



Vienna Center for
Logic and Algorithms



Annual Report 2023/2024



Contents

6	About VCLA
7	In Memoriam
9	Organization
10	Activities
11	LogicLounges and Guest Talks
11	LogicLounge 2024 with Georg Gottlob: Artificial Intelligence and Artificial Ignorance
13	LogicLounge at CAV2024 in Montreal
14	Women in Logic Online with Valeria de Paiva: Network Mathematics
15	Vienna World Logic Day Lecture 2024 with Adnan Darwiche: Beyond Truth and Falsehood: Logic as a Calculus of Events
16	Hans van Ditmarsch: Distributed Knowledge Revisited
17	Petra Mutzel: Algorithmic Data Science on Graphs
18	Emiliano Lorini: A Rule-based Modal View of Causal Reasoning
19	Reiner Hähnle: Context-aware Trace Contracts
20	Nick Bezhanishvili: Degrees of the Finite Model Property for Superintuitionistic and Modal Logics
21	Byron Cook: The Business of Proofs
22	David Pearce: Logic, Accountability, and Design



- 23 Helmut Veith Lecture Hall Dedication Ceremony
- 24 Conferences
 - 24 Advances in Modal Logic: AiML in Prague
 - 25 Women in Logic 2024 - 8th International Workshop
- 26 Science Education
 - 26 Kick-off Meeting “Transformer - Co-Creation Space”
- 27 Distinction
 - 27 VCLA International Student Awards
 - 29 Helmut Veith Stipend Winners 2024
- 32 Cooperations
 - 32 Cluster of Excellence: Bilateral Artificial Intelligence
 - 34 Vienna Ball of Sciences 2024
 - 35 MSCA COFUND Doctoral Program LogiCS@TUWien
 - 36 LogiCS@TUWien: Proficiency Evaluations
 - 37 LogiCS@TUWien: Industry Day
- 38 Media Coverage
- 42 VCLA Chairs

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.

In December 2017, Agata Ciabattoni became the new elected co-chair, and the VCLA board structure changed.

The VCLA was funded by TU Wien in association with the FWF - Doctoral College Logical Methods in Computer Science (LogiCS).

The Center aims at promoting international scientific collaboration in logic and algorithms and communicating Austria's excellence in these two areas



of computer science research, using a variety of channels.

These objectives are realized through various activities which include:

- The VCLA International Student Awards for Outstanding Theses
- The LogicLounge series
- The VCLA workshop series
- The VCLA series of winter and summer schools
- The VCLA visitor program
- Hosting talks by renowned international speakers
- Cooperations, and
- Educational outreach

In 2023/2024, all events could be held in person. The Vienna World Logic Day Lecture, however, is held as an online event to allow for participation from abroad, and Women in Logic Online was conceived as an online seminar series.

www.vcla.at

In Memoriam

VCLA co-chair Helmut Veith (1971-2016) passed away under tragic circumstances on March 12, 2016.

Helmut was a vital part of the rebirth of the Austrian logic scene, and it was a matter close to his heart to build bridges between the computer science expert and the layman. His vision is being carried on by the students who he mentored, and his colleagues have launched a number of activities in his honor that will keep his legacy alive.

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 VCLA together with Stefan Szeider, but also to bring to Austria the largest logic conference in history - the Vienna Summer of Logic. Helmut 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).



Photo (c) Nadja Meister

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

In honor of Helmut's advocacy for women in computer science, the TU Wien, the Wolfgang Pauli Institute, and Helmut's friends and colleagues funded the Helmut Veith Stipend for Female Master's Students. Memorial site listing his achievements in academia and beyond:

www.vcla.at/2016/03/helmuth-veith-1971-2016

In Memoriam

Anna Prianichnikova (1967-2025), beloved coordinator of TU Wien's computer science doctoral programs, has passed away after a short but serious illness. She dedicated her career to supporting and nurturing future PhD students through multiple prestigious doctoral programs at TU Wien.

From the first FWF Doctoral College "Logical Methods in Computer Science" to the current Marie Skłodowska-Curie COFUND LogiCS@TUWien program, Anna was at the heart of these initiatives. She worked tirelessly to ensure that students received not only academic support but also personal guidance and encouragement throughout their doctoral journeys. More than an administrator, she was a mentor, a confidante, and a steady presence for countless young researchers.

After the untimely passing of her husband, Helmut Veith, Anna continued his legacy of excellence in computer science education. She was especially committed to encouraging and supporting female students, and played a crucial role in maintaining and expanding the LogiCS doctoral programs.

Anna's commitment to interdisciplinary education and student well-being



helped shape TU Wien's doctoral programs into world-class initiatives that attract top talent from around the globe. Her impact on computer science education will live on through the many students and researchers whose lives she touched.

She will be deeply missed by the entire TU Wien community, particularly by the countless PhD students who benefited from her guidance, wisdom, and care over the years. Her dedication to nurturing the next generation of computer scientists has left an indelible mark on the field. Her warmth, generosity, and unwavering support will remain in our hearts, a lasting testament to the incredible person she was.

<https://www.vcla.at/2025/02/anna-prianichnikova/>

Organization

The VCLA is coordinated by the executive board in consultation with the local board while taking into account the strategic advice from the external advisory board.

Executive Board		Local Board	
Agata Ciabattoni (co-chair)		Matthias Baaz	
Thomas Eiter		Pavol Cerny	
Matteo Maffei		Laura Kovács	
Reinhard Pichler		Alexander Leitsch	
Stefan Szeider (co-chair)		Martin Nöllenburg	
Georg Weissenbacher		Magdalena Ortiz	
		Stefan Woltran	

External Advisory Board			
Roderick Bloem (TU Graz)		Georg Gottlob (TU Wien/Oxford University)	
Nadia Creignou (Université d'Aix-Marseille)		Anuj Dawar (University of Cambridge)	
Fedor Fomin (University of Bergen)		Miroslaw Truszczynski (University of Kentucky)	
Moshe Y. Vardi (Rice University)			

PR and Project Management	Andrea Hackl
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Collaborations

The VCLA frequently collaborates with the following co-funding institutions:

- Kurt Gödel Society (KGS)
- Wolfgang Pauli Institute (WPI)
- Institute of Science and Technology Austria (IST Austria)
- FWF-funded Cluster of Excellence “Bilateral Artificial Intelligence”

Logic and Algorithms Groups

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

- Algorithms and Complexity Group
- Database and Artificial Intelligence Group
- Formal Methods in Systems Engineering Group
- Knowledge-Based Systems Group
- Theory and Logic Group
- Security and Privacy Group

Activities

The VCLA annual report summarizes our activities throughout the year. This report provides details on the events and activities between October 1, 2023 and September 30, 2024. We divide the activities presented in this report into the following subsections:

- [LogicLounges and Guest Talks \(p. 11\)](#)

The LogicLounge is a series of public lectures bringing together the general public and experts from the fields of logic, philosophy, mathematics, computer science, and artificial intelligence.

