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), *Journal of the Institute of Mathematics of Jussieu*, 2024, accpted.

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 Neuchêtal (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 Jiaotang University.

Acdemic Experience

(Selected) Conferences and Colloquium Talks

Nov 2025 Diophantine approximation and transcendence, CIRM, Luminy (France).

Sep 2025 Frontier in Mathematical Sciences, Hong Kong (SAR China).

Jul 2025 section "Varieties over global fields" of SRI (Algebraic Geometry conference every 10 years), Fort Collins (Colorado, USA).

Jun 2025 Complex Geometry and Beyond (Ngaiming Mok's 70th birthday conference), Shanghai (China).

Apr 2025 Colloquium at University of Minnesota Twin Cities, Minneapolis-Saint Paul (MI, USA).

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).

Nov 2023 Colloquium at UCLA, Los Angeles (CA, USA).

Nov 2023 Colloquium at University of Winconsin-Madison, Madison (WI, USA).

Aug 2023 Colloquium at University of Singapore, Singapore.

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).
Apr 2023	Frontiers in Mathematics at Duke University, Durham (NC, 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 (UK).
Apr 2022	Diophantische Approximationen (ID 2216), Oberwolfach (Germany).
Mar 2022	Rational Points 2022, Franken-Akademie Schloss Schney (Germany).
Feb 2022	Colloquium at Yale University, New Haven (CT, USA), online.
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, Gronoble (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).

Seminar Talks

2025	Stanford, Caltech, UCSB, Claremont McKenna College.
2024	IAS–Princeton joint, Columbia–CUNY–NYU joint, UCLA, Northwestern, UW Seattle, VaNTAGe ; Jussieu Paris ; National University of Singapore, SUSTech (Shenzhen, China).
2023	Number Theory Web Seminar ; Dutch Intercity Number Theory Seminar, Clermont-Ferrand (France).
2022	Boston University, UCLA.
2021	Brown, UCSB ; Chalmers/Gothenburg joint, Göttingen–Hannover joint ; SUSTech (Shenzhen, China).
2020	Harvard, Berkeley ; Bordeaux, Groningen (Netherlands), HUJI-BGU (Isreal), 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–	Several committee works at UCLA (CA, USA), including hiring committee, teaching committee, graduate admission committee, graduate studies committee, *etc.*
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 local 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).

References

- **Laura DeMarco**, Harvard University
  demarco@math.harvard.edu
- **Philipp Habegger**, University of Basel (Switzerland)
  philipp.habegger@unibas.ch
- **Thomas Scanlon**, UC Berkeley
  scanlon@math.berkeley.edu
- **Emmanuel Ullmo**, IHES (France)
  ullmo@ihes.fr
- **Shouwu Zhang**, Princeton University
  shouwu@princeton.edu
- **Christine Taylor** (teaching reference), Stanford University
  taylor13@stanford.edu