Ekin Özman
Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence
University of Groningen
e.ozman@rug.nl

Evenement Event

ANTS in Groningen

The end of the academic year is busy for many people working in university, but this year may have been especially busy for the organizers of ANTS, which took place during the week of July 6 in Groningen. For those unfamiliar with the acronym and its connection to mathematics, ANTS stands for "Algorithmic Number Theory Symposium." The 17th edition of ANTS was held at the Bernoulli Institute, University of Groningen from July 6 to 10, 2026, in collaboration with organizers from Eindhoven, Leiden, and Oldenburg. This is the first time the symposium has returned to the Netherlands in 26 years, since it was last held at Leiden University in 2000.

Introduction

Held every two years since 1994, ANTS has become the premier international forum for new research in computational number theory and its applications, drawing together work on the algorithmic side of the field, from elementary and algebraic number theory to analytic number theory, the geometry of numbers, algebraic geometry, finite fields, and cryptography. Known for its high scientific standards, the symposium pairs invited talks with rigorously refereed contributed presentations, all while promoting an inclusive academic environment. Participants span the full range of career stages, from graduate students and early-career researchers to leading experts in the field, and junior scholars in particular benefit from real opportunities to share their work through paper presentations and poster sessions alike, which helps build mentorship and visibility within the community. That inclusive spirit has gone hand in hand with a strong international presence: since its founding, the symposium has rotated among host institutions in countries including the USA, France, Germany, the Netherlands, Australia, Canada, South Korea, New Zealand, and the UK. This year's edition carried that global reach further still, drawing 202 in-person and 44 online participants from 33 countries across 6 continents.

ANTS also bridges disciplinary boundaries, bringing together researchers from mathematics and computer science alongside professionals working on applications like cryptography and coding theory. That interdisciplinary reach shows up in the topics themselves, which move fluidly between foundational theory and real-world application, even as the core focus stays on algorithmic number theory. Nowhere is that influence more visible than in cryptography, where ANTS has repeatedly surfaced the implications of new number-theoretic results years before they reached the mainstream cryptography community. A few highlights from its history make the case: Shor's presentation of quantum algorithms for integer factorization and the discrete logarithm problem; the introduction of the NTRU cryptosystem, one of the leading candidates for post-quantum cryptography; Joux's tripartite Diffie–Hellman protocol, one of the earliest examples of pairing-based cryptography; and a string of advances in the complex multiplication method for constructing pairing-friendly elliptic curves, which now play a critical role in many cryptocurrency protocols. Even the preliminary results that ultimately led to SIKE's removal as a viable post-quantum candidate were first presented at ANTS XV.

ANTS has a wonderfully diverse format, and this year was no exception. Each day opened with an invited lecture, five given over the course of the symposium by distinguished researchers on topics of broad interest, selected jointly by the program and steering committees. These are joined by 27 contributed lectures, drawn from papers submitted to a call for papers and vetted through a rigorous peer-review process, with accepted papers appearing in a proceedings volume. Junior



Photo: Robin Visser

ANTS took place here.

researchers get their own spotlight too, through a poster session that lets them share their work with a wide audience and/or a lightning session, made up of 4 minute presentations of research for those not giving an invited or contributed talk. Then there's the rump session, reserved for short, informal contributions such as research updates, conference announcements, or any other bit of news the community wants to share, and finally the business meeting, where matters related to the organization and running of the event are discussed, including the selection of the venue for the next edition of ANTS.

Organization

A big group of people works behind the scenes to make an event like this possible. This year's organizing committee consisted of Florian Hess (Universität Oldenburg, Germany), Pınar Kılıçer, Steffen Müller, Ekin Özman, and Jaap Top (all of Rijksuniversiteit Groningen, Netherlands), Tanja Lange and Monika Trimoska (Technische Universiteit Eindhoven, Netherlands), and Marco Streng and Jan B. Vonk (Universiteit Leiden, Netherlands), along with our wonderful staff member Ineke Schelhaas from Bernoulli Institute. Alongside the organizing committee, a program committee is responsible for overseeing the review process for submitted papers, with each member typically handling a few submissions in their area of expertise. The program committee for ANTS XVII comprised 41 members from 31 leading institutions around the world, and their reward for all that reviewing is the honor of awarding the Selfridge Prize to the best contributed paper. The Selfridge Prize is a prize funded by the Number Theory Foundation and widely regarded as the most prestigious prize in algorithmic number theory. Publishing at ANTS is highly competitive: this year, only 27 of 72 submissions were accepted. Every contributed talk is a presentation of the results of a full paper reviewed by at least three referees, and accepted papers are published in a proceedings volume with journal-level quality. All accepted papers are made available during the conference itself to spark discussion on the spot. Overseeing it all is a steering committee, made up of the organizers of the five most recent symposia plus one member at large, led by a Chair and Vice Chair who each serve four-year terms.



Photo: Ştevan Gajović

Poster session and Reception.

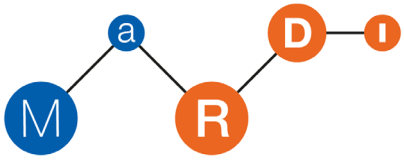


Photo: Pınar Kılıçer

Welcome by Jaap Top.

