

# Curriculum Vitae of Laurent Fargues

Laurent Fargues

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Born 19 June 1975 in Cagnes sur Mer (France)

Citizenship : French

Directeur de recherche at CNRS / Institut de Mathématiques de Jussieu

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## Studies

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**1998–2001** : PHD under the direction of Michael Harris at the Institut de Mathématiques de Jussieu (Paris 7), defended on December 2001.

**November 2009** : "Habilitation à diriger des recherches" University Paris-Sud Orsay

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## Positions

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**October 2002 - October 2011** : Chargé de Recherche at CNRS / Laboratoire de mathématiques d'Orsay

**Octobre 2011 - Février 2013** : Directeur de recherche at CNRS / IRMA Strasbourg

**Since February 2013** : Directeur de Recherche at CNRS / Institut de mathématiques de Jussieu

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## Domain of Research

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Automorphic Representations, Langlands conjectures, Shimura varieties,  $p$ -divisible groups and their moduli spaces,  $p$ -adic Hodge theory

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## Publications

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- "Une suite spectrale de Hochschild-Serre pour l'uniformisation de Rapoport-Zink" note aux CRAS 334 (2002), no. 9, 739-742
- " Cohomologie des espaces de modules de groupes  $p$ -divisibles et correspondances de Langlands locales " in Asterisque 291 (2004) pages 1-200
- " Application de Hodge-Tate duale d'un groupe de Lubin-Tate, immeuble de Bruhat-Tits du groupe linéaire et filtrations de ramifications " : Duke Math vol. 140, No 3 (2007)
- " L'isomorphisme entre les tours de Lubin-Tate et de Drinfeld et applications cohomologiques " in "L'isomorphisme entre les tours de Lubin-Tate et de Drinfeld" pages 1-325, Birkhauser, Progress in Math, vol. 262
- " Filtration de monodromie et cycles évanescents formels ", Inventiones Mathematicae 177, 2009
- " La filtration de Harder-Narasimhan des schémas en groupes finis et plats " Journal für die reine und angewandte Mathematik 645 (2010)
- " La filtration canonique des points de torsion des groupes  $p$ -divisibles", Annales scientifiques de l'ENS, 2011, vol.44
- " Factorization of analytic functions in mixed characteristic", joint with J.-M. Fontaine, Frontiers of mathematical sciences, 307-315, Int. Press, Somerville, MA, 2011.
- " Vector bundles and  $p$ -adic Galois representations", joint with J.-M. Fontaine, AMS/IP Studies in Advanced Mathematics Volume 51, 2011
- " Groupes analytiques rigides  $p$ -divisibles ", Mathematische Annalen. Vol. 374 (2019)
- "Vector bundles on curves and  $p$ -adic Hodge theory" joint with J.-M. Fontaine, in "Automorphic Forms and Galois Representations", London Mathematical Society Lecture Note Series, volume 415, Cambridge University Press, 2014
- "Quelques résultats et conjectures concernant la courbe" dans Astérisque 369, 2015 (proceedings of the conference in honor of Gérard Laumon)
- "From local class field to the curve and Vice Versa". proceedings of the AMS summer institute in Algebraic Geometry, Salt Lake City, July 2015
- " $G$ -torseurs en théorie de Hodge  $p$ -adique", Compositio Math.(2020) Vol. 156. Issue 10.
- "Courbes et fibrés vectoriels en théorie de Hodge  $p$ -adique", joint work with J.-M. Fontaine, Astérisque 406
- "La courbe" Proc. Int. Cong. of Math. - 2018 Rio de Janeiro, Vol. 1
- "Simple connexité des fibres d'une application d'Abel-Jacobi et corps de classe local" Annales de l'ENS (2020) Fascicule 1 Tome 53
- "Groupes analytiques rigides  $p$ -divisibles II" to appear in Math. Annalen.

