

Ziyang GAO

Curriculum Vitae

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Research Interests

Arithmetic geometry, (mixed) Shimura varieties, Diophantine geometry, families of abelian varieties, rational/integral points, transcendence problems.

Academic Positions

- 2024– **Professor.**
UCLA, CA, USA
- 2021–2024 **Professor**, W3 (highest level in the German system).
Leibniz University Hannover, Germany
- 2015–2021 **chargé de recherche**, (tenured junior researcher).
CNRS, Institut Mathématiques de Jussieu-Paris Rive Gauche, Paris, France
- 2016–2018 **Instructor.**
Princeton University, NJ, USA
- 2015–2016 **Member.**
Institute for Advanced Study (IAS), NJ, USA

Education

- 2012–2015 **PhD of Math**, Université Paris-Sud, France and Leiden University, Netherlands.
Supervisors: Emmanuel Ullmo and Bas Edixhoven
Dissertation: The mixed Ax–Lindemann theorem and its applications to the Zilber–Pink conjecture.
- 2011–2012 **M2 (Master 2) of Math**, Université Paris-Sud, France.
- 2010–2011 **M1 (Master 1) of Math**, University of Milan, Italy.
- 2006–2010 **Bachelor of Science, Math**, Peking University, China.

Awards and Fundings

- Spring 2026 Von Neumann Fellowship, IAS.
- 2025 Compositio Prize for the period 2020–2022.

Awarded every 3 years to a paper published in the journal *Compositio Mathematica*. For my paper “Generic rank of Betti map and unlikely intersections”.

2024 Frontiers Science Award.

2023 ICCM Best Paper Award (International Consortium of Chinese Mathematicians).

2022 David Goss Prize.

Awarded every two years to mathematicians under 35 for outstanding contributions to number theory.

2020 ICCM Best Paper Award (International Consortium of Chinese Mathematicians).

09/2020- ERC Starting Grant "UnIntUniBd", approx. 1,5 million €. Early termination 09/2024
08/2025 after move to the US.

02/2020- research funding ANR T-ERC(7) "UniBdPt", approx. 120k €. Early termination in
07/2022 08/2020 after awarded ERC.

2015 Stieltjes Prize.

Dutch mathematical thesis prize.

Publications and Preprints

- 23 **Hodge cycles and quadratic relations between holomorphic periods on CM abelian varieties** (with E. Ullmo), *Preprint*, 2024.
- 22 **Heights and periods of algebraic cycles in families** (with S. Zhang), *Preprint*, 2024.
- 21 **Bigness of the tautological line bundle and degeneracy loci in families of abelian varieties**, *Compte-rendu*, 2024.
- 20 **Bi- $\overline{\mathbb{Q}}$ -structure on Hermitian symmetric spaces and quadratic relations between CM periods** (with E. Ullmo and A. Yafaev), *Preprint*, 2024.
- 19 **The Relative Manin–Mumford Conjecture** (with P. Habegger), *Preprint*, 2023.
- 18 **Degeneracy loci in the universal family of abelian varieties** (with P. Habegger), *Journal of Number Theory (JNT Prime)*, vol. 270 (Proceedings of the Second JNT Biennial Conference 2022), p. 96-121, 2025.
doi.org/10.1016/j.jnt.2024.05.015, published online in May 2024
- 17 **The Uniform Mordell–Lang Conjecture** (with T. Ge and L. Kühne), *Preprint*, 2021.
- 16 **Recent developments of the Uniform Mordell–Lang Conjecture**, *Survey*, 2021.
- 15 **The Ax–Schanuel conjecture for variations of mixed Hodge structures** (with B. Klingler), *Math. Annalen*, vol. 388, p. 3847–3895, 2024.
doi.org/10.1007/s00208-023-02614-w, published online in April 2023
- 14 **A consequence of the relative Bogomolov conjecture** (with V. Dimitrov and P. Habegger), *Journal of Number Theory (JNT Prime)*, vol. 230 (Proceedings of the First JNT Biennial Conference 2019), p. 146–160, 2022.
- 13 **Uniformity in Mordell–Lang for curves** (with V. Dimitrov and P. Habegger), *Annals of Mathematics*, vol. 194, p. 237–298, 2021.

