

# Jeremy Lovejoy

## Curriculum Vitae

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### Personal

Date of birth March 7, 1972  
Place of birth Escanaba, Michigan, USA  
Citizenship American

### Education

May 1994 **B.S.**, Mathematics, Virginia Tech.  
August 2000 **PhD**, Mathematics, The Pennsylvania State University.  
Advisors: George E. Andrews and Ken Ono

### Professional Positions

2000–2003 **VIGRE/Van Vleck Assistant Professor**, *Department of Mathematics*, University of Wisconsin.  
2003–2006 **Researcher**, *Centre National de Recherche Scientifique (CNRS)*, Université Bordeaux 1.  
2006–current **Researcher**, *CNRS*, Université Paris Diderot - Paris 7.

### Research interests

- Partitions and  $q$ -series
- Modular forms and number theory
- Combinatorics
- Quantum knot theory

### Publications

1. Ramanujan Type Congruences for Three-Colored Frobenius Partitions, *J. Number Theory* 86 (2000), 283-290.
2. The Divisibility and Distribution of Partitions into Distinct Parts, *Adv. Math.* 158 (2001), 253-263.
3. 3-regular Partitions and a Modular K3 Surface (with David Penniston), *Contemp. Math.* 291 (2001), 177-182.
4. The Arithmetic of the Number of Partitions into Distinct Parts (with Scott Ahlgren), *Mathematika* 48 (2001) 203-211.
5. Frobenius Partitions and the Combinatorics of Ramanujan's  ${}_{1}\psi_{1}$  summation (with Sylvie Corteel), *J. Combin. Theory Ser. A* 97 (2002), 177-183.

6. Extension of Ramanujan's Congruences for the Partition Function Modulo Powers of 5 (with Ken Ono), *J. reine angew. math.* 542 (2002), 123-132.
7. Lacunary Partition Functions, *Math. Res. Lett.* 9 (2002), 191-198.
8. Partitions with Designated Summands (with George Andrews and Richard Lewis), *Acta Arithmetica* 105 (2002), 51-66.
9. The Number of Partitions into Distinct Parts Modulo Powers of 5, *Bull. London Math. Soc.* 35 (2003), 41-46.
10. Hypergeometric Generating Functions for Dirichlet and Other L-Functions (with Ken Ono), *Proc. Nat. Acad. Sci. USA* vol. 100 no. 12 (2003), 6904-6909.
11. Gordon's Theorem for Overpartitions, *J. Combin. Theory Ser. A* 103 (2003), 393-401.
12. More Lacunary Partition Functions, *Illinois J. Math.* 47 (2003), 769-773.
13. Overpartitions (with Sylvie Corteel), *Trans. Amer. Math. Soc.* 356 (2004), 1623-1635.
14. A Bailey Lattice *Proc. Amer. Math. Soc.* 132 (2004), 1507-1516.
15. Overpartitions and Real Quadratic Fields, *J. Number Theory* 106 (2004), 178-186.
16. Overpartition Theorems of the Rogers-Ramanujan Type *J. London Math. Soc.* 69 (2004), 562-574.
17. Overpartitions and Generating Functions for Generalized Frobenius Partitions (with Sylvie Corteel and Ae Ja Yee), *Trends in Mathematics, Mathematics and Computer Science III: Algorithms, Trees, Combinatorics, and Probabilities (Birkhauser)* (2004) 15-24.
18. Rank and Conjugation for the Frobenius Representation of an Overpartition, *Ann. Comb.* 9 (2005), 321-334.
19. A Theorem on Seven-Colored Overpartitions and its Applications, *Int. J. Number Theory.* 1 (2005), 215-224.
20. An Iterative-Bijective Approach to Generalizations of Schur's Theorem (with Sylvie Corteel), *Europ. J. Comb.* 27 (2006), 496-512.
21. Overpartition Pairs, *Ann. Inst. Fourier* 56 (2006), 781-794.
22. Constant Terms, Jagged Partitions, and Partitions with Difference Two at Distance Two, *Aequationes Math.* 72 (2006), 299-312.
23. Partitions and overpartitions with attached parts, *Arch. Math.* 88 (2007), 316-322.
24. Dyson's rank, overpartitions, and Maass forms (with Kathrin Bringmann), *Int. Math. Res. Not.* (2007), rnm063.
25. Overpartition pairs and two classes of basic hypergeometric series (with Olivier Mallet), *Adv. Math.* 217 (2008), 386-418.
26. Rank and conjugation for a second Frobenius representation of an overpartition, *Ann. Comb.* 12 (2008), 101-113.
27. Rank and congruences for overpartition pairs (with Kathrin Bringmann), *Int. J. Number Theory* 4 (2008), 303-322.
28. An extension to overpartitions of the Rogers-Ramanujan identities for even moduli (with Sylvie Corteel and Olivier Mallet), *J. Number Theory* 128 (2008), 1602-1621.

