

Curriculum vitæ

Martine Girard

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PERSONAL

Date of birth: 10 August 1972

Place of birth: Sucy en Brie, France

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CONTACT ADDRESS

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ACADEMIC POSITIONS

- Since April 2003: Sesqui Postdoctoral Fellow, University of Sydney, Australia.
- October 2002 – March 2003: Postdoctoral Fellow, Università degli Studi di Roma “Tor Vergata”, Italy, within the European research training network “Galois Theory and Explicit Methods in Arithmetic”.
- January 2001 – June 2002: Postdoctoral Fellow, Mathematical Institute, Leiden University, The Netherlands, within the European research training network “Galois Theory and Explicit Methods in Arithmetic”.
- September 1998 – August 2000: Attachée Temporaire d’Enseignement et de Recherche (Fixed-term Lecturer), Paris 7 University, France.

ACADEMIC STUDIES

- Ph.D. Thesis in Mathematics, Paris 7 University, 21 July 2000.
Title: Points de Weierstrass et jacobienne de courbes algébriques de genre 3.
(Weierstrass Points and Jacobians of Algebraic Curves of Genus 3).
(<http://www.institut.math.jussieu.fr/~girard/these/these.ps.gz>)
Advisor: Marc Hindry
Thesis examining board: John Boxall (rapporteur), Antoine Chambert-Loir, Marc Hindry, Jean-François Mestre, Jean-Jacques Sansuc, René Schoof (rapporteur).
- Diplôme d’Etudes Approfondies in Mathematics (in Algebraic Geometry), Paris 7 University, June 1995.
- Maîtrise de Mathématiques, Paris 7 University, June 1994.
- Licence de Mathématiques, Paris 7 University, June 1993.
- D.E.U.G. Sciences et Structure de la Matière, Paris 7 University, June 1992.

CONFERENCES AND WORKSHOPS

- Explicit Methods in Number Theory, Oberwolfach, Germany, 17–23 July 2005.
- Journées Arithmétiques XXIV. Marseille, France, 04 – 08 July 2005.
- Workshop in Arithmetic Geometry. Stellenbosch, South Africa, 1–4 February 2005.
- ECHIDNA 2, Workshop on Elliptic Curves and Higher Dimensional Analogues, Sydney, Australia, 12 – 14 January 2005.
- Explicit Arithmetic Geometry. Institut Henri Poincaré, Paris, France, 6 – 10 December 2004.
- Explicit Methods in Number Theory. Institut Henri Poincaré, Paris, France, 23 November – 13 December 2004.
- Explicit Methods in Number Theory. Banff International Research Station, Banff, Canada, 13–18 November 2004.
- Algorithmic Number Theory Symposium (ANTS V), Burlington, Vermont, USA, 13–18 July 2004.
- Journées Arithmétiques XXIII, Graz, Austria, 6–12 July 2003.
- Computational Arithmetic Geometry Workshop, Sydney, Australia, 18–20 June 2003.
- ECHIDNA, Workshop on Elliptic Curves and Higher Dimensional Analogues, Sydney, Australia, 15–19 July 2002.
- Algorithmic Number Theory Symposium (ANTS V), Sydney, Australia, 7–12 July 2002.
- Explicit Methods in Galois Theory and Arithmetic, Lorentz Center, Leiden, The Netherlands (Organiser), 10–14 June 2002.
- Anabelian Number Theory and Geometry, Lorentz Center, Leiden, The Netherlands, 3–5 December 2001.
- L-Functions from Algebraic Geometry, Lorentz Center, Leiden, The Netherlands, 17–21 September 2001.
- Explicit Methods in Number Theory, Oberwolfach, Germany, 23–27 July 2001.
- Journées Arithmétiques XXII, Lille, France, 2–6 July 2001.
- Gauss Day, Gent, Belgium, 2 May 2001.
- Arithmetic Geometry, MSRI, Berkeley, USA, 11–15 December 2000.
- Algorithmic Number Theory Symposium (ANTS IV), Leiden, The Netherlands, 2–7 July 2000.
- Journées Arithmétiques XXI, Università Lateranense, Vatican City, 12–16 July 1999.
- Points rationnels et algébriques des variétés, IHP, Paris, France, February 1999.
- Colloque Jeunes Chercheurs en Théorie des Nombres, Caen, France, 15–17 September 1998.
- Computational Results in Arithmetic Geometry, Isaac Newton Institute, Cambridge, UK, 14–16 April 1998.
- Conference on Rational Points, Isaac Newton Institute, Cambridge, UK, 30 March – 4 April 1998.
- Summer School on Elliptic Curves, ICTP, Trieste, Italy, 11–29 August 1997.
- Rencontres arithmétiques de Caen, France, 6–7 June 1997.
- Algebraic Curves over Number Fields, Lunteren, The Netherlands, 16–18 December 1996.

