a more efficient linkage to other technology, including scientific and graphical editors, word processors, high-performance computing tools, and mathematical utilities for the web, is needed if the tools are to fully support mathematical reasoning in both research and education.
The aim of this session is to bring together researchers, developers and users of mathematical web/mobile interfaces, mathematical computing and editing facilities, and scientific visualization tools, and help them focus on all the exciting developments in these fields. The session accepts papers that address related research and development and present new technologies. Papers exploring educational experiences by using these technologies in an original way are also welcome.

14. Information services for mathematics: software, services, models, and data

Organizers:
Wolfram Sperber, FIZ Karlsruhe, Wolfram.Sperber@fiz-karlsruhe.de
Michael Kohlhase, Jacobs University Bremen, m.kohlhase@jacobs-university.de

Aim and Scope
Math Inside — this could be a slogan for much of research and technology today. Indeed, it is hard to imagine any that is not driven by Mathematics at its core. But mathematical knowledge is not enough, it must be made useful by mathematical software, services, models, and data (MathSSMD). As a consequence MathSSMD are under dynamic development, widely distributed, and dependent on hard- and software. This makes access, verification, and reuse of MathSSMD difficult, especially as standards and policies for the presentation and description of mathematical MathSSMD are missing. Fortunately the mathematical community is actively engaged to design and establish powerful information services for MathSSMD, especially:

- repositories of MathSSMD, e.g., Netlib or the R Project for Statistical Computing
- portals and bibliographic databases for MathSSMD, e.g., swMATH or Plato
- services, e.g., OEIS or DMLF
- standards for the content analysis of MathSSMD, e.g., a citation standard and metadata schemes for MathSSMD
- evaluation and quality control of MathSSMD, e.g., peer reviewing in journals with focus on mathematical software.

This ICMS session aims to give a discussion forum for concepts, projects, and information services for MathSSMD.

15. **SemDML: Towards a Semantic Layer of a World Digital Mathematical Library** Organizers:
Michael Kohlhase, Jacobs University Bremen
m.kohlhase@jacobs-university.de
Olaf Teschke, FIZ Karlsruhe
olaf.teschke@fiz-karlsruhe.de
Stephen Watt, University of Waterloo
smwatt@uwaterloo.ca

Aim and Scope
The dream of a comprehensive digital mathematical library is almost as old as the practice of distributing documents electronically. Recently, the International Mathematical Union has chartered a working group for establishing World Digital Mathematical Library (WDML) with a semantic layer, i.e. a layer where mathematical knowledge is represented in a way that supports semantic services like computation, proof-checking, or search.
But a semantic layer for a WDML needs the solution of some fundamental problems, including:

1. There are many possible choices of representation formats optimized towards different goals,
2. there are multiple foundations of mathematics (basic theories like ZFC on which all meaning is based), and
3. full formalization in a specific logic/foundation is prohibitively expensive and forces choices that are foreign to mathematical practice.

The SemDML Workshop wants to address these - and related - questions from foundational and technical perspectives and create a forum for advancing the scientific and technological basis for a World Digital Mathematical Library with a Semantic Layer.

16. **Polyhedral methods in geometry and optimization**
Organizers:
Michael Joswig, TU Berlin, joswig@math.tu-berlin.de
Marc Pfetsch, TU Darmstadt, pfetsch@mathematik.tu-darmstadt.de

Aim and Scope
Convex polyhedra occur in optimization as the feasible regions of linear programs. Moreover, integer linear programming is the same as linear programming over the convex hull of the lattice points in a polyhedron. In algebraic geometry and its applications piecewise-linear shapes occur in the guise of polyhedral fans. Examples include secondary and Gröbner fans. This session wants to bring together people working on algorithms and software dealing with any of the above.
Specific topics include, but are not restricted to, the following:

- convex hull computations
- mixed integer linear programming
- explicit methods for triangulating point configurations
- computations in toric or tropical geometry
- parallelization of polyhedral computations
- polyhedral methods in algebraic statistics
- algorithms exploiting symmetry in any of the above.

17. **General**
    Organizers:
    Gert-Martin Greuel, greuel@mathematik.uni-kl.de
    Peter Paule, Peter.Paule@risc.uni-linz.ac.at
    Andrew Sommese, sommese@nd.edu

    Aim and Scope
    This session addresses aspects of mathematical software that are not covered by the previous sessions.
18. **Tutorials** (Gert-Martin Greuel, Peter Paule, Andrew Sommese)
19. **Demos** (Gert-Martin Greuel, Peter Paule, Andrew Sommese)
20. **Posters** (Gert-Martin Greuel, Peter Paule, Andrew Sommese)

Tutorials

Tutorial 1 (also accepted as demo and poster)

Contact Name: **Anna Maria Bigatti** (with John Abbott)

Contact: <bigatti@dima.unige.it>

Title: **CoCoALib and CoCoA-5**

Abstract: CoCoA-5 is a Computer Algebra System for Computations in Commutative Algebra, and specifically for Gröbner bases. It offers a dedicated mathematician-friendly programming language and functions in many aspects of Commutative Algebra.

