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## Annual Report 2015/2016



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# About VCLA



Vienna Center for Logic and Algorithms

The Vienna Center for Logic and Algorithms (VCLA) is a globally unique competence center in the field of logic and algorithm research. It was founded in September 2011 and officially opened in January 2012 in the presence of the rector of the Technische Universität Wien (TU Wien) Sabine Seidler and Turing Award laureate Edmund M. Clarke.

The Center was founded by Stefan Szeider and Helmut Veith and led by both until Helmut Veith passed away in March 2016.

The VCLA scientific program 2011-2016 focused on

- Constraint Satisfaction
- Verification of Hardware and Software, and
- Knowledge Representation



The VCLA was funded by TU Wien for its first four-year period and will continue to be funded for another four years as a part of the Doctoral College Logical Methods in Computer Science (LogiCS).

The Center aims to promote international scientific collaboration in logic and algorithms and to communicate Austria's excellence in these two areas of computer science research, using a variety of channels.

These objectives are realized through activities such as

- the VCLA Workshop Series
- the VCLA Schools, a series of winter and summer schools
- the VCLA Visitor Program
- the hosting of talks by renowned international speakers, and
- the co-organisation of events

# Helmut Veith 1971-2016

VCLA co-chair Helmut Veith passed away in tragic circumstances on March 12, 2016. He is mourned deeply by the members of the VCLA and his many friends and colleagues.

Helmut was a brilliant researcher, an inspiring collaborator and teacher, a generous friend, and a wonderful father and husband. He leaves a void that will be impossible to fill.

Helmut studied Computational Logic at TU Wien, a *studium irregulare* with a curriculum he designed himself, together with Richard Zach. After appointments at TU Munich and TU Darmstadt, he returned to TU Wien for a full professorship in Computer Aided Verification.

Helmut's passion for logic led him to establish not only the Vienna Center for Logic and Algorithms with Stefan Szeider, but also to bring the largest logic conference in history to Austria the Vienna Summer of Logic. He also served as the speaker of the Doctoral College Logical Methods in Computer Science and as the deputy coordinator of the National Research Network Rigorous Systems Engineering (RiSE).

Posthumously, Helmut was award-



ed the ERC Advanced Grant - one of the highest academic distinctions in Europe - for his project HYDRA (Harnessing Model Checking for Distributed Algorithms).

His achievements in academia and beyond are too numerous to be listed here in full, which is why a memorial page has been instated. The page links to several obituaries which honor Helmut Veith's life and his accomplishments:

http://www.vcla.at/2016/03/ helmut-veith-1971-2016

# Organization

The VCLA is managed by a local board in collaboration with an international advisory board. The local board is responsible for day-to-day management and consults with the advisory board about strategic decisions.

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Georg Gottlob
Georg Gottion
Alexander Leitsch
Reinhard Pichler
Stefan Szeider (co-chair)
Helmut Veith (co-chair)†

Public Relations and Project
Management
Katarina Singer

Matthias Baaz (TU Wien) Roderick Bloem (TU Graz) Agata Ciabattoni (TU Wien) Nadia Creignou (Université d'Aix-Marseille) Anuj Dawar (University of Cambridge) Fedor Fomin (University of Bergen) Laura Kovács (TU Wien) Miroslaw Truszczynski (University of Kentucky) Moshe Y. Vardi (Rice University)

## Collaborations

The VCLA frequently collaborates with the following institutions, all of which also provide co-financing for various events and activities:

- Institute of Discrete Mathematics and Geometry at TU Wien
- Kurt Gödel Society (KGS)
- Austrian Rigorous Systems Engineering (ARiSE)
- Wolfgang Pauli Institute (WPI)
- Institute of Science and Technology Austria (IST Austria)

## Logic and Algorithms Groups

The Center is hosted by five research groups at the Faculty of Informatics:

- AC Algorithms and Complexity Group
- DBAI Database and Artificial Intelligence Group
- FORSYTE Formal Methods in Systems Engineering Group
- KR Knowledge-Based Systems Group
- Theory and Logic Group

## Cooperation: Logical Methods in Computer Science

The Doctoral College Logical Methods in Computer Science (LogiCS) was established in March 2014 and led by Helmut Veith† and Stefan Szeider.