- 12 **Uniform bound for the number of rational points on a pencil of curves** (with V. Dimitrov and P. Habegger), *IMRN*, vol. 2021, p. 1138-1159, 2021.
doi.org/10.1093/imrn/rnz248, published online in December 2019
- 11 **Generic rank of Betti map and unlikely intersections**, *Compositio Mathematica*, vol. 156 (12), p. 2469-2509, 2020.
- 10 **The Geometric Bogomolov Conjecture** (with S. Cantat, P. Habegger and J. Xie), *Duke Mathematical Journal*, vol. 170, p. 247-277, 2021.
- 9 **Mixed Ax–Schanuel for the universal abelian varieties and some applications**, *Compositio Mathematica*, vol. 156 (11), p. 2263-2297, 2020.
- 8 **Faltings Heights and L-functions** (with R. von Känel and L. Mocz), in “Arithmetic and Geometry: Ten Years in Alpbach” edited by Gisbert Wüstholz and Clemens Fuchs, *Annals of Mathematics Studies*, vol. 202, Princeton U. Press.
- 7 Appendix to **The Betti map associated to a section of an abelian scheme** (Y. André, P. Corvaja and U. Zannier), *Inventiones mathematicae*, vol. 222, p. 161-202, 2020.
- 6 **Heights in families of abelian varieties and the Geometric Bogomolov Conjecture** (with P. Habegger), *Annals of Mathematics*, vol. 189, p. 527-604, 2019.
- 5 **Panorama on Ax type transcendence results**, *Proceedings of the 7th ICCM*, vol. II, p. 33-52, International Press of Boston, 2019.
- 4 **Enlarged mixed Shimura varieties, bi-algebraic system and some Ax type transcendental results**, *Forum of Mathematics, Sigma*, vol. 7, 2019, e16.
- 3 **About the mixed André–Oort conjecture: reduction to a lower bound for the pure case**, *Comptes rendus Mathématique*, vol. 354, p. 659-663, 2016.
- 2 **A special point problem of André–Pink–Zannier in the universal family of abelian varieties**, *Annali della Scuola Normale Superiore di Pisa, Classe di Scienze*, vol. XVII, p. 231-266, 2017.
- 1 **Towards the André–Oort conjecture for mixed Shimura varieties: the Ax–Lindemann theorem and lower bounds for Galois orbits of special points**, *Journal für die reine und angewandte Mathematik (Crelle)*, vol. 732, p. 35-146, 2017.

Teaching

- Fall 2025 **207A: Introduction to Shimura varieties and compactifications**, *UCLA*, CA (USA).
- Spring 2025 **207C: Introduction to Arakelov Geometry**, *UCLA*, CA (USA).
- W&S 2025 **Participating Number Theory Seminar: Mordell Conjecture, after Faltings 1983**, *UCLA*, CA (USA).
- Winter 2025 **110BH: Honors Algebra**, *UCLA*, CA (USA).
- Spring 2024 **Elliptic Curves**, *Leibniz University Hannover*, Hannover (Germany).
- Fall 2023 **Algebraic Number Theory 2**, *Leibniz University Hannover*, Hannover (Germany).

- Spring 2023 **Block seminar: Irrationality and Transcendence**, *Leibniz University Hannover*, Hannover (Germany).
- Spring 2023 **Block seminar : Mordell Conjecture**, *Leibniz University Hannover*, Hannover (Germany).
- Fall 2022 **Diophantine Geometry**, *Leibniz University Hannover*, Hannover (Germany).
- Spring 2022 **Algebraic Groups**, *Leibniz University Hannover*, Hannover (Germany).
- Fall 2021 **Diophantine Geometry**, *Leibniz University Hannover*, Hannover (Germany).
- Sep 2021 **minicourse at ETH-UZh-Sbg Arithmetic and Geometry Research Group workshop**, Alpbach (Austria).
- Spring 2018 **MAT 202, Linear Algebra with applications**, *Princeton University*, NJ (USA).
- Fall 2017 **MAT 214, Numbers, Equations and Proofs**, *Princeton University*, NJ (USA).
- Spring 2017 **MAT 202, Linear Algebra with applications**, *Princeton University*, NJ (USA).
- Fall 2016 **MAT 214, Numbers, Equations and Proofs**, *Princeton University*, NJ (USA).
- Spring 2015 **Number theory 2: Local fields**, *Leiden University*, Leiden (Netherlands).
- Fall 2014 **Introduction to Algebraic Topology**, *Leiden University*, Leiden (Netherlands).