It is free and open source (C++) and its mathematical core, called CoCoALib, has been designed to be used as a user-friendly C++ library, in order to facilitate integration with other software. Moreover, other software libraries can be integrated with CoCoALib, and be made accessible via the interactive CoCoA-5 system.

After a brief overview of the library and interactive system, we illustrate the latest developments.

Tutorial 2

Contact Name: **Sebastian Gutsche**

Contact: <gutsche@momo.math.rwth-aachen.de>

Title: **Docker images for mathematical software**

Abstract: Software developers in mathematics spend a lot of their work time on releasing their software offering support for several different operating sys tems. A virtual environment like Docker offers one solution to this problem. [Docker](http://www.docker.com) is a system which allows developers to distribute their software in a predefined environment and users to run the software on Linux, OS X, or Windows. Furthermore, it simplifies the distribution of software using DockerHub, a free web service for distributing software images created with Docker.

In this tutorial I will demonstrate how to:

- create a Docker image containing software, which can then be downloaded and executed on the mentioned OSs;
- uploading the image to DockerHub making it accessible to all users;
- using GitHub/BitBucket, Dockerfiles and DockerHub to automatically create images and make them accessible to users.

This tutorial is intended for software developers which might consider using Docker as a stress- and maintenance-free way of shipping their software.

Demos

Demo 1

Proposer: **Joris van der Hoeven** <vdhoeven@lix.polytechnique.fr>

Title: **GNU TeXmacs**

Abstract: GNU TeXmacs is a free scientific office suite. Its core consists of a structured mathematical text editor with a professional typesetting quality, together with a user friendly, wysiwyg interface. The software also integrates various other tools, such as a graphical picture editor, a presentation mode, a bibliography manager, interfaces for many computer algebra systems, etc.

Demo 2

Proposer: **Simon Hampe** <simon.hampe@googlemail.com>

Title: **Polymake 3.0**

Description: We showcase the new and improved features of the recent polymake release 3.0, such as polytopes over the Puiseux fractions, Johnson solids, planar nets, the completely refactored application tropical, functions for computing with transversal matroids and many more.

Demo 3 (also accepted as tutorial and poster)

Proposers: **John Abbott** <abbott@dima.unige.it>, **Anna Maria Bigatti** <bigatti@dima.unige.it>

Title: **CoCoALib and CoCoA-5**

Abstract: CoCoA-5 is a Computer Algebra System for Computations in Commutative Algebra, and specifically for Gröbner bases. It offers a dedicated mathematician-friendly programming language and functions in many aspects of Commutative Algebra.

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After a brief overview of the library and interactive system, we illustrate the latest developments.

Demo 4

Proposer: **Hisashi Usui** <usui@nat.gunma-ct.ac.jp>

Title: **KeTCindy**

Description: We will show some samples of drawings in TeX documents generated with KeTCindy, which is a plug-in to excellent dynamic geometry software Cinderella. It enables us to easily synchronize the interactive operation to mathematical artwork on Cinderella and high-quality graphical output in TeX documents. Efficient linkage to some symbolic computation software has also been established.

Posters

Poster 1

Poster Authors:
E. Abraham, J. Abbott, B. Becker, A.M. Bigatti, M. Brain, B. Buchberger, A. Cimatti, J. H. Davenport, M. England, P. Fontaine, S. Forrest, A. Griggio, D. Kroening, W.M. Seiler and T. Sturm

Contact: Matthew England <Matthew.England@coventry.ac.uk>

Poster Title: Satisfiability Checking and Symbolic Computation

Abstract: Symbolic Computation and Satisfiability Checking are separate research areas, but they share common interests in the development, implementation and application of decision procedures for arithmetic theories. We introduce a new project SC-square to build a joint community, supported by the author's new EU-H2020 grant of the same name. This poster describes the motivation, aims and initial activities of the project.

Poster 2

Poster Authors: **Christoph Benzmüller and Bruno Woltzenlogel Paleo**

Contact: <c.benzmueller@gmail.com>

Poster Title: The Inconsistency in Gödel's Ontological Argument: A Success Story for Automated Theorem Proving in Metaphysics

Abstract: We report on the discovery of the inconsistency in Gödel's ontological argument as a success story for automated theorem proving in metaphysics. Despite the popularity of the argument since the appearance of Gödel's manuscript in the early 1970's, the inconsistency of the axioms used in the argument remained unnoticed until 2013, when it was detected automatically by the higher-order theorem prover Leo-II. Understanding and verifying the refutation generated by the prover turned out to be a time-consuming task. Its completion, as reported here, required the reconstruction of the refutation in the Isabelle proof assistant.