LogiCS is a PhD degree program funded by the Austrian Science Fund FWF and run jointly by three Austrian universities (TU Wien, Graz University of Technology and Johannes Kepler University Linz). Its faculty comprises fifteen renowned researchers with strong records in research, teaching and advising, complemented by eleven associated members.



The program is aimed at highly motivated students who want to work in one of three fundamental fields of computer science: Databases and Artificial Intelligence, Verification, and Computational Logic.

The program has been very successful so far: It attracted excellent students from seventeen countries, and fifty percent of the fully funded students are female.

### http://logic-cs.at/phd



## **Conference: Austrian Computer Science Day 2015**

After co-organizing the first Austrian Computer Science Day in 2012, the VCLA once again supported the conference, which took place in the stunning Kuppelsaal at TU Wien.

More than 80 people attended the eight talks by renowned computer scientists and cheered the winners of the OCG Incentive Award, Harald Beck and Robert Bill.

## Organizers

- Ivona Brandić (TU Wien)
- Ivan Viola (TU Wien)
- Georg Weissenbacher (TU Wien)

#### **Steering Committee**

- Roderick Bloem (TU Graz)
- Krzysztof Pietrzak (IST Austria)
- Thomas Pock (TU Graz)
- Helmut Veith (TU Wien)

## Publicity

• May Chan (IST Austria)



## **Participating Universities**

- Alpen-Adria-Universität Klagenfurt
- IST Austria
- Johannes Kepler Universität Linz
- TU Graz
- TU Wien
- Universität Innsbruck
- Universität Salzburg
- Universität Wien

#### http://csd2015.forsyte.at

## Workshop: Stream Reasoning

The Stream Reasoning Workshop 2015 took place at TU Wien and was co-sponsored by the VCLA.

It aimed at advancing Stream Reasoning as a research theme by bringing together different views and goals. In addition to invited talks, the workshop provided opportunities for all participants to engage in discussions on open problems and future directions.

## Organizers

- Harald Beck (TU Wien)
- Minh-Dao Tran (TU Wien)
- Thomas Eiter (TU Wien)
- Katarina Singer (TU Wien)

### Keynotes

- Fredrik Heintz (Linköping University)
- Emanuele Della Valle (Politecnico di Milano)

### Talks

- Darko Anicic (Siemens AG)
- Alexander Artikis (National Centre for Scientific Research "Demokritos")
- Jean-Paul Calbimonte (École Poly-



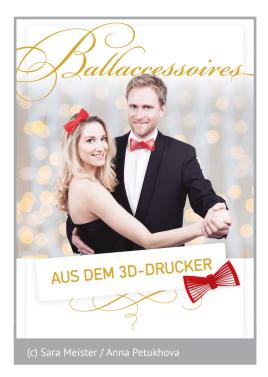
technique Fédérale de Lausanne)

- Thomas Eiter (TU Wien)
- Andreas Harth (Karlsruher Institut für Technologie)
- Ali Intizar (Insight Centre for Data Analytics, Galway)
- Daniel de Leng (Linköping University)
- Boris Motik (Oxford University)
- Konstantin Schekotihin (Universität Klagenfurt)
- Philipp Obermeier (University of Potsdam)
- Özgür Özçep (Universität zu Lübeck)
- Axel Polleres (Vienna University of Economics & Business)
- Anni-Yasmin Turhan (Dresden University of Technology)

### http://www.vcla.at/sr2015

## Cooperation: Vienna Science Ball

After a close and successful cooperation with the first Vienna Science Ball in January 2015, the VCLA prolonged the partnership for the 2016 edition of the Ball. As in the year before, the Vienna Science Ball was completely sold out, attracting more than 2000 people to the ball rooms of the Vienna City Hall.





This year, the VCLA cooperated with the Human Computer Interaction Group at the Faculty of Informatics in order to provide the ball guests with special ball accessories: 3D-printed bows in brilliant red.