CONFERENCES AND WORKSHOPS TALKS

- *Maximality of the Weierstrass subgroup of the generic genus g curve.* Journées Arithmétiques, Marseille, France 5 July 2005.
- *Maximality of the Weierstrass subgroup of the generic genus g curve.* Stellenbosch, South Africa, 3 February 2005.
- *Maximality of the Weierstrass subgroup of the generic genus g curve.* Sydney, Australia, 12 January 2005.
- *Maximality of the Weierstrass subgroup.* Explicit Arithmetic Geometry, Institut Henri Poincaré, Paris, France, 7 December 2004.
- *Maximality of the Weierstrass subgroup.* BIRS, Banff, Canada, 17 November 2004.
- *Computation of the rational points of genus 3 curves via Dem'janenko-Manin's method.* Journées Arithmétiques, Graz, 10 July 2003.
- *Computing sets of rational points using Dem'janenko-Manin's method.* Computational Arithmetic Geometry Workshop, University of Sydney, Australia, 19 June 2003.
- *Explicit computation of the group generated by the Weierstrass points of some plane quartics.* Oberwolfach, Germany, July 2001.
- *The group generated by the Weierstrass points of some plane quartics.* Journées Arithmétiques, Lille, France, 2 July 2001.

SEMINAR PRESENTATIONS

- *Maximality of the Weierstrass subgroup of the generic genus g curve.* Chuo University, Tokyo, Japan, 18 November 2005.
- *Maximality of the Weierstrass subgroup of the generic genus g curve.* Tokyo Institute of Technology, Japan, 15 November 2005.
- *Maximalité du groupe engendré par les points de Weierstrass.* Séminaire de Théorie des Nombres, Caen, France, 3 December 2004.
- *Weierstrass points and the groups they generate.* Algebra and Combinatorics Seminar. Texas A & M University, USA, 19 November 2004.
- *Détermination d'ensembles de points rationnels via la méthode de Dem'janenko-Manin.* Groupe d'étude sur les problèmes diophantiens, Institut de Mathématiques de Jussieu, Paris, France, 3 June 2004.
- *Elliptic curves and their moduli spaces $X(1)$, $X_0(N)$ and $X_1(N)$.* Number Theory Seminar, University of Sydney, Australia, 23 April 2004.
- *Group of Weierstrass points of a plane quartic.* Number Theory Seminar, Rome, Italy, 31 January 2003.
- *The group generated by the Weierstrass points of a curve.* Number Theory Seminar, Leiden, The Netherlands, 13 January 2003.
- *Le groupe engendré par les points de Weierstrass d'une courbe.* Séminaire de Théorie des Nombres, Algorithmique et Cryptographie, Toulouse (GRIMM), France, 19 December 2002.
- *Le groupe des points de Weierstrass d'une quartique plane ayant un nombre fixé de points d'hyper-inflexion.* Séminaire de Théorie des nombres, Grenoble, France, 9 January 2002.

- *Group of Weierstrass points of a plane quartic with a fixed number of hyperflexes.* Algebraic Geometry Seminar, University of Sydney, Australia, 9 November 2001.
- *Computation of blow-ups and Néron models.* Number Theory Seminar, Leiden, The Netherlands, 24 October 2001, 29 October 2001.
- *The group generated by the Weierstrass points of some plane quartics.* Computational Algebra Seminar, University of Sydney, Australia, 5 April 2001.
- *Groupe des points de Weierstrass de courbes algébriques de genre 3.* Toulouse, France, 16 March 2001.
- *Groupe des points de Weierstrass de familles de quartiques.* Séminaire d'Algorithmique arithmétique, Bordeaux, France, 8 March 2001.
- *Weierstrass points and the moduli space \mathcal{M}_3 .* Number Theory Seminar, Leiden, The Netherlands, 5 March 2001.
- *The group generated by the Weierstrass points of a plane quartic.* Intercity Number Theory Seminar, The Netherlands, 2 February 2001.
- *Groupe des points de Weierstrass de familles de quartiques.* Séminaire de Géométrie algébrique, Rennes, France, 23 November 2000.
- *Groupe des points de Weierstrass de familles de quartiques.* Séminaire de Théorie des nombres, Caen, France, 10 November 2000.
- *Thesis defence.* Institut de Mathématiques de Jussieu, 21 July 2000.
- *Groupes de points de Weierstrass sur des courbes de genre 3,* Groupe d'étude sur les problèmes diophantiens, Institut de Mathématiques de Jussieu, Paris, France, February 2000.

PUBLICATIONS

- *Points de Weierstrass et jacobienne de courbes algébriques de genre 3 (Weierstrass points and Jacobians of algebraic curves of genus 3),* Ph.D. thesis, Paris 7 University, 2000.
- *Group of Weierstrass points of a plane quartic* Research Hilight, Annual Report of the Mathematical Institute, Leiden University, 2002.
- *Group Generated by the Weierstrass Points of a Plane Quartic* with Pavlos Tzermias, Proc. Amer. Math. Soc. 130 (2002), 667-672.