Reference: The Inconsistency in Gödel's Ontological Argument: A Success Story for AI in Metaphysics (Christoph Benzmüller, Bruno Woltzenlogel Paleo), International Joint Conference on Artificial Intelligence, July 9 - 15, 2016, New York City, USA.

Poster 3 (also DEMO and TUTORIAL)

Poster Authors: Anna Maria Bigatti

Contact: <bigatti@dima.unige.it> (with John Abbott)

Poster Title: CoCoALib and CoCoA-5

Abstract: CoCoA-5 is a Computer Algebra System for Computations in Commutative Algebra, and specifically for Gröbner bases. It offers a dedicated mathematician-friendly programming language and functions in many aspects of Commutative Algebra.

It is free and open source (C++) and its mathematical core, called CoCoALib, has been designed to be used as a user-friendly C++ library, in order to facilitate integration with other software. Moreover, other software libraries can be integrated with CoCoALib, and be made accessible via the interactive CoCoA-5 system.

After a brief overview of the library and interactive system, we illustrate the latest developments.

Poster 4

Poster Author: Max Demenkov

Contact: <max.demenkov@gmail.com>

Poster Title: Zonotopes and explicit linear programming

Abstract: We study linear programming (LP) with box constraints on all variables (in addition to other linear constraints). Following research of Fujishige et al., we consider this problem as finding an intersection between a line and a specially constructed zonotope. A zonotope is a linear projection of the hypercube. If we can compute explicit hyperplane representation of the zonotope, we can obtain the solution of LP as the intersection of several intervals on the line, computed in parallel.

Remark: This poster is connected with my accepted talk at “Polyhedral methods in geometry and optimization" session.

Over-all Program

The lectures will mainly take place at ZIB in the following rooms:

- auditorium: Room 2005 (ground floor)
- seminar room 2006 (ground floor)
- seminar room 3028 (first floor)

Selected sessions will take place at FU Berlin, Arnimallee 6:

- FU-1: SR 031
- FU-2: SR 025/026
- FU-4: SR 032

and at FU Berlin, Takustrasse 9:

- FU-3: SR 046
- FU-5: SR 005

Over-all Program

Mon, July 11		Auditorium	Room 2006	Room 3028	FU	FU
9:00 – 9:25	Registration	Registration				
9:25 – 9:30	Opening	Opening				
9:30 – 10:30	Plenary Talk	Jack Dongarra				
10:30 – 11:00	Break	Break				
11:00 – 12:40	Parallel Sessions	2.1	11.1	5.1		
12:40 – 14:00	Lunch	Lunch				
13:30 – 14:00	Registration	Registration				
14:00 – 15:40	Parallel Sessions	2.2	11.2	5.2		
15:40 – 16:00	Break	Break				
16:00 – 17:40	Parallel Sessions	12.1	2.3	7.1	3.1 (FU-1)	
17:40		END				
18:00		Welcome Reception and Poster Session				

Tue, July 12		Auditorium	Room 2006	Room 3028	FU	FU
9:00 – 10:00	Plenary Talk	Stephen Watt				
10:00 – 10:30	Break	Break				
10:30 – 12:10	Parallel Sessions	12.2	17.1	7.2	4.1 (FU-2)	
12:10 – 13:30	Lunch	Lunch				
13:00 – 13:30	Registration	Registration				
13:30 – 14:20		Tutorial/Demo/Poster				
14:20 – 16:00	Parallel Sessions	12.3	14.1	13.1		
16:00 – 16:20	Break	Break				
16:20 – 18:00	Parallel Sessions	12.4	6.1	13.2	3.2 (FU-4)	16.1 (FU-3)
18:00		END				

Wed, July 13		Auditorium	Room 2006	Room 3028	FU	FU
9:00 – 10:00	Plenary Talk	Wolfram Decker				
10:00 – 10:30	Break	Break				
10:30 – 12:10	Parallel Sessions	10.1	6.2	13.3		
12:10 – 13:30	Lunch	Lunch				
13:00 – 13:30	Registration	Registration				
13:30 – 14:20		Tutorial/Demo/Poster				
14:20 – 16:00	Parallel Sessions	1.1	14.2	8.1		
16:00 – 16:20	Break	Break				
16:20 – 18:00	Parallel Sessions	1.2	4.2	8.2	16.2 (FU-5)	
18:00		END				
18:20		Bus transfer from ZIB to TV tower (Alexanderplatz)				
19:30		Social Dinner				