- [Conferences \(p. 24\)](#)

They are organized by the members of the research groups hosting the VCLA.

- [Educational Outreach and Science Communication \(p. 26\)](#)

The VCLA is raising awareness about the field of logic and algorithms by running educational outreach projects for teachers and students as well as science communication activities for the general public.

- [VCLA International Student Awards \(p. 27\)](#)

These annual awards aim to recognize and support students all over the world for their outstanding Master and Undergraduate Theses in the field of Logic and Computer Science.

- [Helmut Veith Stipend \(p. 29\)](#)

The Helmut Veith Stipend is awarded annually to excellent international female students who pursue (or plan to pursue) one of the master's programs in Computer Science at TU Wien.

- [Cooperations \(p. 32\)](#)

The VCLA cooperates with academic programs and initiatives, as well as with initiatives raising awareness for gender mainstreaming and diversity in the field.

Activities - LogicLounge

At LogicLounge 2024, Georg Gottlob talked about Artificial Intelligence and Artificial Ignorance.

The series of public discussions Logic Lounge, which celebrated its tenth anniversary in 2024, was held on May 28 at Café Museum, which already served as a meeting place for Wittgenstein and the Vienna Circle. In his talk “Artificial Intelligence and Artificial Ignorance,” Professor Georg Gottlob, who recently joined the University of Calabria (Unical), provided guests with unique insights into the world of machine learning and large language models. The discussion, which is organized by the Vienna Center for Logic and Algorithms (VCLA), was moderated by journalist Sarah Kriesche (Ö1) for the third time in a row.

“The ghost of the previous tenant still lived in the building.” This was Georg Gottlob’s tongue-in-cheek explanation for his low credit limit during his time in Oxford. After all, numerous payment reminders bore testimony to the previous tenant’s tendency to leave his bills unpaid, and anyone who lives with such a person must be of a similar mindset. At least that was the train of “thought” of the AI-based system of the rating agency that set Gottlob’s credit limit. The system simply did not know



that the previous tenant usually moves out as soon as a new tenant moves in – something that is common knowledge to human beings. And even if the conclusion in terms of payment habits can perhaps not be dismissed entirely, it is still highly questionable from an ethical point of view.

These and other limitations of AI-based applications were discussed at length during this year’s LogicLounge. Gottlob provided numerous anecdotes and observations ranging from self-driving cars (whereby he is looking forward to sending his car on its way instead of having to park it himself) to superior chess computers.

Another focus of the discussion was the optimization of sub-symbolic AI through a combination with symbolic AI, as the Cluster of Excellence “Bilateral AI”, in which the TU Wien is

Activities - LogicLounge

... continuation from page 11

participating, has recently been approved by the Austrian Science Fund (FWF). Imagine two halves of the human brain that are responsible for different tasks. With sub-symbolic AI (right hemisphere), the focus is on machine learning, i.e., processing huge amounts of data using neural networks. This form of AI is ideally suited as a tool, e.g., in medical diagnostics. Symbolic AI (left hemisphere), on the other hand, deals with fact- and rule-based conclusions. We don't have to learn the hard way that certain berries are poisonous – we are taught this information at a young age. It would therefore be ideal to combine sub-symbolic and symbolic AI. But who decides which rules are used and what leeway should be allowed in the implementation of these rules? If you would like to find out more about this exciting topic and the strengths and weaknesses of large language models such as ChatGPT, you can watch the recording of the LogicLounge on the VCLA YouTube channel.

<https://www.youtube.com/watch?v=pvhmmYARBJ0>

About LogicLounge:

Initiated in 2014 at the Vienna Summer of Logic, the LogicLounge has since become an event travelling between Vienna and the venue of the CAV conference, where it has become a regular event in memoriam of Prof. Helmut Veith (1971 - 2016).

More information is available at:

<http://www.vcla.at/logiclounge>

<https://www.vcla.at/2024/05/logiclounge-2024-with-georg-gottlob/>



Activities - LogicLounge

LogicLounge at CAV2024 in Montreal Scott Shapiro: Realizing Leibniz's Dream

This LogicLounge was held as part of the CAV2024 (the 36th International Conference on Computer Aided Verification) program in Montreal on July 25, 2024. Essentially, Shapiro explored how formal methods and LLMs can be utilized to realize Leibniz's dream of automated legal reasoning.

Abstract: In the 17th Century, the philosopher, mathematician and lawyer Gottlieb Leibniz envisioned the creation of a *characteristica universalis* and *calculus ratiocinator* that would enable reasoning in law and morals as systematically as in geometry and analysis. His goal was to resolve legal disputes with the precision and clarity with which accountants settle financial discrepancies. "To take pen in hand, sit down at the abacus and, having called in a friend if they want, say to each other: Let us calculate!"

We are now, for the first time in history, positioned to realize Leibniz's dream of automating legal reasoning. The crucial step in this process, I will argue, is the alignment of sophisticated computer science techniques with appropriate types of legal problems. Au-

tomating code-based legal reasoning, which relies on explicit statutes and regulations, differs fundamentally from automating case-based reasoning, which depends on precedents and interpretations. I will explore how formal methods and Large Language Models (LLMs) can be utilized to achieve what Leibniz envisioned three centuries ago, effectively transforming the landscape of legal reasoning through the power of modern computational technology.