Long-term Visiting Scholar

- 07-09/2024 Morningside Center of Mathematics, Beijing, China.
- 01-04/2023 MSRI, Berkeley, CA, USA. For the special program “Diophantine Geometry”.
- Organizer of the Learning Seminar. Scientific program writer of the part “Uniform Mordell–Lang and adelic line bundles” and gave 2 lectures.
- 02-03/2022 IHES, Bures-sur-Yvette, France.
- 08/2018 Morningside Center of Mathematics, Beijing, China.
- 2017-2018 Institute for Advanced Study (IAS), Princeton, NJ, USA.
- 06/2017 Fields Institute, Toronto, Canada.

Advising and mentoring

PhD thesis

- 2024– **John Zhou**, *UCLA*, CA, USA.
- 2024– **Zhaobo (Tom) Han**, *UCLA*, CA, USA.
- 2024 **Ruida Di**, *Leibniz University Hannover*, Germany.

PhD tutor

- 2020-2021 **Camille Amoyal**, *Sorbonne Université*, France.
- 2019-2021 **Zhouhang Mao**, *Sorbonne Université*, France.

Bachelor and master thesis

- 2023 **Justus Wiegand**, *bachelor*, *Leibniz University Hannover*, Germany.
- 2022 **Maximilian Rabeler**, *master*, *Leibniz University Hannover*, Germany.

- 2021 **Ruida Di**, *master, Sorbonne Université, France.*
- 2019 **Sou-Manh Chhin**, *master, Université Paris-Diderot, France.*
- 2018 **Zhenlin Ran**, *master, Université Paris-Diderot, France.*

Postdocs

- **Riccardo Pengo**, *Leibniz University Hannover, Germany, 10/2023-09/2024.*
Tenure-track researcher at University of Messina (Italy).
- **Francesco Campagna**, *Leibniz University Hannover, Germany, 10/2022-08/2023.*
Assistant Professor with tenure at Clermont-Ferrand (France).
- **Hang Fu**, *Leibniz University Hannover, Germany, 10/2022-09/2024.*
Postdoc at Basel (Switzerland).
- **Gabriel Dill**, *Leibniz University Hannover, Germany, 04/2022-09/2023, on leave 01-05/2023 for a postdoc at MSRI.*
Assistant Professor at Neuchâtel (Switzerland).
- **Guy Fowler**, *Leibniz University Hannover, Germany, 10/2021-09/2024.*
Postdoc at Manchester.
- **Jinzhao Pan**, *Sorbonne Université and Leibniz University Hannover, France and Germany, 01/2021-09/2024.*
Postdoc at Shanghai Jiaotong University.

Academic Experience

(Selected) Conferences Talks

- Nov 2025 Diophantine approximation and transcendence, CIRM, Luminy (France).
- Sep 2025 Frontier in Mathematical Sciences, Hong Kong.
- Jul 2025 section “Varieties over global fields” of SRI (Algebraic Geometry conference every 10 years), Colorado (USA).
- Jun 2025 Complex Geometry and Beyond (Ngaiming Mok’s 70th birthday conference), Shanghai (China).
- Sep 2024 Southern California Number Theory Day, Irvine (CA, USA).
- Jul 2024 Conference on “Arithmetic Geometry” in Honour of Gerd Faltings’ 70th Birthday, Bonn (Germany).
- Jul 2024 The 2nd International Congress of Basic Science, Beijing (China).
- Jul 2024 The Mordell conjecture 100 years later, Boston (MA, USA).
- Dec 2023 2023 Winter Meeting in Algebra and Geometry, Rome (Italy).
- Aug 2023 Recent Developments in Algebraic Geometry, Arithmetic and Dynamics (Part II), Singapore.
- Aug 2023 PKU Mathematics Forum (Peking University), Beijing (China).
- Apr 2023 Degeneracy of algebraic points, MSRI, Berkeley (CA, USA).
- Feb 2023 Introductory Workshop: Diophantine Geometry, MSRI, Berkeley (CA, USA).