Thu, July 14		Auditorium	Room 2006	Room 3028	FU	FU
9:00 – 10:00	Plenary Talk	Vladimir Voevodsky				
10:00 – 10:30	Break	Break				
10:30 – 12:10	Parallel Sessions	1.3	9.1	17.2	16.3 (FU-4)	
12:10 – 13:10	Lunch	Lunch				
13:10 – 14:50	Parallel Sessions	1.4	9.2	15.1		
14:50 – 15:00	Break	Break				
15:00 – 16:15	Parallel Sessions	10.2	9.3	15.2		
16:15		Closing				
16:30		Excursion				

Detailed Program

Plenary talks	**9:30 – 10:30 Auditorium** (first day, next days 9:00 -10:00)	
Monday	Jack Dongarra	With Extreme Scale Computing the Rules Have Changed
Tuesday	Stephen M. Watt	Toward an International Mathematical Knowledge Base
Wednesday	Wolfram Decker	Current Challenges in the Development of Open Source Computer Algebra Software
Thursday	Vladimir Voevodsky	UniMath - a library of mathematics formalized in the univalent style

Session 1	**Univalent Foundations and Proof Assistants**	

Session 1.1	**Wednesday, July 13, 14:20-16:00, Auditorium**	
14:20-14:55	Marc Bezem	A taxonomy of mathematical mistakes
14:55-15:30	Abhishek Anand	Exploiting uniformity in substitution: the Nuprl term model
15:30-16:00	Vincent Rahli	Exercising Nuprl's Open-Endedness

Session 1.2	**Wednesday, July 13, 16:20-18:00, Auditorium**	
16:20-16:55	Thorsten Altenkirch	A Cubical Type Theory
16:55-17:30	Mark Bickford	A model of Cubical Type Theory in Nuprl
17:30-18:00	Anders Mortberg	Cubical Type Theory

Session 1.3	**Thursday, July 14, 10:30-12:10, Auditorium**	
10:30-11:05	Matthieu Sozeau	Coq for Univalent Foundations
11:05-11:40	Benedikt Ahrens	Inductive sets in UniMath
11:40-12:10	Jason Gross	The HoTT/HoTT Library in Coq: Designing for Speed

Session 1.4	**Thursday, July 14, 13:10-14:50, Auditorium**	
13:10-13:35	Guillaume Brunerie	Custom definitional equalities in Agda
13:35-14:00	Catherine Lelay	A construction of real numbers in UniMath
14:00-14:25	Floris van Doorn	The Lean HoTT library
14:25-14:50	Jacob von Raumer	Formalizing Double Groupoids and Cross Modules in the Lean Theorem Prover

Session 2	**Software for Mathematical Reasoning and Applications**	

Session 2.1	**Monday, July 11, 11:00-12:40, Auditorium**	
11:00-11:05	Wolfgang Windsteiger	Opening and General Structure of the Workshop
11:05-11:35	Christoph Benzmüller	Automating Free Logic in HOL
11:35-12:05	Alexander Steen	Agent-Based HOL Reasoning
12:10-12:40	Alexander Maletzky	Interactive Proving, Higher-Order Rewriting, and Theory Analysis in Theorema 2.0

Session 2.2	**Monday, July 11, 14:00-15:40, Auditorium**	
14:00-14:30	Yang Zhang	Automated Deduction in Ring Theory
14:35-15:05	Francisco Botana	Automated discovery of elementary geometry theorems: First steps
15:10-15:40	Alexei Lisitsa	Efficient knot discrimination via quandle colouring with SAT and #-SAT

Session 2.3	**Monday, July 11, 16:00-17:40, Room 2006**	
16:00-16:30	Renaud Rioboo	Certifying efficient polynomial implementations using the FoCaLize system
16:35-17:05	Yuan Zhou	Parameter space analysis for algebraic Python programs in SageMath
17:10-17:40	Akira Terui	An automated deduction and its implementation for solving problem of sequence at university entrance examination

Session 3	**Computational Number Theory meets computational Algebraic Geometry**	

Session 3.1	**Monday, July 11, 16:00-17:40, FU-1: Room SR 031, Arnimallee 6**	
16:00-16-50	Andreas Steenpass	Gröbner Bases over Algebraic Number Fields
16:50-17:40	Hans Schoenemann	Extending Singular with new types and algorithms

Session 3.2	**Tuesday, July 12, 16:20-18:00, FU-4: Room SR 032, Arnimallee 6**	
16:20-17:10	Janko Boehm	Gröbner Bases over Algebraic Number Fields
17:10-18:00	Anne Fruehbis-Krueger	Algorithmic resolution of singularities

Session 4 Algebraic Geometry in Applications

Session 4.1	Tuesday, July 12, 10:30-12:10, FU-2: Room SR 025/026, Arnimallee 6	
10:30-11:05	Fatemeh Mohammadi	Combinatorial and geometric view of the system reliability theory
11:05-11:40	Laurent Evain	Calibration of accelerometers and the geometry of quadrics
11:40-12:10	Jonathan Hauenstein	Decomposing solution sets of polynomial systems using derivatives