29. Rank differences for overpartitions (with Robert Osburn), *Quart. J. Math. (Oxford)* 59 (2008) 257-273.
30.  $n$ -color overpartitions, twisted divisor functions, and Rogers-Ramanujan identities (with Olivier Mallet) (G.E. Andrews' 70th birthday issue) 6 (2008), 23-36.
31. Overpartitions and class numbers of binary quadratic forms (with Kathrin Bringmann), *Proc. Nat. Acad. Sci. USA* 106 no. 14 (2009), 5513-5516.
32. Rank and crank moments for overpartitions (with Kathrin Bringmann and Robert Osburn), *J. Number Theory* 129 no. 7 (2009), 1758-1772.
33. Overpartitions and the  $q$ -Bailey identity (with Sylvie Corteel), *Proc. Edinburgh Math. Soc.* 52 (2009), 297-306 .
34. Partitions weighted by the parity of the crank (with Dohoon Choi and Soon-Yi Kang), *J. Combin. Theory Ser. A* 116 (2009), 1034-1046 .
35.  $M_2$ -rank differences for partitions without repeated odd parts (with Robert Osburn), *J. Théor. Nombres Bordeaux* 21 no. 2 (2009), 313-334.
36. Automorphic properties of generating functions for generalized rank moments and Durfee symbols (with Kathrin Bringmann and Robert Osburn), *Int. Math. Res. Not.* (2010), rnp131.
37. On identities involving sixth order mock theta functions, *Proc. Amer. Math. Soc.* 138 (2010), 2547-2552.
38.  $M_2$ -rank differences for overpartitions (with Robert Osburn), *Acta Arithmetica* 144 (2010), 193-212.
39. Partitions with rounded occurrences and attached parts, *Ramanujan J.* 23 (2010), 307-313.
40. Quadratic forms and four partition functions modulo 3 (with Robert Osburn), *Integers* 11 (2011), 47-53.
41. On the modularity of the unified WRT invariants of certain Seifert manifolds (with Kathrin Bringmann and Kazuhiro Hikami), *Adv. Appl. Math.* 46 (2011), 86-93.
42. Automorphic properties of generating functions for generalized odd rank moments and odd Durfee symbols (with Claudia Alfes and Kathrin Bringmann), *Math. Proc. Cambridge Phil. Soc* 151 (2011), 385-406.
43.  $\ell$ -adic properties of smallest parts functions (with Scott Ahlgren and Kathrin Bringmann), *Adv. Math.* 228 (2011), 629-645.
44. Ramanujan-type partial theta functions and conjugate Bailey pairs, *Ramanujan J.* 29 (2012), 51-67.
45. The Bailey chain and mock theta functions, *Adv. Math.* 238 (2013), 442-458.
46.  $q$ -hypergeometric double sums as mock theta functions (with Robert Osburn), *Pacific J. Math.* 264 (2013), 151-162 .
47. On  $q$ -difference equations for partitions without  $k$ -sequences (with Kathrin Bringmann and Karl Mahlburg), *Legacy Of Ramanujan, Ramanujan Mathematical Society Lecture Notes* 20 (2013), 129-137.

