

# Tsung-Hsuan TSAI

## Ph.D. in Mathematics

Email: [tsai71517@gmail.com](mailto:tsai71517@gmail.com)

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

I was born on 13th April 1996 in New Taipei City, Taiwan, where I received my early education until I graduated from high school. Afterwards, I pursued my higher education in France until I received my Ph.D. degree.

I am currently awaiting notification of my military service in Taiwan scheduled for late 2022 - early 2023, and applying for a postdoctoral position at the same time.

Last update: 25th October 2022.

## RESEARCH INTERESTS

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• Random groups   • Hyperbolic groups   • Geometric group theory   • Small cancellation theory

## RESEARCH EXPERIENCES

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

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2019 - 2022   **Université de Strasbourg, France**  
Ph.D. in Mathematics, supervised by 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

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2019 - 2022 **Université de Strasbourg, France**  
Teaching assistant  
2019,2020,2021 autumn: TD Algèbre S5 (exercise 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

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- 2021 T.-H. Tsai, *Density of random subsets and the intersection formula*.  
Preprint arxiv: 2104.09192.  
Accepted for publication in the *Journal of Combinatorial Algebra*.  
Published online first (October 2022), DOI: 10.4171/JCA/63.
- 2021 T.-H. Tsai, *Freiheitssatz and phase transitions for the density model of random groups*.  
Preprint arxiv: 2111.08958.  
Submitted December 2021.
- 2022 T.-H. Tsai, *Phase transitions in random groups: free subgroups and van Kampen 2-complexes*.  
PhD Thesis. University of Strasbourg, defended July 2022.
- 2022 T.-H. Tsai, *Phase transition for the existence of van Kampen 2-complexes in random groups*.  
Preprint arxiv: 2210.08234.

## TALKS

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- 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

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• English • French • Chinese (Mandarin and Taiwanese)