Of course, part of the program was to ignite the guests' competitive streak with a riddle just like during the first Vienna Science Ball. This time it was a folding puzzle with portraits of Kurt Gödel, courtesy of Erik and Martin Demaine (MIT, USA). The first 15 people who handed in their correct solutions received a 3D-printed bow in return. For a contribution to the refugee initiative of the Faculty of Informatics (Welcome.TU.code), those without such quick riddle-solving skills received a bow as well.

### http://www.wissenschaftsball.at

http://www.informatik.tuwien.ac.at/ welcomeTUcode

## LogicLounges: Cliff B. Jones and Moshe Y. Vardi

The LogicLounge, a meeting place for friends of logic from academia and the public, was created during the Vienna Summer of Logic 2014, the largest conference in the history of logic research. Its success inspired the LogicLounge initiators, Helmut Veith and Oliver Lehmann (IST Austria), to continue the one-hour discussions with eminent scientists from the fields of logic, computer science and philosophy even after the Vienna Summer of Logic had ended.

In March 2016, Cliff B. Jones (University of Newcastle), discussed the topic of Formal Methods and his time at the Vienna IBM Lab with Tanja Traxler (Der Standard) at TU Wien. Several of his colleagues from the 1960s attended the event as well.

In July 2016, the LogicLounge went overseas: the organizers of the conference Computer-Aided Verification (CAV) 2016 held an instance of this series in memory of Helmut Veith. Moshe Vardi (Rice University) discussed with Canadian journalist Dan Falk whether robots were going to take human jobs.

http://www.vcla.at/logiclounge





Cliff B. Jones and his colleagues from the IBM Lab

## Workshop: Algebra and Coalgebra meet Proof Theory

Algebra and Coalgebra meet Proof Theory (ALCOP) is a workshop series whose seventh edition took place at TU Wien in April 2016. It was supported by the VCLA, the Wolfgang Pauli Institute and by the Kurt Gödel Society.

The workshop was hosted by the Theory and Logic Group. Its aim was to bring together experts in algebraic logic, coalgebraic logic and proof theory to share new results and to strengthen the relationship between these fields.

#### **Invited Speakers**

- Matthias Baaz (TU Wien)
- Nick Bezhanishvili (U. Amsterdam)
- Alessio Guglielmi (U. Bath)
- Rosalie lemhoff (U. Utrecht)
- Alessandra Palmigiano (U. Delft)
- Kazushige Terui (U. Kyoto)
- Luca Viganò (U. London)

### Local Organizing Committee

- Paolo Baldi
- Leonardo Cabrer
- Agata Ciabattoni (Chair)
- Francesco A. Genco
- Roman Kuznets
- Björn Lellmann
- Revantha Ramanayake
- Vlasta Sikimić

#### **Steering Committee**

- Nick Bezhanishvili (U. Amsterdam)
- Rostislav Horčík (U. Prague)
- Rosalie lemhoff (U. Utrecht)
- Clemens Kupke (U. Glasgow)
- George Metcalfe (U. Bern)
- Alessandra Palmigiano (U. Delft)

#### http://alcop2016.logic.at

## Spring School: LOVE 2016

The RiSE and LogiCS Spring School on Logic and Verification (LOVE) 2016 took place in April 2016 and was supported by the Vienna Center for Logic and Algorithms, among others.

The Spring School was aimed at master's and doctoral students in Computer Science and Mathematics with a strong interest in Logic and Automated Verification. It attracted 50 attendees, eight of which were from North America, three from South America, four from Asia and 35 from various European countries.



LOVE 2016 attendees during a lecture

Photos by Matthias Schlaipfer

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Georg Weissenbacher introducing one of the speakers



Dinner at a traditional Austrian inr

## http://forsyte.at/events/love2016

# Distinction: VCLA International Student Awards

The highly successful second edition of the VCLA International Student Awards was concluded on April 16, 2016 with the celebration of two winners.