Session 4.2	Wednesday, July 13, 16:20-18:00, Room 2006	
16:20-16:55	Tomas Pajdla	Computational Algebraic Geometry in 3D Computer Vision
16:55-17:30	Viktor Levandovskyy	A commutative approach to the Bernstein data of a hypersurface
17:30-1800	Thomas Kahle	Semi-algebraic geometry of Poisson regression

Session 5 Computational aspects of homological algebra, group, and representation theory

Session 5.1	Monday, July 11, 11:00-12:40, Room 2006	
11:00-11:50	David Green	Group cohomology and efficient methods for group algebras of large p-groups
11:50-12:40	Caroline Lassueur	Endo-p-permutation modules: a computational approach via character theory

Session 5.2	Monday, July 11, 15:00-15:40, Room 3028	
14:00-14:40	Sebastian Posur	Constructing morphisms by diagram chases
14:50-15:40	Øyvind Solberg	Test for infinite projective dimension

Session 6 Software of Polynomial Systems

Session 6.1	Tuesday, July 12, 16:20-18:00, Room 2006	
16:20-16:45	Davenport, England	Need Polynomial Systems be Doubly-exponential?
16:45-17:10	Bigatti, Abbott, Robbiano	New, Practical Algorithms for Implicitization of Hypersurfaces
17:10-17:35	John Abbott	Fault-Tolerant Rational Reconstruction Applied to Implicitization of Hypersurfaces
17:35-18:00	Yinping Liu, Ruoxia Yao, Zhibin Li, Le Yang, Xiaoyan Tang	NDEmathema: An Innovative Web-based Automated Symbolic Computing Platform for Nonlinear Differential Equations

Session 6.2	Wednesday, July 13, 10:30-12:10, Room 2006	
10:30-10:55	Eder, Faugere	GBLA - A Groebner Basis Linear Algebra Package
10:55-11:20	Fukasaku, Iwane, Sato	On the Implementation of CGS Real QE
11:20-11:45	Wang, Mou, Dong	Epsilon 1: A Software Library for Triangular Decomposition
11:45-12:10	Heinz Kredel	Common Divisors of Solvable Polynomials in JAS

Session 7 Software for the Symbolic Study of Functional Equations

Session 7.1	Monday, July 11, 16:00-17:40, Room 3028	
16:00-16:30	Suzy Maddah	Overview talk
16:35-17:05	Thomas Cluzeau	Algorithms and related Maple packages for integrable connections and planar polynomial vector fields
17:10-17:40	Jamal Hossein Poor	Normal forms for operators via Gröbner bases in tensor algebras

Session 7.2	Tuesday, July 12, 10:30-12:10, Room 3028	
10:30-11:00	Albert Heinle	Factoring Elements in G-Algebras with 'ncfactor.lib'
11:05-11:35	Viktor Levandovskyy	Algorithms for systems of linear functional equations and their implementation in Singular
11:40-12:10	Cluzeau, Koutschan	Effective algebraic analysis approach to linear systems over Ore algebras

Session 8 Symbolic Integration

Session 8.1	Wednesday, July 13, 14:20-16:00, Room 3028	
14:20-14:30	Christoph Koutschan	Session Opening and Overview
14:30-15:00	Clemens G. Raab	Computer algebra tools for integrals
15:00-15:30	Roche, May	A Discussion of the Practical Issues of Computing Integrals in Maple
15:30-16:00	Jeffrey, Rich	Recent Developments in the RUBI Integration Project

Session 8.2	Wednesday, July 13, 16:20-18:00, Room 3028	
16:20-16:50	James H. Davenport	Complexity of Integration, Special Values, and Recent Developments
16:50-17:20	Waldek Hebisch	Integration in terms of exponential integrals and incomplete gamma functions
17:2-17:50	Lin Jiu	The Method of Brackets

Session 9 Symbolic computation and elementary particle physics

Session 9.1	Thursday, July 14, 10:30-12:10, Room 2006	
10:30-11:00	Johannes Blümlein	The mathematical function spaces of higher loop Feynman integrals
11:05-11:35	Andreas v. Manteuffel	Reducing Feynman integrals with finite fields
11:40-12:10	Abilio De Freitas	Three-loop heavy flavor corrections to DIS structure functions

Session 9.2	Thursday, July 14, 13.10-14:50, Room 2006	
13:10-13:40	Stefan Weinzierl	Algorithms for all-order expansions
13:40-14:10	Mark Round	Summation techniques for Feynman diagrams via special functions
14:10-14:40	Erik Panzer	Conical sums and multiple polylogarithms

Session 9.3	Thursday, July 14, 15:00-16:15, Room 2006	
15:00-15:30	Dirk Kreimer	Motivating computational practice
15:30-16:00	Christian Bogner	MPL - a program for computations with multiple polylogarithms
16:00-16:15	Carsten Schneider	Symbolic summation packages for elementary particle physics

