CURRICULUM VITAE

Contact information
Name Sophie Morel
Professional address ENS de Lyon site Monod
UMPA UMR 5669 CNRS
46, allée d’Italie
69364 Lyon Cedex 07, FRANCE
Telephone +33 (0)4 72 72 84 45
E-mail sophie.morel@ens-lyon.fr
Website https://perso.ens-lyon.fr/sophie.morel/

Education
— Université Paris-Sud, PhD in mathematics, 2005.

Diplomas
— 2001 : DEA ”Méthodes algébriques” from Université Paris 6.
  Title of the DEA thesis : Termes locaux dans la formule des points
  fixes de Lefschetz, d’après un article de M. Goresky et R. MacPherson.
  Director : Gérard Laumon.
— December 2005 : PhD in mathematics, Université Paris-Sud.
  Title : Complexes d’intersection des compactifications de Baily-Borel.
  Le cas des groupes unitaires sur Q.
  Director : Gérard Laumon.

Academic positions
— Directeur de recherche, CNRS and ENS Lyon, since February 2020.
— Invited professor, Université Lyon 1, February-May 2018.
— Invited professor, ENS de Lyon, October 2017-January 2018.
— Professor, Princeton University, September 2012-January 2019.
— Member, Institute for Advanced Study, 2012-2013.
— Professor, Harvard University, December 2009- August 2012.
— Member, Institute for Advanced Study, 2010-2011.
— Visitor, Harvard University, September 2009 - December 2009.
— Member, Institute for Advanced Study, 2006-2009.
— Teaching assistant, Université Paris-Sud (September 2002-August 2005).

Publications

(available on the arXiv)

— Complexes d’intersection des compactifications de Baily-Borel. Le cas des groupes unitaires sur $\mathbb{Q}$, thèse, Université Paris-Sud (2005)
— Cohomologie d’intersection des variétés modulaires de Siegel, suite, Compos. Math. 147 (2011), no. 6, p 1671-1740
— The intersection complex as a weight truncation and an application to Shimura varieties, Proceedings of the International Congress of Mathematicians, Hyderabad, India (2010)
— The sign conjecture for Shimura varieties, with Junecue Suh, Journal für die reine und angewandte Mathematik (2014)
— Construction de représentations galoisiennes de torsion, d’après Peter Scholze, séminaire Bourbaki, juin 2015
— Some combinatorial identities appearing in the calculation of the cohomology of Siegel modular varieties, with Richard Ehrenborg and Margaret Readdy, (Algebraic Combinatorics, October 2019)
— A generalization of combinatorial identities for stable discrete series constants, with Richard Ehrenborg and Margaret Readdy (Journal of combinatorial algebra, 2022)
— Sharing pizza in $n$ dimensions, with Richard Ehrenborg and Margaret Readdy (Transactions of the American Mathematical Society), 2022
— Pizza and 2-structures, with Richard Ehrenborg and Margaret Readdy (to appear in Discrete & Computational geometry)
— The six operations on perverse motives, with Florian Ivorra (to appear in Journal of the European Mathematical Society)

Prepublications

(available on the arXiv)

— Mixed l-adic complexes for schemes over number fields (submitted, 2019)
— *Comparison of different definitions of pseudocharacters*, with Kathleen Emerson (2023)

**Advanced courses**

— Spring 2014: graduate course at Princeton University on the geometric Satake correspondence.
— Fall 2014: graduate course at Princeton University on Vincent Lafforgue’s work on the global Langlands correspondence.
— February-March 2015: mini-course (10h) called *On the Kontsevich-Zagier conjecture on periods* at the CRM in Montréal as Aisenstadt chair.
— May 2015: mini-course (10h) called *Deformation rings in equal characteristic* at the CRM in Montréal as Aisenstadt chair.
— February 2016: mini-course (10h) at the IPM in Teheran on the global Langlands correspondence.
— May 2016: mini-course (8h) at the ENS de Lyon on the geometric Langlands correspondence.
— June 2016: mini-course (4h) at the summer school *Fundamental groups in arithmetic geometry* on Vincent Lafforgue’s work.
— January 2017: mini-course (10h) on derived deformation rings at TIFR in Mumbai.
— January-April 2018: graduate course at the Université Lyon 1 on derived algebraic geometry.
— May 2018: mini-course (10h) with Benoît Stroh on the work of Genestier-Lafforgue about the local Langlands correspondence.
— Spring 2019: graduate course at Princeton University on rigid analytic geometry (adic spaces).
— Fall 2019: graduate course at Princeton University on homological algebra.
— Fall 2020: graduate algebraic geometry course at the ENS Lyon.
— Fall 2021: graduate course on Lie groups and Lie algebras at the ENS Lyon.
— June 2022: *Weighted cohomology of Shimura varieties*, course at the IRMA summer school *Motives and arithmetic groups* in Strasbourg.
— July 2022: *Introduction to Shimura varieties*, course at the IHES summer school on the Langlands program.
— Fall 2022: a graduate course on complexe algebraic geometry and a graduate course on rigid geometry at the ENS Lyon.
— Fall 2023: Graduate course on representation theory at the ENS de Lyon.
Other teaching

