



**combinatorial
synergies**

Review and Outlook

The past, the present and the future

Annual Meeting of the SPP “Combinatorial Synergies”

the past and the present

members

61 members:

- 34 project PIs
incl. 4 PIs “Eigene Stelle”
- 20 PhD students
- 7 postdocs

11 associate members



8 workshops
in the last year

3 schools
throughout all seasons

Wachspress Geometry, Leipzig, Sep '24

Martin Winter, Rainer Sinn

Geometry without Geometry, Frankfurt, Dec '24

Raman Sanyal, Martin Ulirsch

Winter School and Workshop on Polytopes, Osnabrück, Feb '25

Martina Juhnke, Matthias Reitzner, Christoph Thäle

Combinatorial Synergies East, Leipzig, Mar '25

Thomas Kahle, Bernd Sturmfels

Algebraic Statistics, Munich, Mar '25

Carlos Améndola, Mathias Drton, Ben Hollering, Thomas Kahle

Spring School “Dynkin Classification”, Bochum, Mar '25

Karin Baur, Alexander Ivanov, Markus Reineke, Gerhard Röhrle, Christian Stump

New perspectives on hyperplane arrangements, Bochum, May '25

Takuro Abe, Gehrhard Röhrle, Johannes Schmitt, Christian Stump

Summer School “Nonlinear Optimization and Combinatorics”

Braunschweig, Aug '25

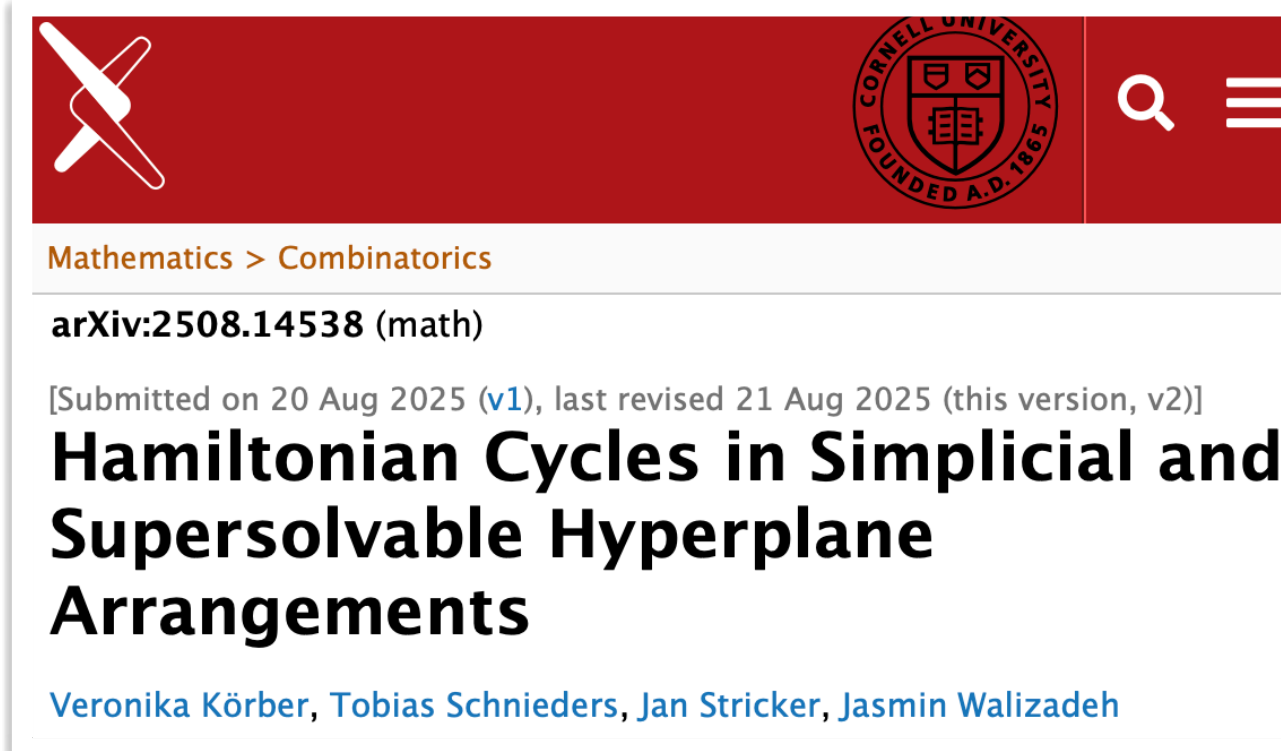
Christian Kriches, Thorsten Theobald, Timo de Wolff, Jonas Ellwanger, Birte Ostermann, Nikolas Rieke

2 dives into research

Hannover, March '25

Michael Cuntz, Lukas Kühne, Raman Sanyal

- 12 students + 3 PhD students
- 3 weeks + 1 semester
- 3 projects
- 2 articles



Bochum, September '25

Drew Armstrong, Karin Baur, MB, Christian Stump

- 14 students + 5 PhD Students + 2 Postdocs
- 5 weeks
- 4 projects
- currently ongoing