*Preprints* : cf. <http://www.math.jussieu.fr/~fargues>

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## Distinctions

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- Cours Peccot at the College de France, Spring 2004
- "Petit d'Ormy, Carrière, Thébault" prize of the french academy of sciences (2009)
- ERC Advanced grant "GeoLocLang" (starting 2017)
- Invitation at the international congress of mathematicians in Rio in 2018 (sections 3 and 4)
- "Tsinghua University Loo-Keng Hua Distinguished Lecture", Spring 2018
- Leonid Frank great prize of the french academy of sciences (2022)
- ICBS Best Paper Award 2023 - Beijing (International congress of basic science)
- Eilenberg distinguished Lectures - Columbia University - Fall 2023
- ICCM 2023 plenary distinguished lecture - Shanghai

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## PHD students

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## Defended PHD thesis

- Miaofen Chen defended in Mai 2011. Now associate professor at the East China Normal University (Shanghai)
- Xu Shen defended in Decembre 2012. Assistant professor at the Morningside Center of Mathematics (Beijing)
- Arno Kret (joint PHD direction with Laurent Clozel) defended in 2012. Permanent position in Amsterdam.
- Valentin Hernandez (joint PHD direction with Vincent Pilloni) defended in June 2017. Now Assistant professor ("maître de conférence") in Orsay.
- Arthur-César Le Bras defended in June 2017 (joint PHD direction with Michael Harris). Now "Chargé de Recherche" at CNRS
- Ildar Gaisin (joint PHD direction with Jean-François Dat) defended in Septembre 2017. Postdoc in Tokyo
- Nhuyen Kieu Hieu (joint PHD direction with Pascal Boyer) defended in 2019. Postdoc with Eva Viehmann.
- Sebastian Bartling, defended in September 2022. Now Assistant professor at Essen for 7 years.
- Tobias Kreuz, joint with Bruno Klingler, defended in 2022. Now postdoc at the Max Planck Institut in Bonn

## Master internship

- 2017-2018 : Sebastian Bartling
- 2017-2018 : Arnaud Vanhaecke. Now in PHD with Pierre Colmez.
- 2013 : Macarena Peche Irissary. Did her PHD with Christophe Cornut.
- Miaofen Chen et Xu Shen before their PHD.

## Post-docs

- 2016-2017 : Alexander Ivanov and Daniel Kirch, DFG postdocs
- 2017-2018 : Timo Richartz, DFG postdoc
- 2018-2019 : Johannes Anshütz, Paul Breutmann, on my ERC grant.
- 2020-2021 : Luciena Xiao Xiao on my ERC.

## PHD thesis and Habilitation referee

- Referee for the PHD thesis (2009) and Habilitation (2016) of Vincent Pilloni
- Referee for the Habilitation thesis of Benoît Stroh in 2014
- Referee for the PHD thesis of Stéphane Bijakowski in 2014
- Referee for the PHD thesis of Shinan Liu, Septembre 2018
- Referee for the PHD thesis of Stephan Neupert in 2016
- Referee for the PHD thesis of Banafsheh Farang-Hariri, 2012
- Referee for the PHD thesis of Tobias Ashendorf, 2012

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## Talks at international conferences

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- "Workshop on reductions of Shimura varieties and related spaces : geometry and representation theory", Toronto, Fields Institut, November 2001
- conférence "Representation of reductive p-adic groups" Banff, PIMS (Canada) February 2002
- Regensburg, May 2002 (conference of the European Network "arithmetic algebraic geometry")
- Conference "Groupes Réductifs" at CIRM Luminy, October 2002
- Conference "Number theory and arithmetic geometry" in Hiroshima November 2002
- "Workshop on Shimura varieties and related topics" at the Fields Institut, March 2003