Session 10 Software for numerically solving polynomial systems

Session 10.1	Wednesday, July 13, 10:30-12:10, Auditorium	
10:30-11:00	Hans Schoenemann	Primary decomposition in Singular
11:05-11:35	Anders Jensen	An implementation of exact mixed volume computation
11:40-12:10	Miguel Marco	SIROCCO: a library for certified polynomial root continuation

Session 10.2	Thursday, July 14, 15:00-16:15, Auditorium	
15:00-15:30	Daniel Brake	Numerically decomposing complex and real tropical curves in any number of dimensions
15:40-16:10	Bernard Mourrain	Border basis for polynomial system solving and optimization

Session 11 High-precision arithmetic, effective analysis and special functions

Session 11.1	Monday, July 11, 11:00-12:40, Room 2006	
11:00-11:10	Fredrik Johansson	Special functions and interval arithmetic
11:10-11:40	Navas-Palencia, Arratia	On the computation of confluent hypergeometric functions for large imaginary part of b and z
11:40-12:10	Marc Mezzarobba	Rigorous Multiple-Precision Evaluation of D-Finite Functions in Sage
12:10-12:40	Pascal Molin	L functions in Pari/GP

Session 11.2	Monday, July 11, 14:00-15:40, Room 2006	
14:00-14:25	Elias Tsigaridas	Real root isolation in FLINT
14:25-14:50	Breust, Chabot, Dumas, Fousse, Giorgi	Recursive double-size fixed precision arithmetic
14:50-15:15	Joldes, Muller, Popescu, Tucker	CAMPARY: Cuda Multiple Precision Arithmetic Library and Applications
15:15-15:40	Rodriguez, Abad, Barrio, Marco-Buzunariz	Automatic implementation of the numerical Taylor series method

Session 12 Mathematical Optimization

Session 12.1	Monday, July 11, 16:00-17:40, Auditorium	
16:00-16:20	Horand I. Gassmann	Recent developments in Optimization Services (OS)
16:20-16:40	Mike Steglich	CMPL (<Coliop|Coi> Mathematical Programming Language)
16:40-17:00	Matthias Miltenberger	PySCIPOpt: Mathematical Programming in Python with the SCIP Optimization Suite
17:00-17:20	Shahadat Hossain	DSJM: A Software Toolkit for Direct Determination of Sparse Jacobian Matrices
17:20-17:40	Andrew Mason	SolverStudio and OpenSolver: Excel Tools for Bringing Advanced Optimisation to the Masses

Session 12.2	Tuesday, July 12, 10:30-12:10, Auditorium	
10:30-10:50	J.A. Julian Hall	Parallel distributed-memory simplex for large-scale stochastic LP problems
10:50-11:10	Timo Berthold	Parallelization of the FICO Xpress Optimizer
11:10-11:30	Yuji Shinano	A First Implementation of ParaXpress: Combining Internal and External Parallelization on Supercomputers
11:30-11:50	Nowak, Breitfeld	pyADCG: A preliminary implementation of a new parallel solver for nonconvex MINLPs in Pyomo/Python
11:50-12:10	Katsuki Fujisawa	Advanced Computing&Optimization Infrastructure for Extremely Large-Scale Graphs on Post Peta-Scale Supercomputers

Session 12.3	Tuesday, July 12, 14:20-16:00, Auditorium	
14:20-14:40	Keiji Kimura	Mixed Integer Nonlinear Programming for Minimization of Akaike's Information Criterion
14:40-15:00	Tristan Gally	SCIP-SDP: A Framework for Solving Mixed-Integer Semidefinite Programs
15:00-15:20	Angelika Wiegele	Improving BiqMac: stronger semidefinite relaxations for solving binary quadratic problems
15:20-15:40	Matthias Köppe	Software for cut generating functions in the Gomory-Johnson model and beyond
15:40-16:00	Sebastian Schenker	PolySCIP, a solver for multi-objective MIPs

Session 12.4	Tuesday, July 12, 16:20-18:00, Auditorium	
16:20-16:40	Adolfo R. Escobedo	Efficient Validation of Basic Solutions via the Roundoff-Error-Free Factorization Framework
16:40-17:00	Tobias Weber	High-Precision Quadratic Programming by Iterative Refinement
17:00-17:20	Andreas Meyer	Global error control for Optimal Control problems
17:20-17:40	Rafael Arndt	On Solution Algorithms for Time-Dependent Quasi-Variational Inequalities with Gradient Constraints
17:40-18:00	Felix Lenders	Solving the Trust-Region Subproblem using Krylov subspace methods

Session 13 Interactive operation to scientific artwork and mathematical reasoning