48. Mixed mock modular  $q$ -series (with Robert Osburn), *J. Indian Math. Soc.*, Special Volume to commemorate the 125th Birth Anniversary of Srinivasa Ramanujan and the National Mathematics Year - 2012 (2013), 45–61.
49. Bailey pairs and indefinite quadratic forms, *J. Math. Anal. Appl.* 410 (2014), 1002–1013.
50. The rank of a unimodal sequence and a partial theta identity of Ramanujan (with Byungchan Kim), *Int J. Number Theory* 10 (2014), 1081–1098.
51. Torus knots and quantum modular forms (with Kazuhiro Hikami), *Res. Math. Sci.* 2:2, 2014.
52. On two tenth order mock theta identities, *Ramanujan J.* 36 (2015), 117–121.
53. Anti-lecture hall compositions and Andrews' generalization of the Watson-Whipple transformation (with Sylvie Corteel and Carla Savage), *J. Combin. Theory Ser. A* 134 (2015), 188–195.
54. Overpartitions with restricted odd differences (with Kathrin Bringmann, Jehanne Dousse, and Karl Mahlburg), *Electron. J. Combin.* 22 (2015), no.3, paper 3.17.
55. Real quadratic double sums (with Robert Osburn), *Indag. Math.* 26 (2015), 697–712.
56. Ramanujan-type partial theta identities and rank differences for special unimodal sequences (with Byungchan Kim), *Ann. Comb.* 19 (2015), 705–733.
57. A partition identity and the universal mock theta function  $g_2(x; q)$  (with Kathrin Bringmann and Karl Mahlburg), *Math. Res. Lett.* 23 (2016), 67–80.
58. Odd-balanced unimodal sequences and related functions: parity and quantum modularity (with Byungchan Kim and Subong Lim), *Proc. Amer. Math. Soc.* 144 (2016), 3687–3700.
59. Overpartitions into distinct parts without short sequences (with Youn-Seo Choi and Byungchan Kim), *J. Number Theory* 175 (2017), 117–133.
60. Partial indefinite theta identities (with Byungchan Kim), *J. Aust. Math. Soc.* 102 (2017), 255–289.
61. Mock theta double sums (with Robert Osburn), *Glasgow Math. J.* 59 (2017), 323–348.
62. Asymmetric generalizations of Schur's theorem, Proceedings of the 2016 Gainesville International Conference on Number Theory in honor of Krishna Alladi's 60th birthday, to appear.
63. On a Rogers-Ramanujan type identity from crystal base theory (with Jehanne Dousse), *Proc. Amer. Math. Soc.*, to appear.
64. On some special families of  $q$ -hypergeometric Maass forms (with Kathrin Bringmann and Larry Rolen), *Int. Math. Res. Not. IMRN*, to appear.
65. Hecke-type formulas for families of unified Witten-Reshetikhin-Turaev invariants (with Kazuhiro Hikami), *Commun. Number Theory Phys.*, to appear.
66. Ramanujan-type partial theta identities and conjugate Bailey pairs, II. Multisums (with Byungchan Kim), *Ramanujan J.*, to appear.
67. Generalizations of Capparelli's identity (with Jehanne Dousse), submitted.
68. Identities for overpartitions with smallest parts odd (with Min-Joo Jang), submitted.
69. Asymmetric generalizations of Göllnitz' theorem, in preparation.

## Talks

### Conferences - Invited talks

- October 2000 *The Combinatorics of Ramanujan's  ${}_1\psi_1$  and the  $q$ -Gauss  ${}_2\phi_1$  summation,  $q$ -series with Applications to Combinatorics, Number Theory, and Physics, University of Illinois, Urbana, IL.*
- March 2001 *The Arithmetic of the Number of Partitions into Distinct Parts, AMS Spring Southeastern Section Meeting, University of South Carolina, Columbia, SC.*
- August 2001  *$q$ -series Identities, The Life and Legacy of Ramanujan, MAA MathFest Short Course, University of Wisconsin, Madison, WI.*
- May 2003 *Gordon's Theorem for Overpartitions, AMS Spring Sectional Meeting, San Francisco State University, San Francisco, CA.*
- February 2004 *Overpartition Analogues of Classical Families of Partition Theorems, Conference on Paths, Permutations, and Trees, Nankai University, Tianjin, China.*
- November 2004 *Extending Partition Theorems of Schur and Göllnitz to Overpartitions, Additive Number Theory, Gainesville, FL.*
- January 2006 *Constant terms, jagged partitions, and partitions with distance two at distance two, Workshop of Combinatorics on  $q$ -series and Partitions, Lyon, France.*
- June 2006 *Overpartition pairs, lattice paths, and Andrews' well-poised basic hypergeometric series, International conference on number theory, KIAS, Seoul, Korea.*
- December 2008 *Andrews' generalization of Selberg's  $q$ -difference equations, Combinatory Analysis 2008: Partitions,  $q$ -series, and Applications.*
- May 2009  *$q$ -series and class numbers, Mock theta functions and applications in combinatorics, algebraic geometry, and mathematical physics, Max Planck Institute, Bonn, Germany.*
- March 2011 *Congruences for smallest parts functions, Modular Forms and Mock Modular Forms and their Applications in Arithmetic, Geometry and Physics, Trieste, Italy.*
- March 2012 *Ramanujan's identities for the sixth order mock theta functions, Symposium on Modular Forms, Mock Theta Functions, and Applications, Cologne, Germany.*
- August 2013 *The Bailey chain and mock theta functions, The Combinatorics of  $q$ -Series and Partitions in honor of Professor George Andrews' 75th birthday, Tianjin, China.*
- February 2015 *Torus knots and quantum modular forms, Functional equations and special functions: from combinatorics to model theory, Grenoble, France.*
- December 2017 *TBA, Trends in Modular Forms, Daejeon, South Korea.*
- April 2018 *TBA, AMS Spring Western Sectional Meeting, Portland State University.*