<https://i-cav.org/2024/logic-lounge/>

<https://www.vcla.at/2024/07/logiclounge-at-cav-realizing-leibniz-dream/>



Activities - Guest Talks

Women in Logic Online with Valeria de Paiva: Network Mathematics

On March 20, 2024, **Valeria de Paiva** (Topos Institute) held the first talk in the new seminar series “Women in Logic Online”, which is organized and promoted by the VCLA. In this talk, which was held via zoom with a live-stream to youtube, Valeria talked about the gender gap in STEM, the rocky road towards gender equality, and the timeline in which this is likely to be achieved in different countries across the world. She then went on to discuss her research on how AI tools may contribute to making mathematics easier to understand for everyone.

Title: Network Mathematics

Abstract: This is the first talk in a new series of seminars we are calling “Women in Logic Online”. As such, I want to start by discussing our collective “Women in Logic”, our successes and challenges, as well as our future plans. Still, for most of our work as women in logic in the past seven years, we have vouched to discuss not only our problems and actions, but mostly real work in logic, be that in Computing, AI, Linguistics, Mathemat-

ics, Philosophy, and any of the intersections thereof. Thus, I also want to talk about my project “Network Mathematics”, which puts together previous strands of work in language, logic, and mathematics. This means that I will tell you about three small prototypes designed to make use of the new tools of AI to improve access to mathematics, especially to Category Theory.

From now on, there will be quarterly talks featuring women in logic.

<https://www.vcla.at/2024/02/women-in-logic-online/>



Valeria de Paiva gives the first talk in the new seminar series “Women in Logic Online”.

Activities - Guest Talks

Vienna World Logic Day Lecture 2024 - Adnan Darwiche: Beyond Truth and Falsehood: Logic as a Calculus of Events



Every year on January 14, we celebrate the World Logic Day. Its main aim is to bring the intellectual history and practical implications of logic to the attention of interdisciplinary science communities. The day also celebrates the idea that logic, as reasoning, is a central quality of human beings.

The fourth Vienna Logic Day Lecture at the VCLA was an online event offering the possibility for worldwide participation. This guest talk was held by **Adnan Darwiche** (UCLA), who aimed to equip our participants with logical tools designed to address the challenges of modern society.

Abstract:

Logic is widely viewed as a calculus of truth and falsehood. However, over the last few decades, the role of logic in AI has been mostly as a calculus of events, which has been effectively and profoundly employed in tasks such as probabilistic reasoning, machine

learning and explainable AI. In this talk, I will discuss some of the fundamental insights, techniques and tools that have emerged from this broader role of logic, and will provide concrete examples of how they enabled the development of state-of-the-art AI systems that transcend the traditional scope of logic.

<https://logicday.vcla.at/vienna-logic-day-lecture/>



The recording is available on the YouTube channel of the Vienna Center for Logic and Algorithms:

<https://www.youtube.com/watch?v=ve2n786qOQQ>

Date: **January 12, 2024**
5 pm CET

Activities - Guest Talks

Talk by Hans van Ditmarsch: Distributed Knowledge Revisited

After giving talks in 2021 and 2022, **Hans van Ditmarsch** again visited the Faculty of Informatics of TU Wien on **October 18, 2023**, to speak about the concept of distributed knowledge.

Abstract: We review the history and some recent work on what is known since the 1990s as distributed knowledge. Such epistemic group notions are currently getting more and more attention both from the modal logical community and from distributed computing, in various settings with communicating processes or agents. The typical intuition is that if a knows p , and b knows that p implies q , then together they know that q : they have distributed knowledge of q . In order to get to know q they need to share their knowledge. We will discuss:

(i) the complete axiomatization, (ii) why not everything that is distributed knowledge can become common knowledge, (iii) the notion of collective bisimulation, (iv) distributed knowledge for infinitely many agents, (v) the novel update called resolving distributed knowledge and some variations (and its incomparable update expressivity to action models), (vi) dis-

tributed knowledge that is stronger than the sum of individual knowledge (where the relation for the group of agents is strictly contained in their intersection), (vii) common distributed knowledge and its topological interpretations, (viii) dynamic distributed knowledge, a version of the semantics ensuring that what is distributed knowledge becomes common knowledge.

<https://www.vcla.at/2023/10/talk-distributed-knowledge-revisited/>



Activities - Guest Talks

Talk by Petra Mutzel: Algorithmic Data Science on Graphs

Petra Mutzel, a professor of Computational Analytics at the University of Bonn, gave a talk at the Faculty of Informatics of TU Wien on **November 16, 2023**.

Abstract (abbrev.): This talk will show that algorithm engineering is the perfect foundation for algorithmic data science. We will discuss Weisfeiler-Leman based approaches which is an important ingredient for Babai's quasi-polynomial time algorithm for solving the graph isomorphism problem, and which is increasingly applied for analysis tasks on graph data sets. I will present new local versions for the k-dimensional Weisfeiler-Leman approach, which takes into account the local structure of the graph. We will also discuss their strengths and weaknesses for data analysis. Applications are, e.g., learning tasks in drug design, social network analysis, brain network analysis, and geodesy. Subsequently, I will present the results of our experimental evaluation of the quantum processing unit of the D-Wave 2000Q that is constructed to approximately solve Ising models on so-called Chi-

mera graphs. Ising models are equivalent to quadratic unconstrained binary optimization (QUBO) problems and to maximum cut problems on the associated graphs. In our experiments we compute exact solutions by engineered branch and cut approaches based on integer linear programming and examine how reliably the D-Wave computer can deliver true optimum solutions of the Ising problem. We also compare the annealer's performance in terms of solution time and solution quality with the performance of a heuristic based on bounded tree width graphs and present some surprising results.

<https://www.vcla.at/2023/11/talk-algorithmic-data-science-on-graphs/>



Activities - Guest Talks

Talk by Emiliano Lorini: A Rule-Based Modal View of Causal Reasoning

On **February 28, 2024**, **Emiliano Lorini** visited the VCLA to give a talk on a rule-based modal view of causal reasoning. Emiliano is a senior researcher at the Centre National de la Recherche Scientifique (CNRS), co-head of the LILaC team (Logic, interaction, language and computation) at the Institut de Recherche en Informatique de Toulouse (IRIT).

