Curriculum vitae

Nicolas MASCOT
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Born on Nov. 9th, 1988
in Lannion (France)
French nationality

Employment

Since Aug. 2017	**Assistant professor at the American University of Beirut (Lebanon)**
Sept. 2014 - Aug. 2017	**Research fellow at the University of Warwick (UK)** *Postdoctoral position, supported by the EPSRC Programme Grant "LMF: L-Functions and Modular Forms"*

Research articles

- Published:

- **Rigorous computation of the endomorphism ring of a Jacobian** joint with E. Costa (Dartmouth College, USA), J. Sijsling (Universität Ulm, Germany) and J. Voight (Dartmouth College, USA)
  To appear in *Math. Comp.*

- **Companion forms and explicit computation of $\mathbf{PGL}_2$-number fields with very little ramification** (30 pages) Published in *Journal of algebra 509 (2018), 476–506.*

- **Certification of modular Galois representations** (43 pages) Published in *Math. Comp. 87 (2018), 381–423.*

- **Computing modular Galois representations** (43 pages) Published in *Rendiconti del Circolo Matematico di Palermo*, volume 62, issue 3, December 2013.

- Preprints:

- **Explicit computation of a Galois representation attached to an eigenform over $\mathbf{SL}_3$ from the $\mathbf{H}^2$ étale of a surface** arXiv preprint 1810.05885 (19 pages)

- **Hensel-lifting torsion points on Jacobians and Galois representations** arXiv preprint 1808.03939 (35 pages)

- Planned:

- **Computing Galois representations attached to Hilbert modular forms** joint with A. Page (Bordeaux, France)

- **Enumeration of points of bounded degree on modular curves** joint with S. Siksek (Warwick, UK)

Software

- A SAGE package ($\approx$ 5000 lines) to compute periods of modular curves and mod ℓ Galois representations arising from modular forms
- A PARI/GP package ($\approx$ 2000 lines) to rigorously certify that the output of the package above is correct
- A publicly accessible database of modular Galois representations
- A PARI/GP package ($\approx$ 2500 lines of C language using the PARI library) to compute Galois representations occurring in the torsion of the Jacobian of any curve
- A PARI/GP package ($\approx$ 500 lines) to compute by 2-descent the rank of the Jacobian of hyperelliptic curves of any genus

Other mathematical texts

May 2018	**Algebraic number theory** Lecture notes (139 pages), originally in collaboration with A. Page
July 2014	**Calcul de représentations galoisiennes modulaires** (210 pages) PhD thesis, IMB (Bordeaux, France)
October 2010	**La méthode de Chabauty et Coleman** Research domain introduction thesis, ENS Ulm (Paris, France)
September 2010	**Fonctions zêta de courbes projectives sur un corps fini et cohomologie Weil-étale** Master's thesis, Paris VI university (France)
June 2009	**Gaussian elimination** for a computer algebra course
March 2009	**The modularity of theta series attached to lattices** after A. Ogg
June 2008	**Symétries de Lie des systèmes d'équations aux dérivées partielles et classification des actions locales de groupes de Lie** Magistère thesis, ENS Ulm (Paris, France)

Research visits

January 2018 (1 week)	**IMB (Bordeaux, France)** upon invitation from Pr. Aurel Page.
February 2017 (1 week)	**IRMAR (Rennes, France)** to give a 3h lecture on my work during a special week on algorithmic approaches to the p-adic Langlands correspondence.
October 2016 (1 week)	**AUB (Beirut, Lebanon)** upon invitation from Pr. Kamal Khuri-Makdisi.
May 2016 (10 days)	**IMB (Bordeaux, France)** upon invitation from Pr. Jean-Marc Couveignes.
April 2016 (1 week)	**AUB (Beirut, Lebanon)** upon invitation from Pr. Kamal Khuri-Makdisi.
Autumn 2015 (3 months)	**ICERM (Providence, USA)** as a visiting research fellow on the occasion of the special term "Computational aspects of the Langlands program".

Research talks

August 2018	**Hensel-lifting torsion points and Galois representations** MIT (USA)
November 2017	**Computing with Galois representations** CAMS (AUB, Beirut, Lebanon)
October 2017	**Computing with Galois representations** NDU (Louaizé, Lebanon)
July 2017	**Computing modular Galois representations and lightly ramified PGL2-fields** Oldenburg (Germany)
February 2017	**3h lecture** on the computation and certification of modular Galois representations IRMAR (Rennes, France)
October 2016	**Certification of modular Galois representations** AUB (Beirut, Lebanon)
May 2016	**Certification de représentations galoisiennes modulaires** IMB (Bordeaux, France)
April 2016	**Computing modular Galois representations** AUB (Beirut, Lebanon)
January 2016	**Certification of modular Galois representations** Bristol (UK)
December 2015	**Certification de représentations galoisiennes modulaires** IRMAR (Rennes, France)
November 2015	**Certification of modular Galois representations** ICERM (Providence, USA)
April 2015	**Calculs de représentations galoisiennes modulaires** IMM (Marseille, France)
November 2014	**Computing modular Galois representations** Warwick (UK)
September 2014	**Computing modular Galois representations** Sheffield (UK)
March 2014	**Computing modular Galois representations** CIRM (Marseille, France)
January 2014	**Calculs de représentations galoisiennes modulaires** Caen (France)
January 2014	**Calculs de représentations galoisiennes modulaires** LIP (Lyon, France)
December 2013	**Calculs de représentations galoisiennes modulaires** IRMAR (Rennes, France)
November 2013	**Calculs de représentations galoisiennes modulaires** Clermont-Ferrand (France)
September 2013	**Computing modular Galois representations** LMB (Besançon, France)
July 2013	**Computing modular Galois representations** MFO (Oberwolfach, Germany)
May 2013	**Calculs de représentations galoisiennes modulaires** CIRM (Marseille, France)
April 2013	**Calculs de représentations galoisiennes modulaires** LMB (Besançon, France)
January 2013	**Calculs de représentations galoisiennes modulaires** IRMAR (Rennes, France)
January 2013	**Calculs de représentations galoisiennes modulaires** IMB (Bordeaux, France)
February 2011	**Plongements grassmanniens et arithmétique jacobienne rapide** IMB (Bordeaux, France)