Out of 22 submissions in total, one was selected for the Outstanding Master Thesis Award and one for the Outstanding Undergraduate Research Award by a committee consisting of 20 internationally recognized researchers. An honorable mention was also given to one of the submissions. The award ceremony took place during the Spring School on Logic and Verification (LOVE 2016).



f.l.t.r.: Stefan Szeider, Bahareh Afshari, Maximilian Schleich, Valeria Vignudelli, Felix Dörre, Magdalena Ortiz, Igor Konnov, Simone Bova

VCLA chair Stefan Szeider congratulated the following award recipients:

#### **Outstanding Master Thesis Award**

Valeria Vignudelli (Thesis: The Discriminating Power of Higher-Order Languages: A Process Algebraic Approach)

## Outstanding Undergraduate Research Award

Felix Dörre (Thesis: Verification of Random Number Generators)

## **Honorable Mention**

Maximilian Schleich (Thesis: Learning Regression Models over Factorised Joins)

The VCLA International Student Awards are given to authors of outstanding scientific works in the field of Logic and Computer Science.

http://www.vcla.at/second-edition -of-the-vcla-international-student -awards

Photography © VCLA

## Workshop: New Trends in Belief Change

This symposium was jointly funded by the VCLA and the Wolfgang Pauli Institute and took place in May 2016. It was organized by Stefan Woltran, Jean-Guy Mailly and Adrian Haret. Twenty-three participants from Europe and North America attended the workshop.

The aim of this workshop was to bring together researchers from different fields in order to discuss recent results and ongoing work on these new challenges. Topics of interest included:

Belief Change in:

- Fragments of Classical Logic
- Nonclassical Logics

Belief Change and:

- Computational Social Choice
- Stream Reasoning
- Ontologies

http://dbai.tuwien.ac.at/ntbc16



Stefan Woltra © NTBC16



Pavlos Peppas © NTBC16

# Invited Speakers and Visitors

Eighteen talks by speakers from countries across the world have been hosted by the VCLA during the past year. An online listing with abstracts is available at http://www.vcla.at/category/talks

Jörg Rothe (Universität Düsseldorf, Germany): Economics and Computation: Five Challenges in Algorithmic Game Theory, Computational Social Choice, and Fair Division

Martin Schäf (SRI International, USA): Classifying Bugs with Interpolants

**Igor Razgon (Birkbeck University of London, United Kingdom):** Lower bounds for branching programs of bounded repetition computing CNFs of bounded treewidth: an overview

Idit Keidar (Technion, Israel): Transactional Data Structure Libraries

**Leslie Lamport (Microsoft USA):** A Mathematical View of Computer Systems – Q&A **Tom van Dijk (University of Twente, Netherlands):** Workers in forests: developments in parallel decision diagrams

Joseph Sifakis (IMAG, France): Rigorous System Design in BIP

**O-Joung Kwon (Hungarian Academy of Sciences, Hungary):** Deletion problems regarding graphs of bounded rank-width

**Cliff B. Jones (Newcastle University, United Kingdom):** Reasoning about Interference (or Lack Thereof)

**Evgenia Ternovska (Simon Fraser University, Canada):** An Algebra of Modular Systems

Johannes Hölzl (TU München, Germany): Markov chains and Markov decision processes in Isabelle/HOL

**Pierre Bourhis (LIFL, France):** A Formal Study of Collaborative Access Control in Distributed Datalog

**Keren Censor-Hillel (Technion, Israel):** Distributed Algorithms as Combinatorial Structures

Maria Gorinova (University of Cambridge, United Kingdom): Termination proving

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Eighteen talks by speakers from countries across the world have been hosted by the VCLA during the past year. An online listing with abstracts is available at http://www.vcla.at/category/talks

**Martin Suda (University of Manchester, United Kingdom):** Resolution-based Methods for Linear Temporal Reasoning

**Sayan Mitra (University of Illinois at Urbana Champaign, USA):** Automating invariant and progress proofs for distributed systems

Bertrand Mayer (ETH Zurich, Switzerland): A Theory of Programs

**Miroslav Truszczynski (University of Kentucky, USA):** Abstract Perspectives on Modularity in Knowledge Representation

# Media Coverage

The VCLA was present in the media through its members and activities, especially the Doctoral College Logical Methods in Computer Science, and the Vienna Science Ball.