— At Harvard University:
  — Fall 2009: Math 21b (linear algebra and differential equations).
  — Spring 2010: Math 129 (number fields).
  — Fall 2011: Math 21b (linear algebra and differential equations), and a graduate student seminar on Morihiko Saito’s theory of pure Hodge modules (with Sam Raskin).
  — Spring 2012: Math 21a (multivariable calculus).
— At Princeton University:
  — Fall 2012: Co-organizer (with Chris Skinner and Richard Taylor) of the working seminar on number theory.
  — Spring 2013: Co-organizer (with Chris Skinner and Richard Taylor) of the working seminar on number theory.
  — Fall 2013: Math 449 (Representation theory of compact Lie groups) and Co-organizer (with Chris Skinner, Richard Taylor and Shouwu Zhang) of the working seminar on number theory.
  — Spring 2014: Co-organizer (with Chris Skinner, Richard Taylor and Shouwu Zhang) of the working seminar on number theory.
  — Fall 2014: Math 449 (Representation theory of Lie algebras), and Co-organizer (with Chris Skinner, Richard Taylor and Shouwu Zhang) of the working seminar on number theory.
  — Fall 2016: Math 449 (Representation theory: finite groups, compact groups and introduction to Lie groups and Lie algebras) and Co-organizer (with Chris Skinner, Richard Taylor and Shouwu Zhang) of the working seminar on number theory.
  — Spring 2017: Math 217 (Honors linear algebra) and Co-organizer (with Chris Skinner, Richard Taylor and Shouwu Zhang) of the working seminar on number theory.
  — I participated (and gave lectures) in the working seminars on reductive group schemes at the Université Lyon 1 and on Fargues’s geometric proof of local class field theory at the ENS de Lyon.
  — Undergraduate seminar at the ENS de Lyon in January-April 2018 (about representations of finite groups and applications to random walks).
  — Fall 2018: Math 449 (Representation theory: representations of locally compact groups, Peter-Weyl theorem, Gelfand pairs, applications).
— At the ENS Lyon:
  — Spring 2020: Classical algebraic geometry.
Course notes and exposition

(available on my website)

— *Representation theory* (fall 2018)
— *Introduction À la géométrie algébrique dérivée* (notes of my graduate class at the Université Lyon 1 in January-April 2018.
— Notes of my two graduate classes about geometric Satake and Vincent Lafforgue’s work (taken by Dan Collins, not proofread by me).
— *Notes from MAT 449 (Introduction to representation theory, Fall 2016)* (notes of all the lectures, homework problems, take-home final and full solutions)
— *I know that you know : enigmas based on the concept of common knowledge* (expository, in Persian, joint with Mohammad Shahryari; appeared in the Newsletter of the Iranian Mathematical Society, 149-150, Fall-Winter 2017)
— *Beilinson’s construction of nearby cycles and gluing*
— *A quick introduction to perverse sheaves*

Service

— Participation in Hiring committees at Harvard and Princeton Universities, and in various French universities (at the graduate school, postdoc, junior faculty and senior faculty level).
— Member of the editorial committee of the *Journal de l’École polytechnique* and of *Essential Number Theory*.
— Organizer (with Arthur-César Le Bras, Vincent Pilloni and Timo Richarz) of the research school *Condensed mathematics* at CIRM in March 2023.
— Member of the outside scientific committee of the special trimester “Groupes algébriques et géométrisation du programme de Langlands” (ENS de Lyon and Université Lyon 1, April-June 2018).
— Organizer (with Dennis Gaitsgory and Xinwen Zhu) of the workshop “Global Langlands correspondence” at AIM in December 2016.
— Organizer (with Peter Scholze, Richard Taylor and Jared Weinstein) of the workshop *Perfectoid Spaces and their Applications* at MSRI in February 2014.
— Organizer (with Pascal Boyer, Alain Genestier, Laurent Lafforgue, Sergey Lysenko and Bao Chau Ngo) of the conference *De la géométrie algébrique aux formes automorphes : une conférence en l’honneur de Gérard Laumon* (Orsay, June 2012) and editor of the proceedings of that conference.
— Referee for the ERC.

Graduate advising

— Kathleen Emerson (phd, 2013-2018), topic: Comparison of different definitions of pseudo-characters.
— Swann Tubach, Spring 2021, master’s thesis.
— Swaa Tubach, Fall 2022-, phd.

Undergraduate advising

— Spring 2012: Lucia Mocz, reading course on the étale fundamental group.
— Spring 2013: Minh-Tam Trinh, junior project titled From representation theory to $L$-functions.
— Spring 2015: Daniel Li, sophomore independent project titled Deligne-Lusztig theory for $GL_n(F_q)$.
— Fall 2016-Spring 2017: Daniel Li, senior thesis titled A Scholzian approach to the local Langlands correspondence for $GL_n$ over function fields.
— Spring 2017: Joshua Wang, reading course on modern algebraic geometry.
— Spring 2017: Roger van Peski, junior project titled Macdonald polynomials and root systems.
— Spring 2017: Timothy Ratigan, junior project titled Local class field theory is easier.
— Spring 2017: Xiaoyu Xu, junior project titled A homological approach to Hilbert’s third problem.
— Spring 2019: Two reading courses (introduction to Lie groups and modern algebraic geometry).
— Spring 2019: Eitan Levin, junior project on invariant theory.
— Spring 2020: Riku Kurama, junior project on de Jong’s conjecture.
— Spring 2022: Matteo Verni, senior thesis.
Fellowships and honors

— Speaker in the number theory section of the ICM in Hyderabad (India), August 2010.
— Prize of the European Mathematical Society (July 2012).
— Inaugural AWM-Microsoft prize in algebraic and number theory (August 2014).
— Aisenstadt chair at the CRM in Montréal (Spring 2015).