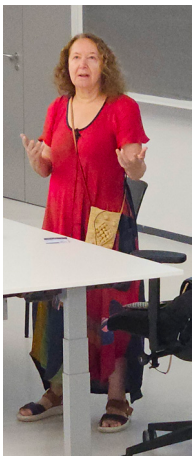
First day: recent results on K3 surfaces

ANTS-XVII opened with a warm welcome from Jaap Top, followed by the first invited talk of the symposium, given by Eva Bayer-Fluckiger (École Polytechnique Fédérale de Lausanne, Switzerland), who shared several interesting recent results and open questions on the arithmetic of K3 surfaces. The day continued with five contributed talks on algorithms and computations spanning gonalities of algebraic curves, Drinfeld modules, and superspecial abelian varieties, before moving into a lightning talk session featuring 23 short presentations. Monday wrapped up with a poster session and a delightful reception including plenty of Mediterranean-inspired food. What we didn't know yet was that the day had two award winners in store: the MaRDI award, given to the authors of the papers with the most reproducible software, and the "ANTSY," awarded for the best lightning talk. We'd have to wait until the rump session to find out who took them home.



Winners of the MaRDI award: A. Leudière and R. Scheidler, P. Gaudry, J. Soumier, P.J. Spaenlehauer, E. Costa, T. Dupuy, S. Marseglia, D. Roe and C. Vincent.

Tuesday: automorphic forms



Eva Bayer-Fluckiger.

The second day of the conference opened with an invited talk by Aurel Page (Centre Inria de l'université de Bordeaux, France), who explored the question, "What can automorphic forms tell us about algorithmic problems?" The day was loaded with contributed talks, nine in total, with one presented from the other side of the Atlantic. Together, these talks explored the arithmetic of curves, abelian varieties, and number fields, touching on rational points, modular curves, Chabauty methods, and abelian surfaces, along with hyperelliptic curve cryptography, Darmon–Dasgupta units, and p-adic cohomology. Among them was the eventual winner of the Selfridge Prize, though, once again, we had no idea yet.

Wednesday: elliptic and Shimura curves

By Wednesday, we were almost halfway through the event. After a few hiccups and small crises solved behind the scenes, it's fair to say the organizers had started to feel a little more relaxed. Being a half day, it may have been shorter, but it was certainly not lesser: as usual, we started with an invited talk, this time by Peter Koymans (Utrecht University, Netherlands), who spoke about his joint work with Carlo Pagano, explaining how to construct, for every number field, an elliptic curve defined over that field with rank equal to one. Until the day wrapped up with a group photo, we heard several contributed talks covering how to compute the cohomology of Shimura curves and Hilbert modular



Photo courtesy of R. Visser

Winners of the "cheque" from "The Bank of Genus 2 Curves": R. van Bommel, C. Maistret, J. Shi, A. Sutherland and R. Visser.



Photo: Pnar Kılıçer

Creator (J. Voight) and winner (A.A. Sanchez) of the "ANTSY".

forms, algorithms for generating factored smooth integers, and a result showing that there are elliptic curves admitting infinitely many twists satisfying the Birch–Swinnerton-Dyer conjecture.

Thursday: talks, awards and AI

Thursday opened with an invited talk by Sabrina Kunzweiler (Centre Inria de l'université de Bordeaux, France), who spoke about different models of principally polarized abelian varieties. After several interesting contributed talks ranging from isogeny graphs in cryptography to elliptic surfaces and lattices, the day continued with the rump session, which packed in 28 short talks: everything from conference announcements to an exploration of sleeping options on campus along with the presentation of the MaRDI and ANTSY awards, and even a special award from "The Bank of Genus 2 Curves." The day ended with the business meeting, during which a report on the current edition was shared with the participants, and several related topics including the bid for the next edition, the venue for the proceedings, and AI use at ANTS were discussed openly as a whole community. It was great seeing everyone able to express their opinions freely, with every voice taken into account.

Friday: future for computer algebra systems?

It was hard to believe the conference was



Photo: Gulsemin Çonoğlu

Happy PhD students Ilknur, Mustafa and Gulsemin after finally having their visas.



Photo: Pnar Kılıçer

Chair of the Steering Committee (A. Sutherland) and winner of the Selfridge Prize (J. Rouse).

about to end as we started the last day with a lively invited talk by John Voight (University of Sydney, Australia). This talk explored how computational experiments continue to shape number theory, ranging from statistical approaches to elliptic curve ranks and class group computations, to broader questions about the future of computer algebra systems during growing formalization and AI/machine learning integration. After contributed talks touching on classical notions in number theory, such as the Collatz conjecture and Carmichael numbers, it was finally time to reveal the winner of the Selfridge Prize: Jacob Mayle and Jeremy Rouse, for their paper "Rational points on modular curves via maps to elliptic curves with rank zero." The conference then came full circle, closing with remarks from Jaap Top, just as it had opened at the beginning of the week.

Conclusion

Of course, organizing such a big event required all sorts of contributions from various people and organizations. As expected, applications for several grants were handled by the organizing committee, but perhaps less expected was the help given to PhD students from countries requiring a visa to attend the conference. In some cases, a standard invitation letter wasn't enough, and a push from the local organizers was necessary to make sure participants could apply for their visas in time.

Financial contributions from several sponsors were of course essential. With Netherlands Organisation for Scientific Research (NWO) being the main sponsor of this event, the event was also supported by the ERC starting grant "GAGARIN", Clay Mathematics Institute, the Number Theory Foundation, Foundation Compositio Mathematica, 4TU+ AMI, Computer Algebra Nederland, Springer, the DIAMANT mathematics cluster, Fachgruppe Computeralgebra, U.S. National Science Foundation and the Bernoulli Institute.

All in all, it is fair to say that ANTS-XVII was a great success, which gave many of the participants an opportunity to visit the most northern part of the Netherlands. Between the talks, the poster sessions, and catching up with old friends and making new ones, the conference reminded us why this community keeps coming back together every two years. For those who got to spend the week here in Groningen, it was easy to agree with us locals when we say:

Er gaat niets boven Groningen.



Photo: Ineke Schelhaas

ANTS-XVII, Groningen.