We describe the group generated by the Weierstrass points in the Jacobian of the curve $X^4 + Y^4 + Z^4 + 3(X^2Y^2 + X^2Z^2 + Y^2Z^2) = 0$. This curve is the only curve, apart from the fourth Fermat curve, possessing exactly twelve Weierstrass points. Using the geometry of the elliptic factors of the Jacobian, we prove that this group is isomorphic to $(\mathbb{Z}/4\mathbb{Z})^5$.

- *Géométrie du groupe des points de Weierstrass d'une quartique lisse,* Journal of Number Theory 94 (2002), 103–135.

Abstract: We describe the group generated by the Weierstrass points in the Jacobian, for the family of curves $y^4 = x(x-1)(x-t)$. This gives an explicit example where this group is not finite, namely it is isomorphic to $\mathbb{Z}^9 \times (\mathbb{Z}/4\mathbb{Z})^2$. We deduce from this result that for a generic quartic, the group generated by the Weierstrass points generated by the Weierstrass points is \mathbb{Z}^r with $11 \leq r \leq 23$. We obtain similar bounds on the rank and on the torsion part depending of the number of Weierstrass points and their geometric configuration.

- *Groupe des points de Weierstrass sur une famille de quartiques lisses* Acta Arithmetica 105 (2002), 305–321.

Abstract: We describe the group generated by the Weierstrass points in the Jacobian, for the family of curves $y^3 = x(x-1)(x^2 - 2\beta x + \beta)$. We prove that this group is not finite, namely it is isomorphic to $\mathbb{Z}^4 \times (\mathbb{Z}/3\mathbb{Z})^5$. The proof relies on a descent using an isogeny of the Jacobian for a special curve in the family.

- *Group of Weierstrass points of a plane quartic with eight hyperflexes.*, to appear in Mathematics of Computation.

Abstract: In this paper, we describe the structure of this group for all plane quartics with at least eight hyperflexes. It enables us to better the bounds previously obtained both on the rank and on the torsion part of the group generated by the Weierstrass points of a generic quartic having a fixed number of hyperflexes in the moduli space \mathcal{M}_3 of curves of genus 3.

- *Computation of sets of rational points of genus 3 curves via the Dem’janenko-Manin method* with Leopoldo Kulesz, to appear in the London Mathematical Society Journal of Computation and Mathematics.

Abstract: We construct two families of genus 3 curves defined over $\mathbb{Q}(t)$ with three independent morphisms to an elliptic curve of rank at most two. We give explicit examples of application of the Dem’janenko-Manin method to determine completely the set of the $\mathbb{Q}(t)$ -rational points of the curves we consider, as well as the set of \mathbb{Q} -rational points of some specialisations.

Submitted papers

- *The Weierstrass subgroup of a curve has maximal rank.* with David Kohel and Christophe Ritzenthaler.

Abstract: In this paper, we show that the group generated by the Weierstrass points of a generic curve in its Jacobian is of maximal rank.

In preparation

- *Galois module structure of Weierstrass subgroups.* with David Kohel.

Abstract: We determine the complete Galois module structure of the Weierstrass subgroups for each strata of Vermeulen’s stratification of the moduli space of genus 3 curves.

PROGRAMMING

- Code for computing heights of points on elliptic curves over function fields and number fields. Incorporated in the latest release of magma.

TEACHING EXPERIENCE

- Semester 1, 2005: Honours course “Algebraic curves”, University of Sydney.
- December 2004, January 2005: Supervision of a vacation scholar on the topic “Rational points on elliptic curves”, University of Sydney.
- 2002: Tutorials in Algebraic Number Theory (in English), fourth year students, Leiden University.

- 1998 – 2000: Travaux dirigés (tutorials) in DEUG (first two years of University), Paris 7 University.
- 1997 – 1998: Teaching students preparing the CAPES (competitive teaching diploma), Versailles University.
- 1995 – 1997: Oral examiner for students preparing the competitive exams to enter engineer schools, Paris 7 University.

ADMINISTRATION

- Since 2005, organiser (with Robert Carls) of the Number Theory Seminar, Sydney University.
- Organiser (with Bart de Smit) of the conference Explicit Methods in Galois Theory and Arithmetic, Leiden, June 2002 .
- Elected representative of the postgraduate students at the Conseil de Laboratoire (Management Committee) of the Institut de Mathématiques de Jussieu, April 1999 – January 2001.
- Deputy representative of the postgraduate students at the Conseil de Laboratoire (Management Committee) of the Institut de Mathématiques de Jussieu, April 1997 – March 1999.
- Member of the bureau des doctorants (Postgraduate Office) of the Institut de Mathématiques de Jussieu, in charge mainly of allocating postgraduates' offices and managing computer facilities for postgraduate students, 1999 – 2001.

SCHEDULED CONFERENCES, WORKSHOPS AND TALKS

- ANTS (Algorithmic Number Theory Symposium) VII, Berlin, July 2006.