≥ 9 articles

with synergies to

- machine learning
- analysis and ODEs
- commutative algebra
- algebraic geometry
- optimization and control
- probability



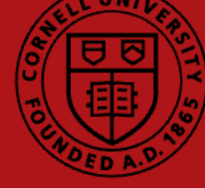
Mathematics > Commutative Algebra

arXiv:2503.02536 (math)

[Submitted on 4 Mar 2025]

The Likelihood Correspondence

Thomas Kahle, Hal Schenck, Bernd Sturmfels, Maximilian Wiesmann



Statistics > Machine Learning

arXiv:2508.13967 (stat)

[Submitted on 19 Aug 2025]

A PC Algorithm for Max-Linear Bayesian Networks

Carlos Améndola, Benjamin Hollering, Francesco Nowell



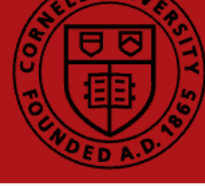
Mathematics > Probability

arXiv:2401.09418 (math)

[Submitted on 17 Jan 2024]

Quantification of the Fourth Moment Theorem for Cyclotomic Generating Functions

Benedikt Rednoß, Christoph Thäle



Mathematics > Classical Analysis and ODEs

arXiv:2505.04225 (math)

[Submitted on 7 May 2025]

Complete monotonicity of log-functions

Rourou Ma, Julian Weigert



Mathematics > Combinatorics

arXiv:2504.16678 (math)

[Submitted on 23 Apr 2025 (v1), last revised 9 May 2025 (this version, v2)]

An Intersection Product for the Polytope Algebra

Thomas Wannerer



Mathematics > Probability

arXiv:2411.00748 (math)

[Submitted on 1 Nov 2024]

Central limit theorems for the nearest neighbour embracing graph in Euclidean and hyperbolic space

Holger Sambale, Christoph Thäle, Tara Trauthwein



Mathematics > Optimization and Control

arXiv:2312.10500 (math)

[Submitted on 16 Dec 2023 (v1), last revised 6 Aug 2024 (this version, v3)]

Symmetric SAGE and SONC forms, exactness and quantitative gaps

Philippe Moustrou, Cordian Riener, Thorsten Theobald, Hugues Verdure



Mathematics > Algebraic Geometry

arXiv:2506.22415 (math)

[Submitted on 27 Jun 2025]

Linear operators preserving volume polynomials

Lukas Grund, June Huh, Mateusz Michałek, Hendrik Süß, Botong Wang

Journal of Symbolic Computation

Volume 127, March–April 2025, 102374

Symmetric SAGE and SONC forms, exactness and quantitative gaps ☆

Dedicated to the memory of Ágnes Szántó, an inspiring mathematical colleague and friend. Her contributions to computer algebra and symbolic computation, along with her scientific curiosity and dedication to our community, have left a lasting impression on us. We cherish the memory of her contributions and friendship

Philippe Moustrou^b, Cordian Riener^a, Thorsten Theobald^c ✉, Hugues Verdure^a

member's checklist

- Are you listed on the members website?
- Are your recent articles listed on the website?
- Do you mention the SPP in your acknowledgments (incl. grant no.)
- If you organized a conference with support from SPP: Did you submit a short report?

the future

5+ workshops
in the next year

Modern Perspectives on Geometry of Numbers, Cottbus, Sep '25
Gennadiy Averkov, Giulia Codenotti, Ansgar Freyer, Frank Vallentin, Marc Christian Zimmermann

94th Séminaire Lothringen de Combinatoire, Bad Boll, Sep '25
Christian Krattenthaler, Christian Stump

Groups, Finite and Infinite, Bielefeld, Sep '25
Kai-Uwe Bux, Thomas Gobet, Linus Kramer, Georges Neaime

Recent Developments on Lattice Polytopes, Leipzig, Jan '26
Akihiro Higashitani, Hidefumi Ohsugi, Irem Portakal

Polyhedral Geometry for Neural Networks, Nuremberg, Mar '26
MB, Christoph Hertrich, Georg Loho, Moritz Stargalla

1+ dive
into research

Combinatorics in Algebraic Statistics and Game Theory,
Dresden, Aug - Sep '26 (6 weeks)
Ben Hollering, Aida Maraj, Irem Portakal

Application Deadline: 15 February '26

Leadership Workshop

Hire only the best:

De-bias your workspace

with Philipp Gramlich

Friday, 26 September 2025,

9:00–11:30 am

2:30–5:00 pm

Online via Zoom

Aimed at postdocs, team leaders,
group leaders, professors



Registration form



timeline

for the second period
(Antragsperiode)

Jan '26 Open call: Start-up funds (“Anschubfinanzierung”)

- Stipend 2-4 months (total amount of funds: ca 20 months)
- Meant for postdocs to write a proposal for “Eigene Stelle” at the future hosting institution
- ≤ 1 visiting postdoc per hosting PI
- Start of stipend earliest in April '26

April '26 Call for proposals

Sept '26 Deadline proposals

Sept' '26 Annual Meeting (Jahrestagung)

April '27 Begin of second period

Questions?