## May 18, 2016

Article in *Heureka 2/16* (German) Young researchers https://www.falter.at/heureka/FALTER\_201605187E1926CBD8/jungforscherinnen

January 31, 2016 Article on *wien.orf.at* (German) Ball buffet with locusts and worms http://wien.orf.at/news/stories/2755216

## January 25, 2016

Article on *science.apa.at* (German) Vienna Science Ball: final ticket sale https://science.apa.at/rubrik/kultur\_und\_gesellschaft/Wiener\_Ball\_der\_Wissenschaften\_Kartenverkauf\_im\_Finale/SCI\_20160125\_SCI39431352627855924

January 14, 2016 Article on *inwien.at* (German) Dancing in competition with molecules https://inwien.at/Mit-Molekuelen-um-die-Wette-tanzen.42488.0.html

January 13, 2016 Article on *woman.at* (German) Win two tickets for the Science Ball http://www.woman.at/a/wissenschaftsball-wien-2016

# Media Coverage

The VCLA was present in the media through its members and activities, especially the Doctoral College Logical Methods in Computer Science, and the Vienna Science Ball.

## January 11, 2016

Article on *scienceblogs.de* (German) Pluto's waltz and the second Vienna Science Ball http://scienceblogs.de/astrodicticum-simplex/2016/01/11/plutos-walzertanzund-der-zweite-wiener-ball-der-wissenschaften

## December 29, 2015

Article on *reflex.cz* (Czech) There are enough fancy balls in Vienna, scientist will serve bugs at theirs http://www.reflex.cz/clanek/zajimavosti/68302/nobl-plesu-je-ve-vidni-dostvedatori-na-tom-svem-budou-servirovat-brouky.html

### December 15, 2015

Article on *vienna.at* (German) Science Ball: "Decent fun, dance with attitude" http://www.vienna.at/ball-der-wissenschaften-spass-mit-anstand-tanz-mithaltung/4552291

December 1, 2015 Article on *profil.at* (German) The magic of numbers: Ada Lovelace and her successors http://www.profil.at/wissenschaft/zahlenzauber-ada-lovelace-nachfolgerinnen-6115618

# Media Coverage

The VCLA was present in the media through its members and activities, especially the Doctoral College Logical Methods in Computer Science, and the Vienna Science Ball.

## November 17, 2015

Article on *science.orf.at* (German) Criticism: National research is "underfunded" http://sciencev2.orf.at/stories/1764645

Article on *derstandard.at* (German) Research: experts point to underfinancing and lack of private funding http://derstandard.at/2000025876909/Experten-orten-Unterfinanzierung-und-Privatgeld-Mangel

Article on *studium.at* (German) Experts on fundamental research in Austria: severe underfinancing and lack of private funding http://www.studium.at/416422-experten-zur-grundlagenforschung-oesterreich-starke-unterfinanzierung-und-mangel-privatgeld

# VCLA Chairs



Stefan Szeider and Helmut Veith were co-chairs of the Vienna Center for Logic and Algorithms until Helmut Veith passed away in March 2016. They founded the VCLA in 2011, assuming the strategic leadership over its activities. The Center is now led by Stefan Szeider.

Stefan Szeider is a full professor at TU Wien and head of the Algorithms and Complexity Group at the Faculty of Informatics. He is also the speaker (formerly deputy speaker) of the Doctoral College Logical Methods in Computer Science and scientific co-organizer of the Vienna Gödel Lectures.

In his research, Szeider combines algorithmic and logic-based methods for the efficient solution of hard problems that arise in Artificial Intelligence, Automated Reasoning, and Combinatorial Optimization, complemented by complexity-theoretic methods for establishing theoretical limits and lower bounds.

Helmut Veith was a full professor at TU Wien and head of the Formal Methods in Systems Engineering Group at the Faculty of Informatics. He was also an adjunct professor at Carnegie Mellon University and the speaker of the Doctoral College Logical Methods in Computer Science.

In his research, Helmut Veith applied formal and logical methods to problems in software technology and engineering. His work focused on model checking, software verification and testing, embedded software and computer security.

