Xu Gao

Curriculum Vitae

Education

2016–2023 **Doctor of Philosophy**
Mathematics Department, University of California at Santa Cruz
Santa Cruz, California, USA

2012–2015 **Master of Mathematics**
Chern Institute of Mathematics, Nankai University
Tianjin, China

2008–2012 **Bachelor of Science**
School of Mathematical Sciences, Nankai University
Tianjin, China

Ph.D Thesis

Title Simplicial distance in Bruhat-Tits buildings of split classical type

Advisors Suh, Junecue; Dong, Chongying

Experience

2023–present **Postdoctor**
School of Mathematical Sciences, Tongji University
Shanghai, China

Research Interests

My current research focuses on conformal blocks from vertex operator algebras. More specifically, I'm interested on the orbifold theory, through an algebrogeometric approach. The current ongoing project is to extend the factorization theorem of conformal blocks to the orbifold theory.

I'm also interested on Bruhat-Tits buildings and p-adic representations. More specifically, I'm considering problems related to the simplicial distance and concave functions. The goal is to develop a combinatorial geometry on Bruhat-Tits buildings.

Other interests include algebraic analysis, representation theory, p-adic geometry, tensor triangular geometry, higher category theory, homotopical algebras, transcendental number theory, etc.

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Publications and Preprints

- *Twisted restricted conformal blocks of vertex operator algebras II: twisted restricted conformal blocks on totally ramified orbicurves*
  (with Jianqi Liu and Yiyi Zhu)
  Available at arXiv:2403.00545.

- *Twisted restricted conformal blocks of vertex operator algebras I: g-twisted correlation functions and fusion rules*
  (with Jianqi Liu and Yiyi Zhu)
  Available at arXiv:2312.16278.

- *The stable Picard group of finite Adams Hopf algebroids with an application to the $\mathbb{R}$-motivic Steenrod subalgebra $\mathcal{A}^{\mathbb{R}}(1)$*
  (with Ang Li)
  Journal of Pure and Applied Algebra, Volume 228, Issue 11, 2024,
  `https://doi.org/10.1016/j.jpaa.2024.107732`

- *Simplicial volumes in Bruhat-Tits buildings of split classical type*
  Available on arXiv:2210.03328.

- *Extensions and Non-abelian Cohomology of Pre-Lie Algebras*
  Master degree thesis, 2015, Nankai University. Available on my website.

- *Rota-Baxter Operators on Witt and Virasoro Algebras*
  (with Ming Liu, Chengming Bai, and Naihuan Jing)
  Journal of Geometry and Physics, vol.108, 2016, pp.1-20.
  `https://doi.org/10.1016/j.geomphys.2016.06.007`

Academic Talks

Oct.29, 2023	*p-adic representations and simplicial distance in Bruhat-Tis buildings* Conference on Algebraic Combinatorics, Zhuhai, China
July 21, 2023	*p-adic representations and simplicial distance in Bruhat-Tis buildings* 18th National Lie Theory Conference, Shanghai, China
Apr.14, 2023	*p-adic representations and simplicial distance in Bruhat-Tis buildings* UC Santa Cruz - Algebra & Number Theory Seminar
Mar.16, 2023	*p-adic representations and simplicial distance in Bruhat-Tis buildings* UC San Diego - Number Theory Seminar
Jan.31, 2023	*p-adic representations and simplicial balls in Bruhat-Tits buildings* University of Arizona - Algebra and Number Theory Seminar

May 9, 2022 *How many vertices are there in a simplicial ball of radius r (in a Brihat-Tits Building)?*
UCSC Graduate Colloquium

Nov.22, 2021 *Stable Simplexes of p-adic Representations in Bruhat-Tits Buildings.*
UCSC Graduate Colloquium

May 24, 2019 *Transcendence of Periods.*
PhD qualifying oral Presentation

Teaching Experiences

Graduate Student Instructor at **University of California at Santa Cruz**

Duties include instructing students, holding office hours, responding to questions, preparing the course materials such as sliders, course notes, and website, and preparing and grading quizzes, homework, and exams.

Summer 2023 MATH 110: Introduction to Number Theory
Winter 2023 MATH 110: Introduction to Number Theory
Fall 2022 MATH 110: Introduction to Number Theory

Teaching Assistants at **University of California at Santa Cruz**

Duties include organizing discussion sections, holding office hours, responding to questions, reviewing quizzes, writing solutions, and grading homework and exams.

Summer 2022 MATH 22: Introduction to Calculus of Several Variables
Spring 2022 MATH 19B: Calculus for Science, Engineering, and Mathematics
Winter 2022 MATH 19A: Calculus for Science, Engineering, and Mathematics
Fall 2021 MATH 19B: Calculus for Science, Engineering, and Mathematics
Summer 2021 MATH 110: Introduction to Number Theory
Spring 2021 MATH 19B: Calculus for Science, Engineering, and Mathematics
Winter 2021 MATH 110: Introduction to Number Theory
Fall 2020 MATH 11A: Calculus with Applications
Summer 2020 MATH 110: Introduction to Number Theory
Spring 2020 MATH 111B: Algebra
Winter 2020 MATH 110: Introduction to Number Theory
Fall 2019 MATH 100: Introduction to Proof and Problem Solving
Summer 2019 MATH 117: Advanced Linear Algebra
Spring 2019 MATH 19B: Calculus for Science, Engineering, and Mathematics
Winter 2019 MATH 19A: Calculus for Science, Engineering, and Mathematics
Fall 2018 MATH 19B: Calculus for Science, Engineering, and Mathematics
Summer 2018 MATH 21: Linear Algebra
Spring 2018 MATH 21: Linear Algebra

Winter 2018	MATH 110: Introduction to Number Theory
Winter 2018	MATH 111: Algebra
Fall 2017	MATH 21: Linear Algebra
Fall 2017	MATH 100: Introduction to Proof and Problem Solving
Summer 2017	The Calculus series
Spring 2017	MATH 19B: Calculus for Science, Engineering, and Mathematics
Winter 2017	MATH 19B: Calculus for Science, Engineering, and Mathematics
Fall 2016	MATH 19A: Calculus for Science, Engineering, and Mathematics

Teaching Assistants at **Nankai University**

Duties include responding to questions, grading homework, and exams.

2014-2015	Calculus