

## Francesc Castella

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### Academic Positions

- 2017–present     Instructor, **Princeton University**
- 2016–2017     Associate Research Scholar, **Princeton University**
- 2013–2016     Hedrick Assistant Professor, **University of California, Los Angeles**

### University Degrees

- 2013             Ph.D. in Mathematics, **McGill University** (advisor: Henri Darmon)
- 2009             M.Sc. in Mathematics, **BarcelonaTech** (advisor: Victor Rotger)
- 2008             B.Sc. in Mathematics, **BarcelonaTech**

### Awards and Honors

- 2016             Distinguished Teaching Award, UCLA
- 2016             Vicent Caselles Award, BBVA Foundation–Royal Spanish Mathematical Society
- 2008             Évariste Galois Prize, Institut d’Estudis Catalans

### Grants and Fellowships

- 2016–2018     AMS–Simons Travel Grant
- 2011             ISM Graduate Scholarship, Institut des Sciences Mathématiques
- 2010, 2012     Schulich Graduate Fellowship, McGill University

### Publications and Preprints

18. **An anticyclotomic variant of the  $p$ -adic Birch–Swinnerton-Dyer conjecture.**  
(joint with Adebisi Agboola)  
In preparation.
17. **Indivisibility of Heegner points and arithmetic applications.**  
(joint with Ashay Burungale and Chan-Ho Kim)  
In preparation.
16. **Class groups and local indecomposability for non-CM forms.**  
(joint with Carl Wang-Erickson)  
In preparation.
15. **Elliptic curves of rank two and non-vanishing of generalized Kato classes.**  
(joint with Ming-Lun Hsieh)  
In preparation.
14. **Rankin–Eisenstein classes, big Heegner points, and main conjectures for  $GL_2$ .**  
(joint with Xin Wan)  
Preprint (2018).

13. **On Howard’s horizontal non-vanishing conjecture.**  
(joint with Christopher Skinner)  
Preprint (2018).
12. **On the Iwasawa main conjectures for modular forms at non-ordinary primes.**  
(joint with Mirela Çiperiani, Christopher Skinner, and Florian Sprung)  
arXiv:1804.10993, submitted.
11. **On the  $p$ -part of the Birch–Swinnerton-Dyer formula for multiplicative primes.**  
*Cambridge Journal of Mathematics*, **6** (2018), no. 1, 1–23.
10. **Perrin-Riou’s main conjecture for elliptic curves at supersingular primes.**  
(joint with Xin Wan)  
arXiv:1607.02019, submitted.
9.  **$p$ -adic heights of Heegner points and Beilinson–Flach classes.**  
*Journal of the London Mathematical Society*, **96** (2017), no. 1, 156–180.
8. **On the  $p$ -adic variation of Heegner points.**  
*Journal de l’Institut Mathématique de Jussieu*, to appear.
7. **Variation of anticyclotomic Iwasawa invariants in Hida families.**  
(joint with Chan-Ho Kim and Matteo Longo)  
*Algebra & Number Theory*, **11** (2017), no. 10, 2339–2368.
6. **Heegner cycles and  $p$ -adic  $L$ -functions.**  
(joint with Ming-Lun Hsieh)  
*Mathematische Annalen*, **370** (2018), no. 1-2, 567–628.
5. **On the exceptional specializations of big Heegner points.**  
*Journal de l’Institut Mathématique de Jussieu*, **17** (2018), no. 1, 207–240.
4. **A geometric perspective on  $p$ -adic properties of mock modular forms.**  
(joint with Luca Candelori)  
*Research in the Mathematical Sciences*, **4:5** (2017), 15 pp.
3. **Big Heegner points and special values of  $L$ -series.**  
(joint with Matteo Longo)  
*Annales Mathématiques du Québec*, **40** (2016), no. 2, 303–324.
2. **Heegner cycles and higher weight specializations of big Heegner points**  
*Mathematische Annalen*, **356** (2013), no. 4, 1247–1282.
1.  **$p$ -adic  $L$ -functions and Euler systems: a tale in two trilogies.**  
(joint with Massimo Bertolini, Henri Darmon, Samit Dasgupta, Kartik Prasanna, and Victor Rotger)  
*Automorphic Forms and Galois Representations*, LMS Lecture Note Series, **414** (2014), 52–101.

### Invited Talks

- Colloquium, UC Santa Barbara January 2018
- Colloquium, Rice University December 2017
- Colloquium, Michigan State University November 2017
- Colloquium, UC San Diego November 2017
- Purdue University, Automorphic Forms Seminar November 2017
- Princeton University/IAS Number Theory Seminar, Princeton October 2017