- Sep 2022 Number Theory Days, Lausanne (Switzerland).
- Sep 2022 O-minimality and Diophantine Geometry (Jonathan Pila's 60th birthday), Oxford (UK).
- Aug 2022 Mordell 2022: 100 years of elliptic curves, Cambridge (UK).
- Jul 2022 Second JNT Biennial Conference, Cetraro (Italy).
- Jun 2022 Modern Breakthroughs in Diophantine Problems, Banff (Canada), participation online.
- May 2022 Simons Symposium on Periods and L -Values of Motive, Simons Foundation, Scotland.
- Apr 2022 Diophantische Approximationen (ID 2216), Oberwolfach (Germany).
- Mar 2022 Rational Points 2022, Franken-Akademie Schloss Schney (Germany).
- Dec 2021 3rd Kyoto–Hefei workshop on arithmetic geometry, Kyoto (Japan), participation online.
- Sep 2021 Arakelov Geometry (SFB 1085 Higher Invariants - Interactions between Arithmetic Geometry and Global Analysis), Regensburg (Germany).
- Aug 2021 Arithmetic of Shimura varieties over global fields, Cetraro (Italy).
- June 2021 Recent Developments in Algebraic Geometry, Arithmetic and Dynamics (Part I), Singapore, participation online.
- Dec 2020 ICCM (International Consortium of Chinese Mathematicians), *plenary speaker*, Hefei (China), participation online.
- Feb 2020 DART (Differential Algebra and Related Topics) X, CUNY (NY, USA).
- Sep 2019 Topics in Rational and Integral Points, Basel (Switzerland).
- Jul 2019 First JNT Biennial Conference, Cetraro (Italy).
- Jul 2019 Journée Gretchen & Barry Mazur, IHÉS (France).
- Jan 2019 International Conference on Periods and L -functions (Gisbert Wüstholz's 70th birthday), Sanya (China).
- May 2018 Shimura varieties and hyperbolicity of moduli spaces, Montréal (Canada).
- May 2018 Diophantine Geometry, CIRM, Luminy (France).
- Jul 2017 Specialization Problems in Diophantine Geometry (Umberto Zannier's 60th birthday), Cetraro (Italy).
- Feb 2017 Heights and Applications to Unlikely Intersections, Fields Institute (Canada).
- Nov 2016 Second Sino-French Conference in Arithmetic Geometry at TSIMF, Sanya (China).
- Aug 2016 7th International Congress of Chinese Mathematicians, Beijing (China).
- Jun 2016 Arithmetic and Geometry: Ten years in Alpbach, Alpbach (Austria).
- May 2016 Hauteurs de Faltings des variétés abéliennes CM, Grenoble (France).
- Apr 2016 Diophantische Approximationen (ID 1615), Oberwolfach (Germany).
- Jun 2015 Sino-French research institute on arithmetic geometry, Beijing (China).
- Jul 2014 Second ERC Research Period on Diophantine Geometry, Cetraro (Italy).
- Mar 2014 On Lang and Vojta's conjectures, CIRM, Luminy (France).

Colloquium and Seminar Talks

- 2025 Minnesota (colloquium), Stanford, Caltech.
- 2024 IAS–Princeton joint, Columbia–CUNY–NYU joint, UCLA, Northwestern, UW Seattle, VaNTAGe; Jussieu Paris; National University of Singapore, SUSTech (Shenzhen, China).
- 2023 UCLA (colloquium), UW-Madison (colloquium), Duke (Frontiers), Number Theory Web Seminar; Dutch Intercity Number Theory Seminar, Clermont-Ferrand (France); National University of Singapore (colloquium).
- 2022 Yale (colloquium), Boston University, UCLA.
- 2021 Brown, UCSB; Chalmers/Göteborg joint, Göttingen–Hannover joint; SUSTech (Shenzhen, China).
- 2020 Harvard, Berkeley; Bordeaux, Groningen (Netherlands), HUJI-BGU (Israel), London, Paris Algebraic Cycles, Warwick–Oxford–Reading–Kings joint; Morningside Center (Beijing, China).
- 2019 MIT, Columbia; Cambridge UK, Humboldt Universität zu Berlin, Dortmund (Germany), ENS Lyon, Jussieu Paris; Peking University (Beijing, China), SUSTech (Shenzhen, China).
- 2018 IAS–Princeton joint, Columbia–CUNY–NYU joint; University of Zurich, Humboldt Universität zu Berlin; University of Hong Kong.
- 2017 Berkeley, IAS–Princeton joint; Amsterdam, Leiden; Fudan University (Shanghai, China).
- 2016 Columbia–CUNY–NYU joint; Basel, Clermont-Ferrand (France), IHÉS.
- 2015 IAS member talk, Northwestern, Rutgers at Newark, University of Connecticut; Jussieu Paris, SNS Pisa; Morningside Center (Beijing, China).
- 2014 Jussieu Paris, Orsay, IHÉS.