- Workshop "Algebraische Zahlen theorie" in Oberwolfach, June 2003
- Conference in honor of John Coates, Morningside center, Beijing, August 2005
- International conference on arithmetic geometry and automorphic forms, university of Nankai (Tianjin, China), August 2005
- Conference "Of ramification and vanishing cycles", Tokyo, September 2007
- Workshop "Non-archimedean period domains", Max Planck institut, September 2007
- Workshop "Motivic Integration and its Interactions with Model Theory and Non-Archimedean Geometry", Edinburgh, May 2008
- Conference for the 50 years of the IHES, May 2008
- Workshop "Arithmetic Algebraic Geometry", Mathematisches Forschungsinstitut Oberwolfach, August 2008
- Workshop "The stable trace formula, automorphic forms, and Galois representations", Banff August 2008
- "Conference on Arithmetic Algebraic Geometry on the occasion of Michael Rapoport's 60th birthday", Bonn October 2008
- Séminaire de théorie des nombres Paris-Londres, June 2009
- Journées arithmétiques de Caen, June 2009
- "Conference on Arithmetic Algebraic Geometry on the occasion of Thomas Zink's 60th birthday", Bielefeld, June 2009
- Conference "Formes modulaires, Théorie de Hodge p-adique et Applications", Roscoff July 2009
- "Conférence en l'honneur de Jean-Marc Fontaine", Paris March 2010
- "Workshop on Arithmetic Geometry and Related Topics", Taiwan, July 2010
- "Witt vectors, foliations, and absolute de Rham cohomology", Nagoya November 2010.
- "Automorphic Forms and Galois Representations", Durham July 2011
- "Workshop on Cohomology of Shimura varieties : arithmetic aspects and the construction of Galois representations", Fields Institut, March 2012
- "Workshop on the p-adic Langlands program : recent developments and applications", Fields Institut, April 2012
- "Conférence en l'honneur de Gérard Laumon", IHES-university Paris-Sud, June 2012
- Journées Arithmétiques 2013 (Grenoble), July 2013
- "Conference on Arithmetic Geometry", Banach Center (Varsovie), July 2013
- "Conference on Arithmetic Algebraic Geometry", Paderborn, October 2013
- "Hot Topics : Perfectoid spaces and their applications" MSRI February 2014
- "Automorphic forms, Shimura varieties, Galois representations and L-functions", MSRI December 2014
- 2015 Summer Research Institute on Algebraic Geometry University of Utah, Salt Lake City
- "p-adic Hodge theory and Iwasawa theory" September 2015, Bielefeld
- "Motives and Automorphic forms" September 2015, Oxford
- Septembre 2016 : Conference "Geometric representation theory" Oxford Clay Institut
- Novembre 2016 : "The Second Sino-French Conference in Arithmetic Geometry" Sanya (Chine)
- May 2017 : Simons Symposium "p-adic Hodge theory" in Schloss-Elmau (Kriin Allemagne) Octobre 2017 : "Arithmétique, Géométrie et Représentations" franco-indian conference in Jussieu, Paris
- July 2018 : "Correspondance de Langlands p-adique, variétés de Shimura et perfectoides" CIRM Luminy
- July 2018 : "Automorphic Forms, Galois Representations and L-functions" satellite conference of the ICM in Rio
- August 2018 : ICM talk in sections 3 and 4 in Rio
- September 2018 : Talk at the conference "Arithmetic Geometry : l-adic and p-adic aspects" in Tokyo
- October 2018 : Talk at the conference in Bonn for the 70 anniversary of M. Rapoport
- Mars 2019 : Talk at the conference in Beijing at the Morningside center in honnor of M. Rapoport
- Mars 2019 : Talk at the conference "Derived algebraic geometry and its applications" at the MSRI
- Mai 2019 : "Atelier sur la géométrisation du programme de Langlands local" at the CRM in Montréal
- Mai 2019 : Talk at the "Padova school on Serre conjectures and the p-adic Langlands program"
- Juin 2019 : Talk at the final conference of the SFB 45 network in Bonn
- Juin 2019 : Talk at the conference "Arithmetic Geometry in Carthage"

