Yicheng Zhou

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Research Interests

- p-adic Hodge theory for partially proper rigid analytic varieites. Also, inspired by Arnaud Vanhaecke's thesis, I am looking at possible generalizations of the fundamental diagram for coefficients in isotrivial étale local systems.
- p-adic and mod p cohomology theories, $\mathbf{A}^{1,\mathrm{an}}$-homotopy invariant rigid analytic motives and non-$\mathbf{A}^{1,\mathrm{an}}$-homotopy invariant ones.
- Fine saturated log-rigid analytic varieties: stack of fs log-structures, Hyodo-Kato cohomology, Hyodo-Kato isomorphism, comparison theorems.
- Duality theories for p-primary étale cohomology. I hope to extend Kato-Suzuki's results of (derived) duality of p-primary nearby cycles in the good reduction case to semistable models.
- Galois representations, Langlands program (especially p-adic aspects).

Education

2021 — now **PhD candidate**, IMJ-PRG, Sorbonne Université, France
Thesis: "On Hodge theory of p-adic symmetric spaces", under the supervision of Wiesława Nizioł.

2020 — 2021 **M2 Analyse**, **Arithmétique**, **Géométrie**, Institut Polytechnique de Paris, joint program with Université de Paris-Saclay

2017 — 2021 **Cycle d'ingénieur**, Ecole Polytechnique, France

2014 — 2017 **B.Sc. in Mathematics**, Fudan University, China

2013 — 2014 **Natural Sciences Experimental Class**, Fudan University, China

Writings

Preprints:

2024 **Syntomic cohomology and p-adic regulators for proper p-adic rigid analytic varieties**, *in preparation.*
Let $K/\mathbf{Q}_p$ be a finite field extension. By redefining the arithmetic Hyodo-Kato morphism (and arithmetic syntomic cohomology) for rigid analytic varieties over K, we obtain a syntomic descent spectral sequence and syntomic Chern classes. As a result, under the (C_{st})-conjecture for partially proper varieties over K, the p-adic étale regulator map factors through a p-adic syntomic regulator; in particular it factors through the "geometric" Galois cohomology when X is proper.

2024 **Profiniteness of mod p étale cohomology for partially proper curves (in French)**, *available upon request.*
Let $K/\mathbf{Q}_p$ be a finite field extension. We prove that for a strict inclusion pair of affinoid rigid analytic curves over K, the restriction maps of étale cohomology groups (*resp.* induced maps of compactly support étale cohomology) have finite image. As a result, mod p étale cohomology groups (endowed with its natural topology) of partially proper rigid analytic curves over K are profinite.

Notes:

2024 **Altered uniformisation of log-rigid spaces**, *available upon request.*
We prove Temkin's altered local uniformisation in the case of rigid varieties with divisor.

2024 **Stacky approach to log-rigid analytic varieties**, *in progress.*
We explore Olsson's stack of fs log-structures in the rigid analytic context.

Talks on others' works

01/2024 **Dualité de Poincaré abstraite**, *Study group on six functor formalisms*, Jussieu.

10/2022 **Duality theories for p-primary étale cohomology, following Kato-Suzuki**, *Preprint Seminar*, Jussieu, Paris

04/2022 **La K-théorie de Milnor pour les anneaux p-adiques, d'après Lüders-Morrow**, *Preprint Seminar*, Jussieu, Paris

05/2021 **Solid abelian groups II**, *Study group on condensed mathematics*, Jussieu, Paris

Attended conferences and workshops

2024 **Analytic de Rham stacks**, Warsaw

2024 **Oberwolfach Seminar**: **Reduction of Arithmetic Varieties**, Oberwolfach, Germany

2024 **Algebraic K-Theory and Arithmetic**, Będlewo, Poland

2024 **Riemann–Hilbert correspondence — classical and p-adic**, Padova, Italy

2022 **Cohomology of symmetric spaces**, ENS-Lyon, France

2022 **Franco-Asian Summer School on Arithmetic Geometry**, CIRM, France

Teaching and organization

2022 — now **Co-organizer**, *Séminaire Mathjeunes*, Jussieu, Paris

04/2022 **Volunteer assistant**, *Sorbonne Université et Association Science Ouverte*, High school student internship on "La cryptologie : codes secrets et cybersécurité".

2021 — 2024 **Teaching assistant**, *Sorbonne Université*

- LU2MA260 Séries et séries de fonctions, année 2023–2024.
- LU3MA261 Calcul différentiel et optimisation, année 2022–2023.
- LU2MA260 Séries et séries de fonctions, année 2022-2023.

- LU3MA261 Calcul différentiel et optimisation, année 2021–2022.
- LU1MA002 Mathématiques pour les études scientifiques II, année 2021–2022.

Languages

- Chinese (native), English and French (professional fluency), German (basic).