

ÖAW

AUSTRIAN  
ACADEMY OF  
SCIENCES

OCTOBER 7–9, 2024  
AUSTRIAN ACADEMY OF SCIENCES  
DR. IGNAZ SEIPEL-PLATZ 2  
1010 VIENNA



# COLLOQUIUM LOGICUM 2024

WITH THE FIRST AWARDING OF THE ERNST-ZERMELO-RING,  
THE PHD COLLOQUIUM 2024, AND A YOUNG ACADEMY  
DISTINGUISHED LECTURE BY JAN VON PLATO (HELSINKI  
UNIVERSITY) AND HUGH WOODIN (HARVARD UNIVERSITY)



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# ABOUT THE COLLOQUIUM

The *Colloquium Logicum* is organised every two years by the *Deutsche Vereinigung für Mathematische Logik und für Grundlagenforschung der Exakten Wissenschaften (DVMLG)* as an international conference with high-profile international plenary speakers and contributed talks. The Colloquium Logicum covers all areas of mathematical logic, as well as philosophical logic, logic in computer science, and philosophy of science.

Colloquium Logicum 2024 (CL 2024) is the first such colloquium to take place outside of Germany; the DVMLG was delighted that the Austrian Academy of Sciences agreed to host CL 2024 at their venue in Vienna.

The keynote speakers of CL 2024 are Carolin Antos (Konstanz), Libor Barto (Prague), Moritz Müller (Passau), Aristotelis Panagiotopoulos (Vienna), Francesca Poggiolesi (Paris), and Nadja Valentin (Düsseldorf).

Since 2002, the DVMLG has organised a special colloquium for recent PhD graduates as part of the Colloquium Logicum, known as the PhD Colloquium. Members of the DVMLG nominated excellent junior researchers who graduated between September 2022 and September 2024 to be invited to present their doctoral work. This year's PhD Colloquium speakers are Azul Fatalini, Takehiko Gappo, Deborah Kant, Andreas Lietz, Nicholas Pischke, Deniz Sarikaya, Linus Richter, and Florian Starke.

## **CL 2024 PROGRAM COMMITTEE**

Franziska Jahnke, Benedikt Löwe (chair), Julien Murzi, Michael Pinsker, Grigor Sargsyan.

## **CL 2024 ORGANISING COMMITTEE**

Matthias Aschenbrenner, Vera Fischer, Sandra Müller, Georg Schiemer.

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## ABOUT THE PRIZE

The standard axiomatic foundations of mathematics are the Zermelo-Fraenkel axioms of set theory, named after Ernst Zermelo (1871-1953). Zermelo's work was invaluable for the foundations of mathematics, but reached far beyond foundational questions. His widow Gertrud and Professor Heinz-Dieter Ebbinghaus provided his signet ring, inherited from Ernst Zermelo's grandfather Ferdinand and currently in the university archives in Freiburg, for the creation of an academic award.

The DVMLG awards the Ernst-Zermelo-Ring quadrennially to an active researcher in the foundations of mathematics who had a lasting impact on the development of the field and who is expected to remain active in the coming years.

The award committee, consisting of Steffen Lempp, Benedikt Löwe, Michael Rathjen, and Katrin Tent, decided to appoint Professor Ulrich Kohlenbach as the first bearer of the Ernst-Zermelo-Ring. The award ceremony will take place at CL 2024 on Monday, October 7, 2024.

## LAUDATIO

In the 1950s, Georg Kreisel was already emphasising the possibility of applications of proof-theoretical methods to concrete problems in core mathematics, calling his approach the „unwinding of proofs“. During the last three decades, this idea has led to the programme of *proof mining*, which has been systematically developed by Ulrich Kohlenbach and his co-workers. It uses tools from mathematical logic to extract explicit quantitative information (e.g., rates of convergence) from *prima facie* non-constructive proofs (e.g., convergence proofs). This has been applied particularly successfully in the context of non-linear analysis, especially fixed point theory, ergodic theory, topological dynamics and convex optimisation.

The systematic nature of the underlying methodology was borne out by the discovery, between 2003 and 2005, of logical meta-theorems that explain it as instances of general proof-theoretic phenomena. The meta-theorems are based on certain proof-theoretic transformations (*proof interpretations*), notably Ulrich Kohlenbach's monotone functional interpretation, which are far-reaching extensions and modifications of Gödel's famous functional (*Dialectica*) interpretation.

# PROGRAM

MONDAY, OCTOBER 7, 2024

## SITZUNGSSAAL

- 9:30–10:20 **Keynote 1:** *(Conceptual) explanations in logic*  
**Francesca Poggiolesi** | Université Paris 1 Panthéon-Sorbonne
- 10:20–10:40 BREAK
- 10:40–11:10 **PhD Colloquium 1:** *Formal representation and mathematical practice – Capturing dynamics of axiomatizations with methods from philosophy of science*  
**Deniz Sarikaya** | Vrije Universiteit Brussel & Universität zu Lübeck
- 11:10–11:40 **PhD Colloquium 2:** *Independence and naturalness in set-theoretic practice*  
**Deborah Kant** | Universität Hamburg
- 11:40–12:10 **PhD Colloquium 3:** *Paradoxical sets and the Axiom of Choice*  
**Azul Fatalini** | Westfälische Wilhelms-Universität Münster
- 12:10–13:30 LUNCH BREAK
- 12:15–13:15 During the lunch break: General Assembly of the members of the DVMLG (held in German; sandwich lunch for members provided).