- Juillet 2019 : Talk at the conference "Periods and motives" in Berlin
- August 2021 : Talk at the conference "Arithmetic of Shimura varieties over global fields" Cetraro
- February 2022 : Talk at the conference "non-archimedean geometry", Oberwolfach
- May 2022 : Simons Symposium on  $p$ -adic Hodge theory
- July 2022 : IHES summer school on the Langlands program
- September 2022 : Talk at the Clay Math Workshop on  $p$ -adic Hodge theory in Oxford
- October 2022 : Conference on Arithmetic Geometry in Darmstadt
- Juillet 2023 : Conference "Satellite conference in number theory of ICBS" et à l'ICBS (International Congress of Basic Science) à Pékin
- Octobre 2023 : Conference "Arithmetic Algebraic Geometry" in Münster for M.Rapoport 75
- Novembre 2023- Workshop on  $p$ -adic Arithmetic Geometry - IAS Princeton

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## Organization of conferences

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- July 2007 : Organizer with B.C.Ngo et D.Prasad of the conference and summer school " Summer School and Conference on Automorphic Forms and Shimura Varieties " at the ICTP in Trieste
- Organizer with Ulrich Görtz, Eva Viehmann and Torsten Wedhorn of the workshop " Reductions of Shimura Varieties" in Oberwolfach (July 2012)
- Organization of the conference " Arithmétique des variétés de Shimura et des formes automorphes et Applications" at the CIRM Luminy in July 2014
- Organization with Ulrich Görtz, Eva Viehmann and Torsten Wedhorn of the conference "Reductions of Shimura Varieties" in Oberwolfach in August 2015
- Organization with Dennis Gaitsgory, Peter Scholze and Kari Vilonen of the Arbeitsgemeinschaft "The geometric Langlands conjecture" from April 4 to 8 in Oberwolfach.
- Program "Groupes algébriques et géométrisation du programme de Langlands" of the labex Milyon (co-financed by my ERC "GeoLocLang"). April-June 2018
- January 2019. Conference "Arithmetic of Shimura varieties" in Oberwolfach (joint with U.Goertz, E. Viehmann and T. Wedhorn)
- May-August 2023 : Special program "The arithmetic of the Langlands program" at the Hausdorff center in Bonn (joint with A. Caraiani, F. Calegry and P.Scholze)

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## Teaching

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- Cours Peccot at Collège de France Spring 2004
- Introductory course on Lubin-Tate spaces at "Summer school on arithmetic geometry and automorphic forms" Tsinghua (Beijing), August 2005
- " Motifs et formes automorphes : le cas abélien " at the "école d'été franco-asiatique de géométrie algébrique et théorie des nombres" in 2006 at the IHES
- Course on Lubin-Tate spaces and formal groups at the " Hong Kong university of science and technology ", April and May 2007
- Course on Shimura varieties at the " Summer School and Conference on Automorphic Forms and Shimura Varieties " ICTP Trieste July 2007
- Talks on PEL type Shimura varieties and their integral models at the summer school "The stable trace formula, automorphic forms, and Galois representations", Banff August 2008
- Course at the summer school "Advanced school and workshop on  $p$ -adic analysis and applications", Trieste (ICTP) September 2009
- "Professeur chargé de cours d'exercice incomplet" at the Ecole Polytechnique since September 2009 (72h of teaching a year ; PDE, Lebesgue integration, Galois theory)

