# LEI ZHANG

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# PERSONAL INFORMATION

Date of Birth July 16, 1983

GENDER Male

# MATHEMATICAL INTERESTS

My research area is arithmetic algebraic geometry. More specifically, I am interested in Tannakian categories, fibred category and algebraic stacks, Nori fundamental groups, the pro-étale fundamental group, the homotopy sequence of various fundamental groups.

#### **EMPLOYMENT**

The Chinese University of Hong Kong

Oct. 23. 2018 - Present

Research Assistant Professor

Freie Universität Berlin

Nov. 01. 2012 - Oct. 22, 2018

Post-doc

Universität Duisburg-Essen

Jul. 17. 2012 - Sep. 30. 2012

Post-doc

## **EDUCATION**

Universität Duisburg-Essen

Oct. 01. 2009 - Jul. 16. 2012

Ph.D student under the supervision of Professor Hélène Esnault

Thesis title: The homotopy sequence for fundamental groups

AWARDED: July 16, 2012

Capital Normal University

Sep. 2006 - Jun. 2009

Master Student under the supervision of Professor Kezheng Li

Thesis title: Left Invariant Differential Operators

Degree awarded by College of Mathematical Science in June 2009.

CHINA UNIVERSITY OF MINING AND TECHNOLOGY

Sep. 2002 - Jun. 2006

Bachelor student in Financial Mathematics

Degree awarded by College of Science in June 2006.

### PREPRINTS AND PUBLICATIONS

(1) The Homotopy Sequence for Nori's Fundamental Group. Journal of Algebra, Vol. 393, pp. 79 - 91, 2013. doi: https://doi.org/10.1016/j.jalgebra.2013.07.010

- (2) The Homotopy Sequence for the Algebraic Fundamental Group. International Mathematics Research Notices, no. 22, 6155-6174, 2013. doi: 10.1093/imrn/rnt163
- (3) Nori's Fundamental Group over a non-algebraically Closed Field.

  Annali della Scuola Normale Superiore di Pisa Classe di Scienze (5), 18, no. 4, 1349–1394, 2018. doi: 10.2422/2036-2145.201604\_007
- (4) Algebraic and Nori Fundamental Gerbes (with Fabio Tonini). Journal of the Institute of Mathematics of Jussieu, 1-43, 2019 doi:10.1017/S147474801700024X
- (5) F-divided sheaves trivialized by dominant maps are essentially finite (with Fabio Tonini). Transactions of the American Mathematical Society, 371, 1-22, 2019. doi: https://doi.org/10.1090/tran/7444
- (6) Nori fundamental gerbe of essentially finite covers and Galois closure of towers of torsors (with M. Antei, I. Biswas, M. Emsalem, F. Tonini). Selecta Mathematica, 25, no. 2, Art. 18, 37 pp., 2019. doi: https://doi.org/10.1007/s00029-019-0449-z
- (7) Essentially Finite Vector Bundles on Normal Pseudo-proper Algebraic Stacks (with Fabio Tonini). Documenta Mathematica, 25, 159-169, 2020. doi: 10.25537/dm.2020v25.159-169
- (8) The arithmetic local Nori fundamental group (with M. Romagny, F. Tonini). Submitted.
- (9) A crystalline incarnation of Berthelot's conjecture and Künneth formula for isocrystals (with V. Di Proietto, F. Tonini).

  Submitted.
- (10) A generalized Abhyankar's conjecture for simple Lie algebras in characteristic p > 5 (with S. Otabe and F. Tonini).
  Submitted.
- (11) Frobenius fixed objects of moduli (with V. Di Proietto and F. Tonini). Submitted.
- (12) A theorem on meromorphic descent and the specialization of the pro-étale fudnamental group (with Marcin Lara and Jiu-Kang Yu).

  Submitted.

# **GRANTS**

- (1) General Research Fund 14301019 from University Grants Committee,  $\it The\ local\ fundamental\ group$ , 2020-2022.
- (2) Direct Grant 4053343 from College of Science of The Chinese University of Hong Kong, *The pro-étale fundamental group*, 11.2018-11.2020.

#### SELECTED TALKS

DEUTSCHEN MATHEMATIKER-VEREINIGUNG at Universität des Saarlandes, Saarbrücken.