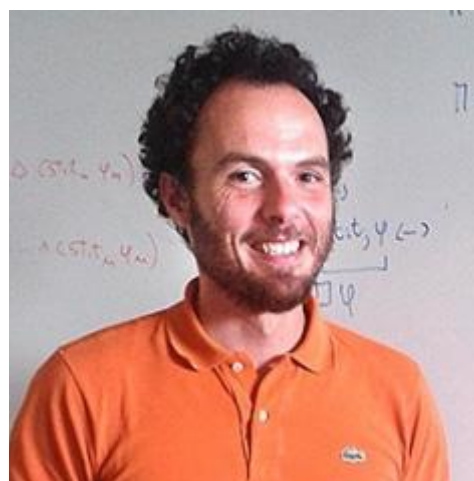
The general aim of his research is to develop formal models of interaction between cognitive agents. He has worked mainly in the area of AI with strong interaction with other disciplines such as economics, philosophy and cognitive sciences. In his work, Lorini uses logic and game theory as formal tools for building models of interaction between cognitive agents.

Abstract:

We introduce a novel rule-based semantics for causal reasoning as well as a number of modal languages interpreted over it. They enable us to represent some fundamental concepts in the theory of causality including causal necessity and possibility, interventionist conditionals and Lewisian condi-

tionals. We provide complexity results for the satisfiability checking and model checking problem for these modal languages. Moreover, we study the relationship between our rule-based semantics and the structural equation modeling (SEM) approach to causal reasoning, as well as between our rule-based semantics for causal conditionals and the standard semantics for belief base change.

<https://www.vcla.at/2024/02/talk-lorini/>



Activities - Guest Talks

Talk by Reiner Hähnle: Context-Aware Trace Contracts

Reiner Hähnle is Professor in Software Engineering at the Computer Science Department of TU Darmstadt. He has wide-ranging interests in the formal foundations of software design, programming languages, and quality assurance by verification. He is co-initiator of the KeY project that maintains the well-known, eponymous Java verification tool, and he is co-designer of the active object language ABS. Moreover, he is co-founder of the Tableaux and IJCAR conference series and currently SC Chair of FASE.

Abstract:

The behavior of concurrent, asynchronous procedures depends in general on the call context, because of the global protocols that govern scheduling. This context cannot be specified with the state-based Hoare-style contracts common in deductive verification. Recent work generalized state-based to trace contracts, which permit to specify internal behavior of a procedure, such as calls or state changes, but not its call context. In this talk we discuss a program logic of context-aware trace

contracts for specifying global behavior of asynchronous programs. We also provide a sound proof system that addresses two challenges: First, to observe the program state not merely at the end points of a procedure, we introduce the novel concept of an observation event. Second, to combat combinatorial explosion of possible call sequences of procedures, we adapt Liskov's principle of behavioral subtyping to the analysis of asynchronous calls. This is a joint work with Eduard Kamburjan (U Oslo) and Marco Scaletta (TU Darmstadt).

Date: March 26, 2024, 13:00 hours

Venue: Helmut Veith Lecture Hall

<https://www.vcla.at/2024/03/talk-by-reiner-hahnle>



Activities - Guest Talks

Talk by Nick Bezhanishvili: Degrees of the Finite Model Property for Superintuitionistic and Modal Logics

Nick Bezhanishvili obtained his PhD in 2006 from the ILLC (Institute for Logic, Language and Computation), University of Amsterdam, under the supervision of Professors Dick de Jongh and Yde Venema. He held postdoctoral positions at the University of Leicester (2006–2008), Imperial College London (2008–2012), and Utrecht University (2012–2013). Since 2014, Nick holds an Assistant Professorship at the ILLC. He has more than seventy publications in the top journals, refereed conference proceedings, and book chapters in his area of research, which is centered on applications of algebraic and topological methods in the study of non-classical logics (such as modal and intuitionistic logics). An important feature of this work is the theory of Stone-like dualities, which gives rise to topological and geometric semantics for intuitionistic and modal logics.

Abstract:

In this talk, I will introduce a new notion of the degree of the finite model property (the degree of FMP) for superintuitionistic and modal logics. This notion resembles that of the degree of incompleteness of modal logics intro-

duced by Fine (1974). In particular, two logics have the same degree of FMP if the classes of their finite frames coincide. I will show that, in contrast with the famous Blok dichotomy theorem, any countable cardinal, as well as the continuum, can be realized as the degree of FMP for some superintuitionistic and transitive modal logic. This provides a solution of a variant of the long-standing open problem when the degree of incompleteness is replaced by the degree of FMP. This is joint work with Guram Bezhanishvili and Tommaso Moraschini.

Date: April 16, 2024, 13:00 hours

Venue: Seminar room Gödel

<https://www.vcla.at/2024/04/talk-by-nick-bezhanishvili/>



Activities - Guest Talks

Talk by Byron Cook: The Business of Proofs

Byron Cook is Professor of Computer Science at University College London (UCL) as well as Vice President and Distinguished Scientist at Amazon Web Services. Byron has worked in a variety of areas over the years, including computer and network security, program analysis and verification, programming languages, theorem proving, hardware design, operating systems, and biological systems.

Byron's interests include theorem proving, logic, program analysis/verification, and programming languages. Byron has applied these techniques to domains such as GenAI, distributed systems, hardware, operating systems, and biological systems. He drove the broad adoption of formal methods and automated reasoning now in use at Amazon.

Abstract:

With only a few niche exceptions, the software industry had not previously figured out how to make deep use of formal mechanical reasoning based on mathematical logic. At Amazon, we have recently seen tremendous adoption of the approach by product groups,

with a variety of customer-facing launches that use automated reasoning, and numerous internal proof projects. This talk describes those projects, and tries to explain what went well at Amazon. The talk also describes challenges that we face to scale the approach to the next level.

<https://www.vcla.at/2024/03/talk-by-byron-cook/>

Date: April 17, 2024, 11:15 hours

Venue: TU Wien, Treitlstraße 3 (Campus Freihaus), ground floor



Activities - Guest Talks

Talk by David Pearce: Logic, Accountability, and Design

David Pearce studied Philosophy, Logic and Scientific Method at the University of Sussex and began his doctoral studies in Philosophy at St John's College, Oxford. He later returned to Sussex, where he obtained his D Phil in 1980. From 1982-94, he worked at the Philosophy Institute of the Free University Berlin as a Lecturer and later as a Heisenberg Research Fellow funded by the DFG. In 1994, he moved to the German AI Research Centre (DFKI) in Saarbrücken, where he joined the group of Jörg Siekmann and coordinated one of the original European Networks of Excellence in the field of Computational Logic. In 2000, he joined the Future and Emerging Technologies Unit of the European Commission in Brussels as a temporary researcher/project officer. In 2002, he moved to Madrid as Ramón y Cajal Research Fellow in the Computer Science department at the Universidad Rey Juan Carlos. In 2009, he joined the UPM as professor in the I3 program.