 Services

Journal activities

- 2023– Expositiones Mathematicae, Associate editor.
- 2022–2023 Expositiones Mathematicae, Leading guest editor for the special volume in memory of Bas Edixhoven.
- 2015– Referee for Annals of Mathematics, Publ. l’IHES, JAMS, Acta. Math., Inv. Math., Forum of Mathematics (Pi & Sigma), Duke Mathematical Journal, JEMS, Annales de l’ENS, Compositio Mathematica, Mathematische Annalen, Algebra & Number Theory, IMRN, etc.
- 2020– Referee for grants, including ISF (Israel), ANR (French), ERC (European).

Department services

- 2024–2025 Graduate admission committee at UCLA (CA, USA).

- Fall 2022 Hiring committee of W1 (junior professor) position at Leibniz University Hannover (Germany).
- Mar 2022-Jun 2024 Deputy management of the Institute of Algebra, Number Theory and Discrete Mathematics at Leibniz University Hannover (Germany).

Broader impacts

- 2026 David Goss Prize committee.
- Jul 2026 Organizer of the “4th JNT biennial conference”, Cetraro (Italy).
- Sep 2025 Organizer of “Arithmetic and Diophantine Geometry, via ergodic theory and o-minimality (in honor of Emmanuel Ullmo’s 60th birthday)”, IHES (France).
- Aug 2025 Organizer of “Arithmetic Dynamics and Diophantine Geometry”, NUS (Singapore).
- Jul 2025 SRI (Algebraic Geometry conference every 10 years), organizer of the section “O-minimality and arithmetic aspects of Hodge theory”, Colorado (USA).
- Oct 9 2024 Scientific American report on my work on Uniform Mordell–Lang.
- 2024 David Goss Prize committee.
- Aug 2024 Organizer of the “3rd JNT biennial conference”, Cetraro (Italy).
- summer 2024 Mentor and adviser of undergraduate research project “Special subvarieties of mixed Shimura varieties and Ribet sections”, Beijing (China).
- Oct 2023 Scientific committee of the “2nd Algant Alumni Network Symposium”, St Jacut de La Mer (France).
- Jun 23, 2023 Organizer of “Women in Math Lunch”, Hannover (Germany).
- Apr 7, 2023 Panellist of “Academic job applications (general process, with a focus on tenure track jobs)”, MSRI, Berkeley (CA, USA).
- Jul 13, 2022 Organizer of “Women in Math Lunch”, Hannover (Germany).

Organization of seminars

- 2021-2024 Organizer of the Arithmetic Geometry and Number Theory Seminar at Leibniz University Hannover (Germany).
- 2021-2022 Organizer of the working group “Adelic line bundles on quasi-projective varieties”, joint between Leibniz University Hannover (Germany) and University of Basel (Switzerland).
- 2020-2021 Organizer of the working group “Rational points and uniformity” at Sorbonne Université, Paris (France).
- 2018–2021 Organizer of the Number Theory Seminar of IMJ-PRG (Paris 6 and 7 joint), Paris (France).
- 2016-2017 Organizer of the Princeton University-IAS joint Number Theory Seminar, NJ (USA).
- 2012-2014 Organizer of Séminaire MathJeunes, Paris (France).

Languages

Madarin Chinese (Native), French (Fluent), English (Fluent), Cantonese (Good), Italian (Intermediate).