

# Curriculum Vitae

## Tsung-Hsuan TSAI

### Post-doctoral researcher

Institut Camille Jordan, Université Claude Bernard Lyon 1

Email: [tsai@math.univ-lyon1.fr](mailto:tsai@math.univ-lyon1.fr)

Website: <https://tsung-hsuan-tsai.github.io/>

Phone: +33 7 82 57 03 90

### RESEARCH INTERESTS

---

I am interested in *geometric group theory*, which aims to study group theory in a geometric viewpoint. My current works focus on *random groups*, which are group presentations constructed under certain probabilistic models. Recently, I have started studying *uniformly recurrent subgroups* of finitely generated groups and *expansive group actions*.

### EXPERIENCES

---

**2023 - 2025 Institut Camille Jordan, Lyon, France**

Funded by LabEx MiLyon

Postdoctoral researcher, with Nicolás Matte Bon.

**2022 - 2023 Military service, Taiwan**

**2019 - 2022 Institut de Recherche Mathématique Avancée, Strasbourg, France**

Funded by CDSN (Contrat doctoral spécifique normalien)

Ph.D. in Mathematics, supervised by Thomas Delzant

Thesis: *Phase transitions in random group: free subgroups and van Kampen 2-complexes*

**2019.05 - 06 Institut de Recherche Mathématique Avancée, Strasbourg, France**

Research internship M2, supervised by Thomas Delzant

Master thesis: *Random groups: the binomial triangular model*

**2018.06 - 07 Università di Padova, Padova, Italy**

Research internship M1, supervised by Remke Kloosterman

Subject: *Fundamental groups of complements of singular algebraic curves*

**2017.05 - 06 Laboratoire de Mathématiques Jean-Leray, Nantes, France**

Research internship L3, supervised by François Laudenbach

Subject: *Algebraic topology and applications: Schreier Theorem and Poincaré paving*

## EDUCATION

---

- 2019 - 2022 **Université de Strasbourg, France**  
Ph.D. in Mathematics at Université de Strasbourg, 2022  
Thesis advisor: Thomas Delzant
- 2016 - 2019 **École normale supérieure de Rennes, France**  
Normalien à titre étranger  
M.Sc. in Mathematics at Université de Rennes 1, 2019  
B.Sc. in Informatics at Université de Rennes 1, 2018  
B.Sc. in Mathematics at Université de Rennes 1, 2017
- 2014 - 2016 **Lycée Janson de Sailly, Paris, France**  
Classe préparatoire aux grandes écoles, MPSI and MP

## TEACHING

---

- 2019 - 2022 **Université de Strasbourg, France**  
Teaching assistant  
2019,2020,2021 autumn: TD Algèbre S5 (exercice sessions of the course Introduction to group theory for 3rd year).  
2020,2021,2022 spring: CI Math pour les sciences 2 (lecturer of the course Basic linear algebra for 1st year).

## PUBLICATIONS AND PREPRINTS

---

- PhD T.-H. Tsai, *Phase transitions in random groups: free subgroups and van Kampen 2-complexes*.  
PhD Thesis. University of Strasbourg, defended July 2022.  
HAL: tel-03693833.
- [1] T.-H. Tsai, *Density of random subsets and the intersection formula*.  
In **Journal of Combinatorial Algebra**, volume 6, number 3/4 (2022).  
DOI: 10.4171/JCA/63. ArXiv: 2104.09192.
- [2] T.-H. Tsai, *Freiheitssatz and phase transitions for the density model of random groups*.  
In **Mathematische Zeitschrift**, 303, 65 (2023).  
DOI: 10.1007/s00209-022-03186-2. Arxiv: 2111.08958.
- [3] T.-H. Tsai, *Phase transition for the existence of van Kampen 2-complexes in random groups*.  
Accepted to be published in **Algebraic and Geometric Topology**.  
Arxiv: 2210.08234.
- [4] T.-H. Tsai, *Parallel geodesics and minimal stable length of random groups*.  
Preprint, Arxiv: 2410.07859.

## TALKS

---

- 2024.03.05 **Algebra and geometry seminar, LMNO, Caen, France.**  
Existence of van Kampen diagrams in random groups.
- 2024.02.20 **GADT seminar, IMB, Dijon, France.**  
Existence of van Kampen diagrams in random groups.
- 2023.12.08 **Geometry seminar, Institut Camille Jordan, Lyon, France.**  
Freiheitssatz for the density model of random groups.
- 2023.11.27 **Groups and Actions seminar, Institut de Mathématique d'Orsay, France.**  
Freiheitssatz for the density model of random groups.
- 2023.10.24 **Group de travail Action!, ENS Lyon, France.**  
Introduction to random groups II: the Freiheitssatz.
- 2023.10.17 **Group de travail Action!, ENS Lyon, France.**  
Introduction to random groups I: The density model.
- 2021.12.17 **Topology seminar, Institut Fourier, Grenoble, France.**  
Freiheitssatz for the density model of random groups.
- 2021.12.14 **ENS Group theory seminar, Paris, France (Online).**  
Freiheitssatz for the density model of random groups.
- 2021.12.06 **Ergodic theory seminar, IRMAR, Rennes, France.**  
Freiheitssatz for the density model of random groups.
- 2021.09 **Séminaire Doctorant, IRMA, Strasbourg, France.**  
Groupes à petite simplification et un théorème de non-torsion.
- 2020.10 **Séminaire Doctorant, IRMA, Strasbourg, France.**  
La plupart des groupes sont hyperboliques.
- 2020.02 **Séminaire Doctorant, IRMA, Strasbourg, France.**  
Ensembles aléatoires : définitions et applications à théorie des groupes.

## LANGUAGES

---

- English
- French
- Chinese (Mandarin and Taiwanese)