Abstract:

Logic can and should play a pivotal role in helping to make AI systems explainable and ultimately more accountable. However, this puts a burden

of responsibility on logic itself. Can we trust applied logical systems, many of them in competition with one another, to provide fair and rational conclusions leading to acceptable decisions and actions? We propose a principled approach to the design of applied logics and a preliminary set of desiderata to support accountability for logic-based systems in knowledge representation and reasoning. A very short talk on this topic was given at Jelía 2023.

<https://www.vcla.at/2024/06/talk-by-david-pearce-logic-accountability-and-design/>

Date: June 5, 2024

Venue: TU Wien, Erzherzog-Johann-Platz, Room FB02 and via zoom



Activities - Special Event

Helmut Veith Lecture Hall Dedication Ceremony

On **December 15, 2023**, we celebrated the legacy of Helmut Veith, brilliant computer scientist, colleague, and friend, with the opening of the Helmut Veith Lecture Hall (former FAV 01).

Gerti Kappel, Dean of TU Wien Informatics, opened the event. “Helmut Veith has always gone the extra mile. He has done away with outdated approaches to informatics and changed the field not only as a researcher but as an activist. He has left a legacy that continues to inspire”, Dean Gerti Kappel honored her colleague. Georg Gottlob, Helmut Veith’s PhD supervisor, shared insights into Veith’s early career, stating that “Helmut never left us, until today we feel his influence. His intellectual prowess and curiosity, rigorous approach to research, and gift to build authentic relationships set the foundation for his remarkable contributions, for which we are thankful until this day.”

The opening was accompanied by four talks encompassing Veith’s core research fields and academic principles: Somesh Jha talked about “Fearless Research or What I Learned from Helmut”, Johannes Kinder talked about “CEGAR

for Regular Expression Semantics in JavaScript”, and Moshe Vardi concluded with a talk on “Model Checking Strategies from Synthesis over Finite Traces”.

Florian Zuleger, Orna Grumberg, Roderick Bloem, Anna Prianichnikova, Christian Fermüller, and Igor Konnov shared their heartfelt memories of their colleague, mentor, friend, and partner.

<https://www.vcla.at/events/helmut-veith-lecture-hall-dedication-ceremony/>



Activities - Conferences

Advances in Modal Logic (AiML) 2024 in Prague

Advances in Modal Logic is an initiative aimed at presenting the state of the art in modal logic and its various applications. The initiative consists of a conference series together with volumes based on the conferences.

AiML 2024 was held at the Faculty of Arts of Charles University in Prague from August 19-23, 2024, and co-located with the 21st International Conference on Relational and Algebraic Methods in Computer Science (RAMiCS).

The program included invited talks by [Alexandru Baltag](#) (University of Amsterdam), [Marta Bílková](#) (Czech Academy of Sciences), [David Fernández-Duque](#)

(University of Barcelona), and [Claudia Nalon](#) (University of Brasília).

VCLA Co-Chair [Agata Ciabattoni](#) acted as Co-Chair of the Program Committee together with [David Gabelaia](#) (TSU Razmadze Mathematical Institute) and was also part of the AiML Steering Committee. The VCLA distributed the Calls for Papers for this conference.

<https://www.cs.cas.cz/aiml2024/>

Date: August 19-23, 2024

Venue: Faculty of Arts of Charles University (Prague)



Activities - Conferences

Women in Logic - 8th International Workshop

The 8th International Workshop of Women in Logic was held at the Europe Hall in the Astra building of the campus of Tallinn University, Estonia, on **July 9, 2024**.

The program committee again consisted of thirteen women (among them VCLA Co-chair Agata Ciabattoni).

The program included four sessions with twelve talks and three invited talks, a round table on women in industry and academia (with Kait O'Neil and Greta Yorsh from Jane Street), and an informal cocktail party.

The invited talks were held by:

Sandra Kiefer (Oxford University):
“Constructive Interactions”

Amal Ahmed (Northeastern University): “New Techniques for Sound Language Interoperability”

Viviana Bono (Università degli Studi di Torino): “Types for (Slow) AI”

Date: July 9, 2024

**Venue: Astra Building,
Tallinn University**



*(c) Women in Logic

Activities - Science Education

Kick-off Meeting: FFG-funded project “Transformer - Co-Creation Space”

The kick-off meeting of the FFG-funded project “Transformer” (call Co-Creation Spaces Climate & Energy) was held at TU Wien on **February 29, 2024**. The VCLA is proud to participate in this project, in which six faculties of TU Wien are teaming up to offer extra-curricular learning opportunities with a focus on the environment. Children and teenagers will actively participate in the revitalization of a vacant building in Vienna, which will then be used as a creative learning space for all kinds of activities. The project is located at Rennweg 89a in the third district.

The official opening of the building was celebrated on June 1, 2024 from 14:00–18:00 hours as part of Klima-Biennale Wien. In the following weeks, the project offered guided tours as well as interactive stations, where visitors could try out activities such as recycling drink cartons, building bricks from clay, or furnishing a small apartment as efficiently as possible. Another attraction at the Transformer site was the Ocean Eye escape box, a marine biology themed escape game

for four to six participants above the age of fifteen.

We look forward to educating young students on all computer science aspects relating to climate, sustainability, and the environment over the course of the next two years.

<https://www.vcla.at/2024/03/transformer/>



Building bricks from clay, a natural material, at the Transformer site

TRANSFORMER

Activities - Distinction

VCLA International Student Awards: Announcement

The VCLA International Student Awards are presented annually. The winners are invited to attend the award ceremony, and they receive a cash prize from an award fund of EUR 2,000. Since 2016, the awards have been dedicated to the memory of Helmut Veith (1971-2016), the initiator of the awards.