### Conferences - Contributed talks

- November 1999 *Divisibility and Distribution of Partitions into Distinct Parts, Conference on  $q$ -series, symbolic computation, number theory, special functions, physics and combinatorics, University of Florida, Gainesville, FL.*
- April 2000 *Extension of Ramanujan's Congruences for the Partition Function Modulo Powers of 5, SERMON (Southeast Regional Meeting on Numbers) 2000, Virginia Tech, Blacksburg, VA.*

- May 2000 *Extension of Ramanujan's Congruences for the Partition Function Modulo Powers of 5*, Millennial Conference on Number Theory, University of Illinois, Urbana, IL.
- June 2000 *Extension of Ramanujan's Congruences for the Partition Function Modulo Powers of 5*, NATO Advanced Study Institute: Special Functions 2000, Arizona State University, Tempe, AZ.
- December 2000 *The Divisibility of the Number of Partitions into Distinct Parts*, Western Number Theory Conference, University of San Diego, San Diego, CA.
- May 2001 *Summing the Tails of Modular Forms,  $q$ -series, and the Arithmetic of Quadratic Number Fields*, Fifth International Joint Meeting of the AMS and the Sociedad Matematica Mexicana (SMM), UNAM, Morelia, Mexico.
- May 2002 *Lacunary Partition Functions*, CNTA, Université de Montreal, Montreal, Quebec.
- July 2005 *A Theorem on Seven-colored Overpartitions and its Applications*, XXIVèmes Journées Arithmétiques, Marseille, France.
- July 2007 *Rank differences for overpartitions*, XXVIèmes Journées Arithmétiques, Edinburgh, Scotland.
- August 2012 *The Bailey chain and mock theta functions*, Building Bridges: 1st EU-US conference on Automorphic Forms and related topics, Aachen, Germany.
- July 2014 *Rank differences for unimodal sequences*, Building Bridges: 2nd EU-US workshop on Automorphic Forms and related topics, Bristol, United Kingdom.

#### Conferences - Competitive submissions

- November 2001 *Frobenius Partitions and Basic Hypergeometric Series*, GasCOM 2001, University of Siena, Siena, Italy.
- June 2003 *Overpartitions (with Sylvie Corteel)*, FPSAC, Sweden.
- September 2004 *Overpartitions and Generating Functions for Generalized Frobenius Partitions*, Third Colloquium on Mathematics and Computer Science, Vienna, Austria.
- September 2006 *An extension to overpartitions of the Rogers-Ramanujan identities for even moduli (with Sylvie Corteel and Olivier Mallet)*, Fourth Colloquium on Mathematics and Computer Science, Nancy, France.

#### Seminars

- October 1999 Pennsylvania State University (USA).
- October 2000 University of Wisconsin (USA) (3 seminars).
- November 2000 Institut Girard Desargues, Université Lyon I (France).
- March 2001 University of Wisconsin (USA).
- April 2001 University of Illinois (USA).
- March 2002 Institut Henri Poincaré (France).
- April 2002 Institut Girard Desargues, Université Lyon I (France).
- April 2002 Sussex University (UK).
- June 2002 LaBRI, Université Bordeaux I (France).

- November 2002 University of Illinois (USA).
- March 2003 University of Wisconsin (USA) (2 seminars)
- December 2003 Max Planck Institute (Germany).
- April 2004 University of Melbourne (Australia).
- November 2004 University of Wisconsin (USA).
- March 2005 Institut Camille Jordan, Université Lyon I (France).
- April 2005 LIAFA, Université Paris 7 (France).
- March 2006 University College, Dublin (Ireland).
- February 2007 Institut Camille Jordan, Université Lyon I (France).
- April 2007 Pohang University of Science and Technology (Korea) (3 seminars).
- April 2007 Korea Institute for Advanced Study (Korea) (2 seminars).
- April 2007 Korea Advanced Institut of Science and Technology (Korea).
- June 2007 Institut Henri Poincaré (France).
- March 2008 IECN, Université Nancy (France).
- November 2009 University of Cologne (Germany).
- October 2011 University College Dublin (Ireland).
- December 2012 Institut Joseph Fourier, Grenoble (France).
- December 2012 Institut Camille Jordan, Lyon (France).
- October 2013 CALIN, Université Paris XIII (France).
- February 2014 University College Dublin (Ireland).
- October 2015 Korea Institute for Advanced Study (Korea).
- October 2016 University of Zurich (Switzerland).
- November 2016 University College Dublin (Ireland).
- April 2017 Nanyang Technological University (Singapore).