Session 13.1	Tuesday, July 12, 14:20-16:00, Room 3028	
14:20-15:00	S. Takato	What is and How to use KeTCindy —- Linkage between Dynamic Geometry Software and TeX graphics capabilities
15:00-15:20	S. Yamashita	The Programming Style for Drawings from KeTpic to KeTCindy
15:20-15:40	S. Kobayashi, S. Takato	Cooperation of KeTCindy and Computer Algebra System
15:40-16:00	H. Usui	How to generate figures at the preferred position of a TeX document

Session 13.2	Tuesday, July 12, 16:20-18:00, Room 3028	
16:20-16:45	N. Hamaguchi, S. Takato	Generating data for 3D models
16:45-17:10	H. Sarafian	Theoretical Physics, Applied Mathematics and Visualizations
17:10-17:35	Y. Nakamura, T. Nakahara	Function Enhancement of Math Input Environment with Flick Operation for Mobile Devices
17:35-18:00	F. Iwama, T. Takahashi	A Framework for Exploring Inference Processes using Reasoning Software

Session 13.3	Wednesday, July 13, 10:30-12:10, Room 3028	
10:30-10:55	von Gagern, Kortenkamp, Richter-Gebert, Strobel	CindyJS --- Mathematical visualization on modern devices
10:55-11:20	von Gagern, Richter-Gebert	CindyJS Plugins --- Extending the mathematical visualization framework
11:20-11:45	Montag, Richter-Gebert	CindyGL: Authoring GPU-based interactive mathematical content
11:45-12:10	Kaneko	The actual use of KeTCindy in education

Session 14 Information services for mathematics: software, services, models, and data

Session 14.1	Tuesday, July 12, 14:20-16:00, Room 2006	
14.20 -14.40	Wolfram Sperber	Information services for mathematical research data
14.40 -15-00	Yue Ren	The software portal swMATH: a state of the art report and next steps
15.00 -15.30	Mila Runnwerth	Linking Mathematical Software in Web Archive
15.30 -16.00	Michael Joswig	The polymake XML file format

Session 14.2	Wednesday, July 13, 14:20-16:00, Room 2006	
14.20-15.00	Michael Kohlhase	Distributed Computing via the Math-in-the-Middle Paradigm in OpenDreamKit
15.00-15.30	Hans-Gert Gräbe	Semantic-aware Fingerprints of symbolic research data
15:10-15:40	Karsten Tabelow	Mathematical models: a research data category?

Session 15 Towards a Semantic Layer of a World Digital Mathematical Library

Session 15.1	Thursday, July 14, 13:10-14:50, Room 3028	
13:10-13:35	Patrick D. F. Ion	The Effort to Realize a Global Digital Mathematics Library
13:35-14:00	Bruno Buchberger	The GDML and EuKIM Projects: Short Report on the Initiative
14:00-14:25	Mila Runnwerth	Mathematical videos and affiliated supplementaries in TIB's AV Portal
14:25-14:50	Chebukov, Izaak, Misyurina, Pupyrev	Math-Net.Ru Video Library: creating a collection of scientific talks

Session 15.2	Thursday, July 14, 15:00-16:00, Room 3028	
15:00-15:25	Bruno Buchberger	Stam's Identities Collection: A Case Study for Math Knowledge Bases
15:25-15:50	Enxhell Luzhnica, Michael Kohlhase	Formula Semantification and Automated Relation Finding in the Open Encyclopedia for Integer Sequences
15:40-16:15	Ginev, Iancu, Jucovshi, A. Kohlhase, M. Kohlhase, Schefter, Sperber, Teschke	The SMGloM Project and System

Session 16 Polyhedral methods in geometry and optimization

Session 16.1	Tuesday, July 12, 16:20-18:00, FU-3: Room 046, Takustraße 9	
16:20-16:50	Anders N. Jensen, Yue Ren	Tropical dimension bounds for monomial-free ideals
16:55-17:25	Simon Hampe	Tropical computations in polymake
17:30-18:00	Benjamin Burton	Multiobjective integer linear programming by tropical convexity

Session 16.2	Wednesday, July 13, 16:20-18:00, FU-5: Room SR 005, Takustraße 9	
16:20-16:45	Lars Kastner	Toric geometry in polymake
16:45-17:10	Bastrakov, Zolotykh	qskeleton: parallel polyhedral computing software based on the double description method and Fourier-Motzkin elimination
17:10-17:35	Matthias Köppe	Sage flavored LattE integrale
17:35-18:00	Max Demenkov	Linear programming using line and zonotope intersection

Session 16.3	Thursday, July 14, 10:30-12:10, FU-4: Room SR 032, Arnimallee 6	
10:30-11:00	Kaibel, Walter	Investigating Polyhedra by Oracles
11:05-11:35	Hojny, Pfetsch	Symmetry Handling in Binary Programs via Polyhedral Methods
11:40-12:10	Bruns, Söger, Sieg	The subdivision of large simplicial cones in Normaliz