The **eighth edition** of the awards was open for degrees awarded between Jan 1, 2023 and Dec 31, 2023, and was co-chaired by Shqiponja Ahmetaj and Anela Lolic. Based on an international call for nominations, the committee announced one recipient of the Outstanding Undergraduate Research Award, and one recipient as well as one runner-up in the category Outstanding Master Thesis Award.

The recipients have been announced in early autumn 2024. The **award ceremony** was held at TU Wien on June 30, 2025, as part of the conference DEON, the 17th International Conference on Deontic Logic, and will be included in the next annual report.

The Outstanding Master Thesis Award went to **Tikhon Pshenitsyn** (Lomonosov

Moscow State University) for his master thesis “Hypergraph Lambek Calculus” under the supervision of Mati Pentus. **Dieter Vandesande** (Vrije Universiteit Brussel) received an honorary mention as runner-up for his thesis “Towards Certified MaxSAT Solving: Certified MaxSAT Solving with SAT Oracles and Encodings of Pseudo-Boolean Constraints” under the supervision of Bart Bogaerts.

Nathaniel Collins (University of Colorado Boulder) was selected as the recipient of the Outstanding Undergraduate Thesis Award for his thesis “Count-Free Weisfeller-Leman and Group Isomorphism” written under the supervision of Joshua A. Grochow.



Activities - Distinction

... Continuation from page 27



Undergraduate Thesis Award
Winner: Nathaniel Collins

Outstanding Master Thesis Award

Tikhon Pshenitsyn

Hypergraph Lambek Calculus

Supervisor: Mati Pentus (Lomonosov
Moscow State University)

Outstanding Undergraduate Research Award

Nathaniel Collins

Count-Free Weisfeiler-Leman and
Group Isomorphism

Supervisor: Joshua Grochow (University of Colorado Boulder)

VCLA Award Committee 2024

Shqiponja Ahmetaj (chair)

Michele Chiari

Katalin Fazekas

Daniela Kaufmann

Matthias Lanzinger

Xinghan Liu

Anela Lolic (chair)

Sanja Lukumbuzya

Jan Maly

Xavier Parent

Vaidyanathan Peruvemba
Ramaswamy

Michael Rawson

Martin Riener

Sebastian Skritek

Matteo Tesi

Felix Winter

Jules Wulms

Kees van Berkel

Activities - Distinction

Helmut Veith Stipend: Announcement

Helmut Veith (1971-2016) was a strong advocate and mentor for women in computer science. To honor Helmut's efforts, a stipend for outstanding female students in computer science was established in 2017 with the financial support of TU Wien, the Wolfgang Pauli Institute, and generous donations of friends and colleagues of Prof. Veith.

In August 2024, the VCLA announced that the 8th edition of the Helmut Veith Stipend for Female Master's Students in Computer Science (submission period end of November 2023) had – for the first time since the stipend's inception – concluded with the selection of four recipients.

Seeing that the committee received an unprecedented number of qualified applications (180 submissions in total), it seemed impossible to select only one candidate. In light of this, the Wolfgang Pauli Institute (WPI) kindly decided to increase its co-funding of the stipend, thereby adding substantially to the existing funds of TU Wien. This generous support of the WPI is designed to boost gender mainstreaming in STEM disciplines as per the goals set by the Austrian Federal Ministry of Education, Science and Research (BMBWF), which co-funds such WPI activities.

The next two pages give a short introduction to the four recipients.



Activities - Distinction

... continuation from page 29

Tatiana Beliaeva has just completed her Bachelor studies of Information Security at the Plekhanov Russian University of Economics in Moscow (Bachelor thesis: “Developments for improving the company’s information security based on predictive analytics methods”). Through volunteering and participating at science conferences, she has developed a profound interest in cyber security and data science. Consequently, she has chosen to pursue a Master’s in Data Science at the Faculty of Informatics of TU Wien. To finance her studies, Tatiana worked as a junior analyst and specialist in cybersecurity at major companies, and she has been awarded scholarships due to her excellent academic records and her engagement in volunteering and student’s activities.

Esther Mugdan completed her Bachelor studies in Computer Science at the University of Basel in 2022 (Bachelor thesis: “Optimality Certificates for Classical Planning”). During her studies, she developed a strong interest in theoretical computer science. As she

could not specialize in this field in Basel, she decided to move to Austria to pursue a Master’s degree in Logic and Computation at TU Wien. Esther has been employed as a student teaching assistant in Basel and is currently working on a research project with the Databases and Artificial Intelligence Group at TU Wien. The Helmut Veith Stipend will allow her to focus on her Master’s thesis in the field of scheduling and planning.

Ivana Bocevska graduated from high school in North Macedonia and then commenced her Bachelor studies of Software and Information Engineering at TU Wien (Bachelor thesis: “Gentzen-type Refutation Systems for Connexive Logics”). Her profound interest in logic and verification has led her to pursue a Master’s degree in Logic and Computation at TU Wien. Ivana works as Solutions Engineer at an international company and is also a student research assistant at the Faculty of Informatics at TU Wien. She has volunteered as a mentor for the Diary of the Female Computer Scientist and has won a number of awards, most nota-

Activities - Distinction

... Continuation from page 30

bly the Siemens Award for Excellence in 2020 and 2023.

Raquel Panadero Palenzuela received her Bachelor's degree in Telecommunication Technologies and Services Engineering with a major in Audio-visual Systems from the Polytechnic University of Catalonia (UPC), Spain. As part of the Erasmus+ program, Raquel moved to Austria, where she developed a machine learning-based approach for predicting cyclist trajectories in urban environments as part of her Bachelor thesis at the Computer Vision Lab of TU Wien. Subsequently, she was admitted to the Master's program Data Science

at TU Wien, where she looks forward to pursuing AI-driven projects with social impact. At UPC, Raquel was an undergraduate research fellow at the Database Technologies and Information Management Group, and she also interned as a software engineer at a leading company in the management of large volumes of data in the music industry.

The award ceremony was held in December 2024, and will therefore be included in the next annual report.

<https://www.vcla.at/2024/08/hv-stipend-announcement/>



*(c) Nadja Meister

Activities - Cooperations

FWF-funded Cluster of Excellence “Bilateral Artificial Intelligence”

The FWF-funded Cluster of Excellence (CoE) “Bilateral Artificial Intelligence” aims to provide AI with significantly better and broader skill acquisition and problem-solving abilities. Headed by **Sepp Hochreiter** (JKU Linz), the CoE board of directors includes renowned AI experts such as VCLA Co-Chair **Agata Ciabattoni** and VCLA Board Member **Thomas Eiter**.