# Participants of VCLA Events

# Workshop on Stream Reasoning 2015

Shqiponja Ahmetaj Albin Ahmeti Darko Anicic Alexander Artikis Harald Beck Bruno Bierbaumer Markus Brenner Jean-Paul Calbimonte Minh Dao-Tran Thomas Eiter Javier Fernandez Andreas Harth Manfred Hauswirth Fredrik Heintz Hermann Hellwagner Ali Intizar Elmar Kiesling Daniel de Leng Boris Motik Philipp Obermeier Özgür Özçep **Axel Polleres** Jöra Pührer Alessandro Ronca Sebastian Rudolph **Orkunt Sabuncu Torsten Schaub** Konstantin Schekotihin Stefan Schlobach Patrik Schneider Mattias Tiger

Dmitriy Traytel Anni-Yasmin Turhan Jacopo Urbani Emanuele Della Valle Peter Wetz Stefan Woltran Pouyan Ziafati

## LOVE 2016 Spring School

Houssam Abbas Sebastian Arming Stanley Bak Nicolas Braud-Santoni Kim Do Hyun Pierre Donat-Bouillud Felix Dörre Fernando L. Dotti Rohit Dureja Gabriel Ebner Katalin Fazekas Andreas Fellner Shromona Ghosh **Bernhard Gleiss** Henning Guenther Chunhui Guo Ákos Hajdu Kuk Jang Martin Jonas Yona-Kee Jun Jens Katelaan Ayrat Khalimov Beniamin Kiesl Jonatan Kilhamn Bettina Könighofer Selyunin Konstantin Marijana Lazic Jeong A Lee Anna Lukina Julio Machado Alfio Martini

# Participants of VCLA Events

Cornelia Mayer Vince Molnár Andreas Moßburger Sebyll Onbasi **Thomas Pani** Ivan Radicek Adrian Rebola Pardo Alena Rodionova Dorsa Sadigh Indranil Saha Sarah Sophie Sallinger Matthias Schlaipfer Yasser Shoukry Sakr Ilina Stoilkovska Mitra Tabaei Befrouei Loredana Tec Tamás Tóth Valeria Vignudelli András Vörös

## Workshop: Algebra and Coalgebra meet Proof Theory

Bahareh Afshari Andrea Aler Tubella Christian Antić Federico Aschieri Matthias Baaz Paolo Baldi Mike Behrisch Nick Bezhanishvili Marta Bílková Kaustuv Chaudhuri Agata Ciabattoni Petr Cintula Andrea Condoluci Marcello D'Agostino Serena Delli Denisa Diaconescu Gabriel Ebner Christian Fermüller Stefan Forster Sabine Fritella Sergey Goncharov Francesco Genco **Giuseppe Greco** Alessio Guglielmi Francesca Gulisano Stefan Hetzl Matthias Hofer Hykel Hosni Andreas Humenberger Rosalie lemhoff Dick De Jongh

Roman Kuznets Frederik Lauridsen Graham Leigh Björn Lellmann Tadeusz Litak Anela Lolić Sonia Marin George Metcalfe Markus Moschner Alessandra Palmigiano **Elaine Pimentel** Nika Pona **Benjamin Ralph** Revantha Ramanayake **Christoph Rauch** Adrian Rebola-Pardo Giselle Reis Laura Schnüriger Vlasta Sikimić Kazushige Terui Sebastiaan Terwijn Apostolos Tzimoulis Luca Viganò Simon Wolfsteiner Tik Lok Wong Fan Yang Zhiguang Zhao

# Participants of VCLA Events

# Workshop: New Trends in Belief Change

Michael Abseher Ringo Baumann Harald Beck Nadia Creignou James Delgrande Martin Diller Daniel Eckert **Thomas Eiter** Chris Fermüller Adrian Haret Markus Hecher Thomas Linsbichler Jean-Guy Mailly Jan Maly Magdalena Ortiz **Pavlos Peppas** Andreas Pfandler Andreas Pieris Vadim Savenkov Mantas Šimkus Sebastian Skritek **Christof Spanring** Stefan Woltran



Editor: Katarina Singer Publisher: Vienna Center for Logic and Algorithms Institute of Information Systems Technische Universität Wien Favoritenstraße 9-11, 1040 Vienna Image credits: Nadja Meister (unless stated otherwise)



## Vienna Center for Logic and Algorithms



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