- Conference: “Special Cycles on Shimura Varieties and Iwasawa Theory”, EPFL August 2017
- Workshop: “Euler Systems and Special Values of  $L$ -functions”, EPFL (3 lectures) August 2017
- Jornadas de Teoría de Números, Lleida (plenary speaker) June 2017
- Conference: “ $p$ -adic Methods for Galois Representations and Automorphic Forms”, Barcelona February 2017
- Colloquium, UC San Diego January 2017
- Montréal–Toronto Workshop in Number Theory, Montréal December 2016
- Columbia University, Arithmetic and Automorphic Forms Seminar December 2016
- University of Pennsylvania, Algebra Seminar October 2016
- BIRS Workshop: “New Directions in Iwasawa Theory”, Banff June 2016
- UCSD, Number Theory Seminar May 2016
- Morningside Center of Mathematics, Beijing (2 lectures) March 2016
- Colloquium, University of Arizona January 2016
- Workshop: “Arithmetic of Euler Systems”, Benasque August 2015
- University of Chicago, Number Theory Seminar April 2015
- Northwestern University, Number Theory Seminar April 2015
- Workshop: “ $p$ -adic Methods in the Theory of Classical Automorphic Forms” Montréal March 2015
- Joint Mathematics Meetings, Special Session: “Selmer Groups”, San Antonio January 2015
- UC Irvine, Number Theory Seminar October 2014
- Columbia University, Arithmetic and Automorphic Forms Seminar September 2014
- ICM Satellite Conference: “Automorphic Forms and Arithmetic”, Pohang August 2014
- $p$ -adic Variation in Number Theory (Glenn Stevens’ 60th), Boston University June 2014
- Caltech, Number Theory Seminar May 2014
- National Taiwan University (3 lectures) February 2014
- IAS Program: “Special Cycles and  $p$ -adic  $L$ -functions”, Hong-Kong January 2014
- Princeton University, Number Theory Seminar November 2013
- UCLA, Number Theory Seminar October 2013
- Workshop: “Effective Methods for Darmon Points”, Benasque August 2013
- FRG/RTG mini-Conference: “ $p$ -adic Modular Forms,  $L$ -functions and Galois Representations”, UCLA May 2013
- University of Texas at Austin, Number Theory Seminar April 2013
- Workshop: “Iwasawa Theory and  $p$ -adic Families of Automorphic Forms”, Kyoto University (4 lectures) April 2013
- CMS Winter Meeting, Special Session: “Algebraic Number Theory”, Montréal December 2012
- Workshop: “ $p$ -adic Langlands Program: Recent Developments and Applications”, Fields Institute, Toronto April 2012

## Teaching Experience

### Princeton

- 2018 Fall · MAT 419: Topics in Number Theory
- 2018 Spring · MAT 202: Linear Algebra with Applications
- 2017 Fall · MAT 511: Class Field Theory
- 2017 Spring · MAT 175: Multivariable Calculus for Economics
- 2016 Fall · MAT 175: Multivariable Calculus for Economics

### UCLA

- 2016 Spring · Math 132: Complex Analysis for Applications
- 2016 Winter · Math 132: Complex Analysis for Applications
- 2015 Fall · Math 32A: Linear Algebra and Applications
- 2015 Fall · Math 132: Complex Analysis for Applications
- 2015 Spring · Math 117: Algebra for Applications
- 2015 Winter · Math 110A: Algebra
- 2015 Winter · Math 31B: Integration and Infinite Series
- 2014 Fall · Math 207A: Topics in Number Theory
- 2014 Spring · Math 33A: Linear Algebra and Applications
- 2013 Fall · Math 115A: Linear Algebra
- 2013 Fall · Math 31A: Differential and Integral Calculus

## Mentoring Experience

### Princeton

- 2018 Summer · Mentee: Gary Hu '20 and Cooper Young '20  
· Reading course on  $p$ -adic singular moduli
- 2018 Spring · Mentee: Alec Leng '21  
· Reading course on the arithmetic of elliptic curves
- 2018 Spring · Mentee: Murilo Zanarella '19  
· Junior paper: “Kolyvagin’s conjecture for supersingular primes”
- 2017 Summer · Mentee: Ishan Levy '19 and Samuel Marks '19  
· Reading course on Stark’s conjectures and  $p$ -adic analogs

### UCLA

- 2016 Spring · Mentee: Jaehoon Lee \*19  
· Reading course on Euler Systems
- 2015 Fall · Mentee: Van Latimer '16  
· Project: “2-adic modular forms and Maeda’s conjecture”
- 2014 Spring · Mentee: Yishu Gong '16.  
· Project: “Towards a  $p$ -adic theory of mock modular forms”
- 2014 Spring · Mentee: Ziyi Zhuang '15  
· Project: “ $p$ -adic properties of Taylor coefficients of modular forms”
- 2013 Fall · Mentee: Mohammed Zuhair \*17  
· Reading course on Algebraic Geometry

## Service

- Projects assistant for Christopher Skinner, Arizona Winter School 2018: Iwasawa Theory.
- Reader/examiner for the senior thesis of Miranda Moore '17, Princeton University.
- Co-organizer, UCLA Number Theory Seminar (2013–2016).
- Organizer, UCLA Participating Number Theory Seminar (Fall 2014).
- Referee for: Algebra & Number Theory, American Journal of Mathematics, Annales de l'Institut Fourier, Annals of Mathematics, Canadian Journal of Mathematics, Commentarii Mathematici Helvetici, Compositio Mathematica, Documenta Mathematica, Duke Mathematical Journal, Forum of Mathematics II, Forum Mathematicum, IMRN, Indiana University Mathematics Journal, Iwasawa 2017 Proceedings (Advanced Studies in Pure Mathematics), Journal für die Reine und Angewandte Mathematik (Crelle's Journal), Journal of the Institute of Mathematics of Jussieu, Kyoto Journal of Mathematics, Mathematische Zeitschrift, Research in Number Theory, Springer, Transactions of the AMS.
- Regular contributor to MathSciNet (2009–present).
- Regular contributor to Zentralblatt MATH (2017–present).

## References

Professor Henri Darmon  
[henri.darmon@mcgill.ca](mailto:henri.darmon@mcgill.ca)

Professor Christopher Skinner  
[cmcls@math.princeton.edu](mailto:cmcls@math.princeton.edu)

Professor Haruzo Hida  
[hida@math.ucla.edu](mailto:hida@math.ucla.edu)

Professor Victor Rotger  
[victor.rotger@upc.edu](mailto:victor.rotger@upc.edu)

Professor James Ralston (teaching)  
[ralston@math.ucla.edu](mailto:ralston@math.ucla.edu)

Professor Mirela Çiperiani  
[mirela@math.utexas.edu](mailto:mirela@math.utexas.edu)

## Personal

- Birthdate: July 28, 1986
- Citizenship: Spanish