

Kai Fu

Institut de Mathématiques de Bordeaux (IMB)

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Curriculum Vitae

Education

- 2022–present **Ph.D. in Mathematics**, *IMB, Université de Bordeaux.*
- 2020–2022 **Master in Mathematics**, *Indiana University Bloomington.*
- 2017–2020 **Master in Mathematics**, *Nankai University.*
- 2013–2017 **Bachelor in Mathematics and Applied Mathematics**, *Beijing Institute of Technology.*

Visiting

- Jun, 2023, Short Student Visiting, YMSC, Tsinghua University (3 weeks)
- Apr, 2022, Student Internship, LaBRI, Université de Bordeaux (6 months)
- Feb, 2019, Student Exchange Program, National Taiwan University (5 months)

Research Interests

Keywords: Flat cone surfaces, translation surfaces, saddle connections, Delaunay triangulations, moduli spaces, linear subvarieties.

My research centers on surfaces (real two-dimensional manifolds) and their associated moduli spaces, with a particular emphasis on the connections between geometry, combinatorics, and dynamics. In particular, I study the geometry and dynamics of translation surfaces and flat cone surfaces by analyzing the combinatorial structures that represent them.

Publications and Preprints

Uniform Length Estimates for Trajectories on Flat Cone Surfaces, 2024, eprint [arXiv:2409.14188](https://arxiv.org/abs/2409.14188).

Bounds on saddle connections for flat spheres, with *Guillaume Tahar*, 2023, eprint [arXiv:2308.08940](https://arxiv.org/abs/2308.08940).

In Preparation

Computing the Multiscale Boundary I. Real Linear Subvarieties of Abelian and Quadratic Differentials, with *Vincent Delecroix and Bradley Zykoski*.

Siegel-Veech Measures of Convex Flat Cone Spheres.

Programming Project

I have a strong interest in **SageMath**, an open-source mathematics software system built on Python. Currently, I am working with Vincent Delecroix and Bradley Zykoski on *Computing the Multiscale Boundary I. Real Linear Subvarieties of Abelian and Quadratic Differentials*, where we contribute new features to the package **veerer**. We aim to compute all boundary strata of a real linear subvariety in the multi-scale compactification of the moduli space, given a tangent space of the subvariety. This work involves constructing veering triangulations with boundaries and Strebel graphs. We construct blow-ups along the facets of the Delaunay cells and establish their connection to the boundary strata of the multi-scale compactification.

Talks

- Nov 08, 2024 **Séminaire de Systèmes Dynamiques**, *Institut de mathématiques de Toulouse*, Toulouse, France.
- Nov 07, 2024 **Groupe de travail**, *Institut de mathématiques de Toulouse*, Toulouse, France.
- Oct 04, 2024 **Geometry Topology Grad and Postdoc Seminar**, *University of Toronto*, online.
- Sep 10, 2024 **Riemann Surfaces: Random, Flat, and Hyperbolic Geometry**, *MFO*, (Lightning talk), Oberwolfach, Germany.
- Oct 17, 2023 **Cours de Géométrie Algébrique et Géométrie Complexe de la fédération MARGAUX**, *Le Laboratoire de Mathématiques et Applications, Université de Poitiers Poitiers*, (Short talk), Poitiers, France.
- Jun 08, 2023 **Student Seminar**, *YMSC, Tsinghua University*, Beijing, China.
- Mar 16, 2023 **Reading group on mapping class groups**, *Institut de mathématiques de Bordeaux*, Bordeaux, France.

Organization

- Mar, 2024 Co-organization of the School on flat surfaces and interactions, Le Teich
- Jan - May, 2023 Co-organization of the Reading group on mapping class groups, Bordeaux

Conference Participation

- Nov, 2024 Riemann Surfaces: Random, Flat, and Hyperbolic Geometry, MFO, Oberwolfach
- Jun, 2024 New Frontiers in Parabolic Dynamics and Renormalization, Department of Mathematics, University of Bologna, Bologna
- Jun, 2024 Rencontre GALS, Institut Camille Jordan, Lyon
- Mar, 2024 School on flat surfaces and interactions, Le Teich
- Jan, 2024 Sage Days 125: combinatorics, number theory, dynamical systems and geometry, Le Teich
- Jan, 2024 Research School - Hodge Theory and o-minimality, CIRM, Marseille
- Dec, 2023 Renormalization and Visualization in Geometry, Dynamics and Number Theory, CIRM, Marseille

- Nov, 2023 The floor to the junior researcher of Plato's network Insitut Fourier, Grenoble
- Oct, 2023 Cours de Géométrie Algébrique et Géométrie Complexe de la fédération MARGAUX, Université de Poitiers, Poitiers
- Oct, 2023 Probability and Geometry in, on and of non-Euclidian spaces, CIRM, Marseille
- Jul, 2023 Renormalization and Visualization for packing, billiard and surfaces, CIRM, Marseille
- Feb, 2023 Sage Days 117: combinatorics, number theory, dynamical systems and geometry, Le Teich
- Sep, 2022 Combinatorics, Dynamics and Geometry on Moduli Spaces, CIRM, Marseille
- May, 2022 Structures on Surfaces, CIRM, Marseille
- Apr, 2022 Mini-rencontre ANR MoDiff, LaBRI, Université de Bordeaux, Bordeaux
- Jun, 2021 CMI-HIMR Dynamics and Geometry Online Summer School, University of Bristol

Scholarship

- Apr, 2021 Hazel King Thompson Scholarship, Indiana University Bloomington
- Apr, 2020 Outstanding Graduate, Nankai University
- Sep, 2018 China National Scholarship, Nankai University

Languages

- Chinese native
- English fluent
- French basic