Study group and popularization talks

December 2016	**Waring's problem and the circle method** Warwick (UK)
February 2015	**Cohomological obstruction to deformation problems and Gouvêa's dimension conjecture** Warwick (UK)
December 2014	**Construction and properties of modular Galois representations of any weight** Warwick (UK)
May 2013	**Un peu de géométrie des surfaces algébriques** IMB (Bordeaux, France)
October 2012	**La constante de Khintchine** IMB (Bordeaux, France)
September 2012	**La jacobienne d'une surface de Riemann compacte** IMB (Bordeaux, France)
May 2012	**La jacobienne d'une surface de Riemann compacte** IMB (Bordeaux, France)
December 2010	**La méthode de Chabauty et Coleman** IMB (Bordeaux, France)
October 2009	**Introduction à la théorie de Galois et à la théorie de Kummer** ENS Ulm (Paris, France)
May 2009	**Représentation informatique des flottants et problèmes d'arrondi** ENS Ulm (Paris, France)

Other mathematical activities

Since 2017	**Member of the PhD committee** AUB (Beirut, Lebanon)
2016	**Participation in writing a grant proposal** on the algorithmic aspects of the p-adic Langlands correspondence, section on explicit deformations of Galois representations and Hilbert and Siegel modular forms
2013	**Organizer of a conference** for PhD students in number theory, IMB (Bordeaux, France)

Teaching experience

At the American University of Beirut:

2018	**Algebraic number theory (graduate course)** $\approx$ 15 students. Number fields, Dedekind domains, class groups, units, and Diophantine equations.
	Calculus and analytic geometry II $\approx$ 200 students (shared). Usual functions, curves and geometry in 2D and 3D.
	Linear algebra $\approx$ 200 students (shared). Gaussian elimination, matrices, vector spaces, diagonalisation, Euclidean spaces.
2017, 2018	**Number theory** $\approx$ 30 students. Congruences, quadratic reciprocity, sums of squares, continued fractions.
2017	**Calculus and analytic geometry I** $\approx$ 200 students (shared). Continuity, derivability, integration.

As a postdoctoral researcher at the University of Warwick:

2016, 2017	**Algebraic number theory (3rd year module)** $\approx$ 90 students (shared). Number fields, Dedekind domains, class groups, units, and Diophantine equations.

During my thesis in Bordeaux I University:

2013	**Computer science tutor** $\approx$ 30 students. Basics of Linux, collaborative online tools, advanced office software.
2011, 2012, 2013	**Mathematics for biology bachelor students** $\approx$ 40 students. Single- and multivariate calculus and integration, linear ODEs, linear algebra.
2011, 2012	**Calculus for mathematics and physics bachelor students** $\approx$ 40 students. Real and vector calculus and integration, direct and inverse trigonometric and hyperbolic functions, linear ODEs.

Before:

2008, 2009	**Oral examiner in mathematics in classe préparatoire MP*** Lycée Louis le Grand, Paris.

Education

Sept. 2011 - Aug. 2014	**Doctorate thesis at IMB (Bordeaux, France)** *Subject : Computing modular Galois representations* *Supervised by Prs. Jean-Marc Couveignes and Karim Belabas* *Funded by the ENS Ulm (Paris, France).*
Sept. 2007 - Aug. 2011	**École Normale Supérieure (ENS Ulm, Paris, France)** *2010: Master's thesis: "Fonctions zêta de courbes projectives sur un corps fini et cohomologie Weil-étale" Supervisor: Pr. Boas Erez (Bordeaux I university)* *2009: Agrégation de mathématiques, option algèbre et calcul formel (rank : 9th)* *2008: Short thesis for the first year of the Master's degree: "Symétries de Lie des systèmes d'équations aux dérivées partielles et classification des actions locales de groupes de Lie" Joint with Sylvain Arguillère. Supervisor: Pr. Joël Merker (ENS Ulm).*
Sept. 2005 - Jul. 2007	**Classes préparatoires in mathematics** Lycée Louis le Grand, Paris *2007: Admitted to the École Normale Supérieure de la rue d'Ulm (ranked 8th) and to the École Polytechnique (ranked 15th).*

Languages

French (mother tongue), English fluently read, spoken and written, knowledge of German, Spanish and Chinese, basic notions of Arabic.

Computer skills

- System : Linux, Windows.
- Programming : C and C++, Python, notions of 386 assembly language. Vast experience in parallel computing on the Bordeaux and Warwick computer clusters.
- Vast experience in PARI/GP and SAGE, good knowledge of MAGMA, MAPLE and SCILAB.
- LaTeX, Git, HTML.