- Master course "Filtrations des schémas en groupes finis et plats" for the "trimestre Galoisien" at the IHP, Spring 2010
- November 2011 : 12h course at Bonn (Hausdorff institut) "Curves and vector bundles in  $p$ -adic Hodge theory"
- Spring 2014 : Master course "Théorie de Hodge  $p$ -adique, le point de vue de la courbe" at the university Paris 6 (24h course).
- March 2015 : Course " $p$ -adic Hodge theory, vector bundles and their modifications" at the "Spring school on  $p$ -adic arithmetic" in Essen
- October/November 2015 : 8 lectures of 2h at Drinfeld's "Geometric Langlands seminar" in Chicago about "Geometrization of the local Langlands correspondence".
- August 2016 : 5h course on my work at the summer school "The Langlands correspondence in arithmetic and geometry" KIAS. Seoul.
- Octobre 2016 : 8h course at the Morningside center of mathematics (Beijing) on my conjecture about the geometrization of the local Langlands correspondence.
- April-June 2018 : Programme "Groupes algébriques et géométrisation du programme de Langlands" du labex Milyon (co-financed by my ERC "GeoLocLang").
- Winter 2019-2020 : 24h course at the Morningside Center of Mathematics on "the curve"
- July 2022 : IHES summer school on the Langlands program : joint talks with P. Scholze
- October-December 2022 : Graduate course at Tokyo university
- Mai - August 2023 : 24h of course at the Hausdorff center in Bonn - Special program on the Arithmetic of the Langlands program
- Fall 2023 : Eilenberg distinguished lecture - Columbia university

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## Invitations

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- October-November 2004 : Harvard University (invited by Richard Taylor)
- April-May 2007 : "Hong Kong university of science and technology" (invited by Jian Shu Li)
- September-December 2008 : Institute for Advanced Study, Princeton (Von Neumann Fellowship)
- November 2011 : Bonn University (invited by Michael Rapoport)
- March-April 2012 : Fields Institut "Thematic program on Galois representations"
- September-December 2014. Invited professor at the MSRI for the program "New Geometric Methods in Number Theory and Automorphic Forms"
- October/November 2015 : Invited professor at Chicago University by Bao Chau Ngo.
- December 2015 : Caltech, invited by Elena Mantovan.
- Février-Mai 2019 : Eisenbud professor at the special program "Derived Algebraic Geometry" au MSRI
- October-December 2022 : Invited professor at Tokyo university
- Mai-August 2023 : Hausdorff Institute of Mathematics - Bonn - co-organizer of the special program "The Arithmetic of the Langlands program"
- Fall 2023 : Eilenberg lectures at Columbia university

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## Administrative activities :

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- Member of the hiring comity (assistant professor) in the math department in Orsay (2004-2006)
- Member of the hiring comity (assistant professor) in Bordeaux (section 25) 2006-2008
- Member of the hiring comity (assistant professor) in Paris 6 (section 25) 2007-2008
- Member of a hiring comity (assistant professor) at the University Lyon I, Spring 2009
- Member of a hiring comity (assistant professor) at the University Paris 6, Spring 2009

- Member of a hiring comity (assistant professor) at the University Paris 7, Spring 2010
- Member of a hiring comity (assistant professor) at the University of Poitiers, Spring 2010
- Member of a hiring comity (assistant professor) at the University of Strasbourg, Spring 2011
- Member of a hiring comity (assistant professor) at the University of Strasbourg, Spring 2012
- Member of a hiring comity (full professor) at the University of Rennes, Spring 2012
- 2014 : Member of a panel for the DFG (Deutsche Forschungsgemeinschaft).
- October 2018-October 2022 : PI ERC Advanced GeoLocLang

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### **Editorial activities**

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- Member of the editorial board of the "Journal de l'Institut de Mathématiques de Jussieu".

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### **Grants**

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- Coordinator de "ACI jeunes chercheurs" (joint grant for juniors in France) "Réalizations géométriques des correspondances de Langlands" (finished in September 2007)
- Member of the ANR project (joint grant) "Méthodes géométriques et p-adiques en théorie des formes automorphes" (finished)
- Scientific coordinator in Orsay of the ANR (joint grant) "ArShiFo" Arithmétique des variétés de Shimura et Formes Automorphes. Finished in December 2014.
- Member of the ANR (joint grant) "PerCoLaTor" beginning in 2015.
- PI ERC Advanced Grant "GeoLocLang", starting on October 1 2017 (1.4 Millions euros).