Sep.17, 2012 - Sep. 20, 2012

On the Homotopy Sequence of Nori's Fundamental Group. (Minisymposia and Sections Sep.17, 2012)

NORTH GERMAN ALGEBRAIC GEOMETRY SEMINAR at Universität Hamburg, Hamburg.

May 15, 2014 - May 16, 2014

Galois Theory for Schemes. (May 16, 2014)

ARITHMÉTIQUE DES VARIÉTÉS EN FAMILLES at Institut de Mathématiques de Bordeaux.

Nov. 4, 2014 - Nov. 7, 2014

Nori's Fundamental Group with a Geometric Point. (Nov. 5, 2014)

CURVES AND GROUPS IN FAMILIES at Henri Lebesgue Center, Rennes.

May 13, 2019 - Nov. 17, 2019

Fundamental group schemes en caracteristic p. (May, 2019)

#### TEACHING EXPERIENCE

- (1) MATH1030E Linear Algebra I, The Chinese University of Hongkong, 2020-21 Term 2.
- (2) MATH1030E Linear Algebra I, The Chinese University of Hongkong, 2019-20 Term 2.
- (3) MATH1030H Linear Algebra I, The Chinese University of Hongkong, summer course, 2018/2019.
- (4) Exercise session for the course Algebraic Number Theory II, Freie Universität Berlin, summer semester 2018.
- (5) Seminar: Quadratische Formen (in English Quadratic Forms), Freie Universität Berlin, summer semester 2018. This seminar was in German.
- (6) Course: Crystals and Crystalline Cohomology, Freie Universität Berlin, winter semester 2017.
- (7) Seminar: *p-adische Zahlen* (in English *p-adic Numbers*), Freie Universität Berlin, summer semester 2017. This seminar was in German.
- (8) Exercise session for the course Algebraic Number Theory II, Freie Universität Berlin, summer semester 2017.
- (9) Course: Étale Cohomology, Freie Universität Berlin, winter semester 2016-2017.
- (10) Course: Algebraic Groups, Freie Universität Berlin, summer semester 2016.
- (11) Seminar: Analytic Methods in Number Theory, Freie Universität Berlin, winter semester 2015-2016.
- (12) Exercise session for the course *Elliptic Curves*, Freie Universität Berlin, winter semester 2015-2016.
- (13) Seminar: Quadratic Forms, Freie Universität Berlin, summer semester 2015.

- (14) Exercise session for the course Algebraic Number Theory II, Freie Universität Berlin, summer semester 2015.
- (15) Exercise session for the course Algebraic Number Theory II, Freie Universität Berlin, winter semester 2014-2015.
- (16) Student seminar p-adic Numbers, Freie Universität Berlin, winter semester 2014-2015.
- (17) Teaching assistant of Prof. Dr. Hélène Esnault for the master course Algebraic Number Theory, Freie Universität Berlin, summer semester 2014.
- (18) Teaching assistant of Prof. Dr. Hélène Esnault for the master course Commutative Algebra I, Freie Universität Berlin, winter semester 2013-2014.
- (19) Teaching assistant of Prof. Dr. Hélène Esnault for the master course Algebraic Number Theory II, Freie Universität Berlin, summer semester 2013.
- (20) Lern- und Diskussionszentren (LuDi), Universität Duisburg-Essen, summer semester 2012.
- (21) Teaching assistant of Prof. Dr. Hélène Esnault and Prof. Dr. Moritz Kerz for the master course Algebraic Geometry III, Universität Duisburg-Essen, summer semester 2011.

## **STUDENTS**

- (1) 2020, Li Kin Lok, bachelor thesis: *Integral closure of finitely generated algebra*, The Chinese University of Hong Kong.
- (2) 2018, Ragnarsson Amazeen, master thesis: Étale and proétale fundamental groups, Freie Universität Berlin.
- (3) 2018, Janine Schuhmann, bachelor thesis: Klassifikation von quadratischen Form über  $\mathbb{Q}_p$ ,  $\mathbb{Q}$  und  $\mathbb{R}$ , Freie Universität Berlin.

## LANGUAGE SKILLS

- (1) Chinese (native)
- (2) English (fluent)
- (3) German (fluent)
- (4) French (basic)