Session 17 General

Session 17.1	Tuesday, July 12, 10:30-12:10, Room 2006	
10:30-10:55	Antoine Plet et al.	A Library for Symbolic Floating-Point Arithmetic
10::55-11:20	Joerg Fehr et al.	A Guide for Good Scientific Practice in Numerical Experiments
11:20-11:45	Mokwon Lee et al.	Robust construction of the additively-weighted Voronoi diagram via topology-oriented incremental algorithm
11:45-12:10	Laurent Evain	The Pycao Software (handling 3D objects…)

Session 17.2	Thursday, July 14, 10:30-12:10, Room 3028	
10:30-10:55	Yuri M. Movsisyan	Bilattices of bi-De Morgan Functions
10::55-11:20	Luigi Di Puglia Pugliese	An algorithm to find the Link Constrained Steiner Tree in Undirected Graph
11:20-11:45	Bahram Alidaee	Meta-Heuristic for Large-Scale Unrelated Parallel Machine Scheduling
11:45-12:10	Joris van der Hoeven	Mathematical Font Art

Session 18	Tutorials	

Session 18.1	Tuesday, July 12, 13:30-13:45, Auditorium	
13:30-13:45	Anna Maria Bigatti	CoCoALib and CoCoA-5

Session 18.2	Wednesday, July 13, 13:30-13:45, Auditorium	
13:30-13:45	Yuri M. Movsisyan	Bilattices of bi-De Morgan Functions

Session 19	Demos	

Session 19.1	Tuesday, July 12, 13:45-14:15, Auditorium	
13:45-14:00	Joris van der Hoeven	GNU TeXmacs
14:00-14:15	Simon Hampe	Polymake 3.0

Session 19.2	Wednesday, July 13, 13:45-14:15, Auditorium	
13:45-14:00	A. John, A.-M.Bigatti	CoCoALib and CoCoA-5
14:00-14:15	Hisashi Usui	KeTCindy

Session 20	Posters	

Session 20.1	Monday, July 11, 18:00, Foyer

Session 20.1	Tuesday, July 12, 13:30-14:15, Foyer	
13:45-14:15	Abraham, Abbott, et. all.	Satisfiability Checking and Symbolic Computation
13:45-14:15	Benzmüller, Woltzenlogel Paleo	The Inconsistency in Gödel's Ontological Argument: A Success Story for Automated Theorem Proving in Metaphysics
13:45-14:15	Anna Maria Bigatti	CoCoALib and CoCoA-5
13:45-14:15	Max Demenkov	Zonotopes and explicit linear programming

Session 20.1	Wednesday, July 13, 13:30-14:15, Foyer	
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13:45-14:15	Max Demenkov	Zonotopes and explicit linear programming

Social Events

Welcome Reception

On Monday, July 11, there will be a welcome reception and poster session starting at about 6:00 pm. Participants are welcome to enjoy the BBQ (including vegetarian options) and drinks outside ZIB and visit the poster session in the foyer of ZIB.

Social Dinner

Social Dinner takes place on top of the Berlin TV tower (Wednesday, July 13). We leave ZIB at 18:20 by busses (departure from Altensteiner Straße 23).

Note that the access to the tower is restricted. Therefore, please ask us for directions if you plan to go there on your own.

Getting Home

The TV tower closes at midnight. It is located close to S and U Alexanderplatz. S- and U-Bahn operate until midnight, but not much longer. If you plan to go home later, you will have to use night busses (besides others, each U-Bahn line has a corresponding night bus line) or stop/call a taxi (e.g., **+49 (30) 261026** or **0800 0261026**). A taxi from the TV tower to ZIB, e.g., will cost 20 to 25 Euros.

Excursion

The ICMS 2016 excursion will take place directly after the conference and will consist of a city tour in doubledecker cabriolet buses. The tour will start at ZIB and will include the most important touristic highlights of Berlin: Kurfürstendamm, Kranzler Eck, Gedächtniskirche, KaDeWe, Kulturforum and Philharmonie, Siegessäule, Tiergarten, Schloss Bellevue, Leipziger Platz, Potsdamer Platz, Government District, Reichstag, Bundeskanzleramt, Hauptbahnhof, Pariser Platz, Brandenburg Gate, Stelenfeld, Unter den Linden, Bebelplatz, Schlossplatz, Museumsinsel, Friedrichstraße (Checkpoint Charlie), Gendarmenmarkt, Bundesrat, Ministries and many more.

There will be English-speaking guides explaining everything to you and answering your questions. You will receive information on the urban development in the last few years as well as on Berlin, as a capital, as a city of modern architecture as well as a city full of German history.

It will take approximately two hours and end in the center of Berlin.

Newtimer.jpg