Curriculum vitae

Nicolas MASCOT
School of Mathematics
Trinity College Dublin
Ireland

mascotn@tcd.ie
maths.tcd.ie/~mascotn/

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

Employment

Since Aug. 2019	**Ussher assistant professor in number theory and cryptography** *Trinity College Dublin (Ireland)*
Aug. 2017 - Aug. 2019	**Assistant professor** *American University of Beirut (Lebanon)*
Sept. 2014 - Aug. 2017	**Research fellow** *University of Warwick (UK)* *Postdoctoral position, supported by the EPSRC Programme Grant "LMF: L-Functions and Modular Forms"*

Research articles

- Published:

- **Hensel-lifting torsion points on Jacobians and Galois representations** (42 pages) To appear in *Math. Comp.*

- **Rigorous computation of the endomorphism ring of a Jacobian** (37 pages) joint with E. Costa (Dartmouth College, USA), J. Sijsling (Universität Ulm, Germany) and J. Voight (Dartmouth College, USA)
Published in *Math. Comp. 88 (2019), 1303–1339.*

- **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:

- **A Prym variety with everywhere good reduction over $\mathbf{Q}(\sqrt{61})$** (18 pages) joint with J. Sijsling (Universität Ulm, Germany) and J. Voight (Dartmouth College, USA)
arXiv preprint 1908.00421

- **Explicit computation of a Galois representation attached to an eigenform over $\mathbf{SL}_3$ from the $\mathbf{H}^2$ étale of a surface** (20 pages) arXiv preprint 1810.05885

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

September 2019	**Hensel-lifting torsion points and Galois representations from the $\mathbf{H}^2$ of surfaces** IRMAR (Rennes, France)
January 2019	**Hensel-lifting torsion points and Galois representations from the $\mathbf{H}^2$ of surfaces** IMB (Bordeaux, France)
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)** ≈ 15 students. Number fields, Dedekind domains, class groups, units, and Diophantine equations.
	Calculus and analytic geometry II ≈ 200 students (shared). Usual functions, curves and geometry in 2D and 3D.
	Linear algebra ≈ 200 students (shared). Gaussian elimination, matrices, vector spaces, diagonalisation, Euclidean spaces.
2017, 2018	**Number theory** ≈ 30 students. Congruences, quadratic reciprocity, sums of squares, continued fractions.
2017	**Calculus and analytic geometry I** ≈ 200 students (shared). Continuity, derivability, integration.

As a postdoctoral researcher at the University of Warwick:

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

During my thesis at Bordeaux 1 University:

2013	**Computer science tutor** ≈ 30 students. Basics of Linux, collaborative online tools, advanced office software.
2011, 2012, 2013	**Mathematics for biology bachelor students** ≈ 40 students. Single- and multivariate calculus and integration, linear ODEs, linear algebra.
2011, 2012	**Calculus for mathematics and physics bachelor students** ≈ 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.