## JOHANNESSAAL

- 13:30–13:50 *Arbitrary Frege Arithmetic*  
**Ludovica Conti**
- 13:50–14:10 *Synonymy of formal theories: axioms and examples*  
**Mirko Engler**

14:10–14:30 BREAK

## SITZUNGSSAAL

- 13:30–13:50 *Cofinitary groups and projective well-orders*  
**Lukas Schembecker**
- 13:50–14:10 *Hausdorff dimension and countable Borel equivalence relations*  
**Dino Rossegger**

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## SITZUNGSSAAL

- 14:30–15:10 *150 Years of Set Theory*  
**Clara List & Benedikt Löwe** | Universität Hamburg
- 15:10–15:30 BREAK
- 15:30–17:00 **Award Ceremony: Ernst-Zermelo-Ring**  
**Matthias Baaz** (Laudatio) & **Ulrich Kohlenbach**

## AULA

- 17:00 Reception

## TUESDAY, OCTOBER 8, 2024

### SITZUNGSSAAL

- 9:30–10:20 **Keynote 2:** *On the consistency of circuit lower bounds for non-deterministic times*  
**Moritz Müller** | Universität Passau
- 10:20–10:40 BREAK
- 10:40–11:10 **PhD Colloquium 4:** *Higher models of determinacy*  
**Takehiko Gappo** | Technische Universität Wien
- 11:10–11:40 **PhD Colloquium 5:** *„ $NS_{\omega_1}$  is  $\omega_1$ -dense“ from large cardinals – a journey guided by the stars*  
**Andreas Lietz** | Technische Universität Wien
- 11:40–14:00 LUNCH BREAK
- 14:00–14:50 **Keynote 3:** *Groups and fields in higher classification theory*  
**Nadja Valentin** | Heinrich-Heine-Universität Düsseldorf
- 14:50–15:10 BREAK

## JOHANNESSAAL

15:10–15:30 *A priori belief updates using dynamic logic*  
**Giorgio Cignarale**

15:30–15:50 *A sufficient epistemic condition for solving stabilizing agreement*  
**Stephan Felber**

15:50–16:10 *Hierarchical pluralism is actually monist universalism*  
**Matteo de Ceglie & Simon Schmitt**

16:10–16:30 *The architecture of mathematics revisited*  
**Claudio Ternullo**

16:30–16:40 BREAK

## SITZUNGSSAAL

16:40–17:30 **Keynote 4:** *Defectiveness of mathematical concepts: a moderately exceptionalist view*  
**Carolin Antos** | Universität Konstanz

## WEDNESDAY, OCTOBER 9, 2024

## SITZUNGSSAAL

9:30–10:20 **Keynote 5:** *Clones, constraints, and minions*  
**Libor Barto** | Univerzita Karlova Praha

10:20–10:40 BREAK

10:40–11:10 **PhD Colloquium 6:** *Proof-theoretical aspects of non-linear and set-valued analysis*  
**Nicholas Pischke** | Technische Universität Darmstadt

## SITZUNGSSAAL

15:10–15:30 *Model-theoretic tilting – arbitrary rank welcome*  
**Margarete Ketelsen**

15:30–15:50 *O-minimal definitions of the Gamma and Riemann zeta functions*  
**Adele Padgett**

15:50–16:10 *Tame pairs of transseries fields*  
**Nigel Pynn-Coates**

16:10–16:30 *On three-valued semantics for impure simplicial complexes*  
**Rojo Fanamperana Randrianomentsoa**

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- 11:10–11:40 **PhD Colloquium 7: On the definability and complexity of sets and structures**  
**Linus Richter** | National University of Singapore
- 11:40–12:10 **PhD Colloquium 8: Digraphs modulo primitive positive constructability**  
**Florian Starke** | Technische Universität Dresden
- 12:10–14:00 LUNCH BREAK
- 14:00–14:50 **Keynote 6: Incompleteness theorems for observables in general relativity**  
**Aristotelis Panagiotopoulos** | Universität Wien
- 14:50–15:10 BREAK

## JOHANNESSAAL

- 15:10–15:30 *Conway à la du Bois-Reymond*  
**Vincent Bagayoko**
- 15:30–15:50 *Proof mining and asymptotic regularity*  
**Laurențiu Leuştean**
- 15:50–16:10 *Sunny non-expansive retractions in non-linear spaces*  
**Pedro Pinto**
- 16:10–16:30 *New proof mining results on Halpern's iteration in non-linear spaces*  
**Andrei Sipos**
- 16:30–17:00 BREAK

Afterwards, you are cordially invited to the continuation of the Young Academy Distinguished Lecture Series:

## SITZUNGSSAAL

- 17:00 **The boundaries of mathematics – from Gödel to the study of large infinities**  
**Jan von Plato** | Helsinki University  
**W. Hugh Woodin** | Harvard University  
**Sandra Müller** | Technische Universität Wien
- 19:00 **Reception**

## **ORGANISER**

Austrian Academy of Sciences

## **CONTACT**

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Please register via the QR code or the link below

<https://www.oeaw.ac.at/veranstaltungen/anmeldung/colloquium-logicum-2024>

<https://collog2024.conf.tuwien.ac.at>

We would like to inform you that photos and film recordings (image and sound) will be made during the lecture.

Photos: OeAW/Daniel Hinterramskogler