At a press conference held at the offices of the Austrian Science Fund (FWF) on May 6, 2024, the FWF announced the approval of a new Cluster of Excellence, “Bilateral Artificial Intelligence – Discovering the Next Dimension of AI”, in the presence of **Martin Polaschek**, Federal Minister for Education, Science, and Research, and Christof Gattringer, president of the FWF. In the evening, selected guests were invited to a reception at the Urania observatory to celebrate the installation of the new cluster.

In this new Cluster of Excellence, the major Austrian players in the field of Artificial Intelligence are teaming up to combine symbolic (logic-based) and sub-symbolic (machine learn-

ing-based) AI. The underlying idea is to imitate the organization of the human brain: According to the Brain Lateralization Hypothesis, the left hemisphere is in charge of language and logical reasoning, whereas the right hemisphere is dominant in performing visual-spatial tasks. Similarly, AI would benefit from a bilateral structure in which Knowledge Representation and Reasoning (left hemisphere) informs Machine Learning (right hemisphere) to create synergy effects. This approach will improve the skill acquisition and problem-solving abilities of AI, thereby making existing technologies even better.

The VCLA assists the CoE as needed, e.g., through distributing calls for open positions, and the dissemination of the obtained results.

<https://www.vcla.at/2024/05/bilateral-artificial-intelligence/>

Date: May 6, 2024

Venue: FWF Office & Urania

Activities - Cooperations

FWF-funded Cluster of Excellence “Bilateral Artificial Intelligence”



Agata Ciabattini, Christoph Lampert, Sepp Hochreiter, Gerhard Friedrich, Martina Seidl, Thomas Eiter, Axel Polleres (from left to right) © FWF/Daniel Novotny



Activities - Cooperations

Vienna Ball of Sciences 2024 - Logic Riddle “Climate Journey”

The Vienna Ball of Sciences 2024 was held on Saturday, **January 27**, at Vienna’s city hall (Rathaus). As part of the many attractions of the event, ball guests were again asked to put their logic skills to the test! As the topic of the ball was the climate crisis, this year’s logic puzzle **“Climate Journey”** required visitors to calculate the total CO₂ emissions caused by five travelers on their journeys through Europe with different modes of transport. The puzzle was again created by **Anouk Michelle Oudshoorn**, a PhD student in our doctoral college LogiCS@TUWien. You may download the puzzle on our website, and then see if you arrived at the correct solution! The CO₂ calculations are based on the website *Mein Klimaschutz*.

The fastest guest to solve the puzzle on the evening of the ball was **Rishabh Sahu**, a postdoc at the Institute of Science and Technology Austria (ISTA) – congratulations! Second place went jointly to **Yilan Xu** and **Honghui Qian**, and third place was awarded to **Julia Mader** and **Benjamin Gallauner**. The pictures show the VCLA team as well as our winner Rishabh with puzzle author

Anouk! It was great to see so many motivated guests – we were out of prizes early!

<https://www.vcla.at/2024/01/vienna-ball-of-sciences-2024/>



Activities - Cooperations

MSCA COFUND Doctoral Program LogiCS@TUWien

The Doctoral College Logical Methods in Computer Science (LogiCS) is an interdisciplinary Marie Skłodowska-Curie COFUND doctoral program at TU Wien that educates 20 PhD students for 4 years on logical methods in Computer Science and their applications, in particular in Artificial Intelligence, Databases, Verification, Algorithms, Security and Cyber-Physical Systems.

LogiCS was established in March 2014 by Helmut Veith† and Stefan Szeider. The first two editions of this doctoral program were funded by the Austrian Science Fund (FWF) and run jointly with universities in Graz and Linz. LogiCS@TUWien is the third generation and was officially launched on October 1, 2021.



VCLA co-chair Stefan Szeider acts as Chair & Program Coordinator and Anna Prianichnikova acted as the Program Manager. In the months following the launch, 20 PhD students were recruited in three calls for application.

The faculty of LogiCS comprises renowned researchers with strong records in research, teaching, and advising.

Among the successful graduates of LogiCS are Anna Lukina (now Assistant Prof. at TU Delft), Kees van Berkel (now Assistant Prof. at TU Wien), and Katalin Fazekas (now Assistant Prof. at TU Wien).

<https://www.vcla.at/msca>



Activities - Cooperations

MSCA COFUND Doctoral Program LogiCS@TUWien Proficiency Evaluations December 2023 and May 2024

The first LogiCS@TUWien proficiency evaluations in the period of this report were held on December 14/15, 2023, in the Helmut Veith Lecture Hall of TU Wien Informatics, prior to the dedication ceremony.

The students who presented were Davide Soldà, Michele Collevati, Dmitry Rozplokhas, Tobias Nießen, and Anouk Oudshoorn (December 14), followed by Josephine Dik, Ignacio David Lopez Miguel, Hai Xia, and Liana Khazaliya (December 15).

On May 22, 2024, another round of proficiency evaluations took place in the Zemanek Lecture Hall; presentations were given by Florian Sextl, Eda Cicek, Dominik Pichler, Tianwei Zhang, Giovanni Buraglio, Islam Hamada, and Mathis Rocton.

**Date: December 14 / 15, 2023
May 22, 2024**

**Venue: Helmut Veith Lecture Hall
Zemanek Lecture Hall**



Activities - Cooperations

MSCA COFUND Doctoral Program LogiCS@TUWien Industry Day

On **January 19, 2024**, we hosted an “Industry Day” for our doctoral college LogiCS@TUWien, so that our PhD students could discuss their projects with external guests.

Industry professionals included **Herwig Schreiner** (Siemens), **Birgit Hofreiter** (TU Wien Innovation Incubation Center), and **Tobias Kaminski** (Bosch). The students had the opportunity to present posters showing their current research in order to receive feedback and helpful input.

Date: January 19, 2024

Venue: Kontaktraum,
Gusshausstraße 27



Media Coverage

The VCLA was present in the media through its members and activities.

September 9, 2024

science.orf.at

Forschungsteam will KI Logik beibringen

<https://science.orf.at/stories/32265895>

July 25, 2024

CAV2024 conference website

Realizing Leibniz's dream (Logic Lounge in Montreal)

<https://i-cav.org/2024/logic-lounge>

July 18, 2024

TU Wien Informatics

WWTF Funding Firework!

(incl. project AXAIS – Aquiring and Explaining Norms for AI Systems)

<https://informatics.tuwien.ac.at/news/2687>

June 19, 2024

Der Standard

Die Chatkontrolle ist ein Sicherheitsrisiko für Europa

(chat monitoring is a security risk for all of Europe) feat. Matteo Maffei

<https://www.derstandard.at/story/3000000224972/die-chatkontrolle-ist-ein-sicherheitsrisiko-fuer-ganz-europa>

June 10, 2024

TU Wien

ERC Advanced grant for Matteo Maffei: Guaranteed Security for Blockchains

<https://www.tuwien.at/en/tu-wien/news/news-articles/news/erc-advanced-grant-fuer-matteo-maffei-garantierte-sicherheit-fuer-blockchains>

June 6, 2024

TU Wien Informatics

LogicLounge 2024 with Georg Gottlob

<https://informatics.tuwien.ac.at/news/2661>

Media Coverage

May 31, 2024

TU Wien Informatics

20 Jahre TU Wien Informatics

(TU Wien Informatics turns 20; the LogicLounge was part of the festivities)

<https://www.tuwien.at/tu-wien/aktuelles/news/news/20-jahre-tu-wien-informatics>

May 6, 2024

FWF

Österreichs nächste Exzellenzcluster starten

(Austria's next Clusters of Excellence are about to launch)

<https://www.fwf.ac.at/aktuelles/detail/oesterreichs-naechste-exzellenzcluster-starten>

May 6, 2024

TU Wien

Exzellenzcluster für KI bewilligt mit starker Beteiligung der TU Wien

(Clusters of Excellence for AI approved with strong participation of TU Wien)

<https://www.tuwien.at/tu-wien/aktuelles/news/news/exzellenzcluster-fuer-ki-be-willigt-mit-starker-beteiligung-der-tu-wien>

May 6, 2024

OTS

„Bilaterale KI“: Projekt unter der Leitung der JKU erhält FWF Cluster of Excellence

(„Bilateral AI“: Project under JKU leadership receives FWF Cluster of Excellence)

https://www.ots.at/presseaussendung/OTS_20240506_OT50082/bilaterale-ki-projekt-unter-leitung-der-jku-erhaelt-fwf-cluster-of-excellence

April 29, 2024

TU Wien Informatics

Maria Christakis and Laura Kovács win Amazon Research Awards

<https://informatics.tuwien.ac.at/news/2633>

Media Coverage

April 23, 2024

TU Wien Informatics

Opening of the TU Wien Cyber Security Center (CySec)

<https://informatics.tuwien.ac.at/news/2628>

April 5, 2024

Ö1 matrix (podcast)

Wird alles berechenbar?

(Will everything be predictable?)

<https://podcasts.apple.com/at/podcast/%C3%B61-matrix/id1088333373>

January 2024

Wiener Ball der Wissenschaften (magazine of the Austrian Ball of Sciences),
page 34

Intelligenz statt Ignoranz (Intelligence instead of Ignorance)

An interview with VCLA Board Member Georg Gottlob.

page 36

Logic Puzzle: Climate Journey

https://www.wissenschaftsball.at/wp-content/uploads/2024/01/WbdW24_Mag.pdf

January 23, 2024

TU Wien

Vom Knowledge zum Know-how: Wie aus alten Materialien Neues entstehen kann
(from knowledge to know-how: how to turn used materials into something new)

This is an FFG-funded project in which the VCLA is participating.

<https://www.tuwien.at/tu-wien/aktuelles/news/news/vom-knowledge-zum-know-how-wie-aus-alten-materialien-neues-entstehen-kann>

December 17, 2023

TU Wien Informatics

Helmut Veith Lecture Hall Opening

<https://informatics.tuwien.ac.at/news/2555>

Media Coverage

December 15, 2023

TU Wien

Helmut Veith Lecture Hall Dedication Ceremony

<https://www.tuwien.at/en/tu-wien/news/events/news/helmut-veith-lecture-hall-dedication-ceremony>

December 13, 2023

TU Wien

TU Wien Informatics Awards das erste Mal vergeben

(TU Wien Informatics Awards presented for the first time)

Ana Vesic, the 6th recipient of the Helmut Veith Stipend, received a Siemens Excellence Award.

<https://www.tuwien.at/tu-wien/aktuelles/news/news/tu-wien-informatics-awards-das-erste-mal-vergeben>

November 25, 2023

Kurier

Ethikunterricht für KI-Systeme

(“ethics training for AI systems”, feat. VCLA co-chair Agata Ciabattoni)

<https://kurier.at/wien-wills-wissen/kuenstliche-intelligenz-ethikunterricht-fuer-ki-systeme/402680113>

October 2, 2023

vut.cz (Brno University of Technology)

Barbora Šmahlíková received the VCLA International Student Awards

<https://www.vut.cz/en/but/f19528/d246103>

VCLA Chairs



Agata Ciabattoni and Stefan Szeider, co-chairs of the VCLA since December 2017

© Luiza Puiu / Nadja Meister

Agata Ciabattoni and Stefan Szeider are co-chairs of the Vienna Center for Logic and Algorithms. Stefan Szeider and Helmut Veith (1971-2016) founded the VCLA in 2011, assuming chair's strategic leadership over its activities.

Agata Ciabattoni is a full professor at TU Wien. In 2011, she has been awarded a START prize, the highest Austrian award for early career researchers, for her project “Non classical proofs: Theory, Applications and Tools.”

In her research, Ciabattoni focuses on non-classical logics (Deontic Logics, Fuzzy Logics, Substructural Logics...), investigating their proof theory and semantics, and applying them to various fields, including Artificial Intelligence, Legal Reasoning and Indian Philosophy.

Stefan Szeider is a full professor at TU Wien and head of the Algorithms and Complexity Group. He is also the co-chair of the MSCA COFUND Doctoral Program LogiCS@TUWien, and the 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.

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Vienna Center for
Logic and Algorithms



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