## Professional Awards and Grants

- 2001–2002 Chateaubriand Fellowship.
- 2004–2007 Principal Investigator (PI), *Partitions d'entiers à l'interface de la combinatoire, des  $q$ -séries, et de la théorie des nombres*, ACI Jeunes Chercheuses et Jeunes Chercheurs, 40.000 Euros.
- 2007–2010 Member, *GAMMA*, ANR Projet Blanc.

- 2008–2009 Co-PI, *Ramanujan-type congruences for overpartitions and overpartition pairs*, Ulysses - PHC Franco-Irlandais, 5.000 Euros.
- 2008–2011 Member, *Arithmetic Properties of Coefficients of Modular Forms*, Science Foundation Ireland Research Frontiers Programme, 117.000 euros.
- 2008–2013 Member, *IComb*, ANR Jeunes Chercheuses et Jeunes Chercheurs, 340.000 euros
- 2014–2015 Co-PI, *Partial theta functions in Ramanujan's lost notebook and beyond*, STAR - PHC Franco-Coréen, 10.880 euros.

## Organizing and Program Committees

- July 2008 Program Committee, *Formal Power Series and Algebraic Combinatorics*, Talca University, Chile.
- July 2010 Co-organizer, *Prospects in  $q$ -series and modular forms* University College Dublin, Ireland.
- May 2012 Co-organizer, *Hypergeometric series and their generalizations in algebra, geometry, number theory and physics*, Institut Henri Poincaré, Paris, France.
- March 2013 Co-organizer, *Automorphic forms workshop*, University College Dublin, Ireland.
- June 2013 Organizing Committee, *Formal Power Series and Algebraic Combinatorics*, Paris, France.
- May 2015 Co-organizer, *Automorphic forms: advances and applications*, CIRM Luminy, France.
- March 2018 Co-organizer, *Modular forms and quantum knot invariants*, BIRS, Banff, Canada.

## Teaching

### Graduate courses

- Master Parisien de Recherche en Informatique (MPRI)
- The Theory of Partitions

### Undergraduate courses

- Calculus I, Calculus II
- Differential Equations
- Linear Algebra, Advanced Linear Algebra
- Quantitative Reasoning
- Combinatorics

## Advising

### Undergraduate

- 2003 Team leader, Research Experience for Undergraduates, University of Wisconsin.

### Master

- 2011 M1 research advisor, Jehanne Dousse, ENS Lyon
- 2016 M2 research advisor, Isaac Konan, Université Paris Sud



## PhD

- 2006–2008 Olivier Mallet, Université Paris Diderot. Current position: Maître de conférences, Université de Rouen.
- 2012–2015 Jehanne Dousse, Université Paris Diderot. Current position: Postdoc, University of Zurich.
- 2016– Isaac Konan, Université Paris Diderot.

## Thesis evaluation

### Thesis examiner

- University of Mysore (India)
- Nanyang Technological University (Singapore)
- Thapar University (India)

### Habilitation Committee

- Frédéric Jouhet, Université Lyon I, 2010

## Refereeing

### Journals

- Acta Arithmetica
- Acta Mathematica Sinica
- Acta Mathematica Scientia
- Advances in Applied Mathematics
- Advances in Difference Equations
- Advances in Mathematics
- American Journal of Mathematics
- American Mathematical Monthly
- Annali dell'Università di Ferrara
- Annals of Combinatorics
- Applicable Analysis and Discrete Mathematics
- Arabian Journal of Mathematics
- Arkiv för Matematik
- Ars Combinatoria
- Bulletin of the Australian Mathematical Society
- Bulletin of the Brazilian Mathematical Society
- Bulletin of the London Mathematical Society
- Bulletin of the Polish Academy of Sciences, Mathematics
- Canadian Journal of Mathematics
- Canadian Mathematical Bulletin
- Central European Journal of Mathematics
- Colloquium Mathematicum

- Compositio Mathematica
- Comptes Rendus Mathématiques
- Constructive Approximation
- Discrete Mathematics
- Discrete Mathematics and Theoretical Computer Science
- Duke Mathematical Journal
- Electronic Journal of Combinatorics
- European Journal of Combinatorics
- Formal Power Series and Algebraic Combinatorics
- Functional Analysis, Approximation, and Computation
- Functiones et Approximatio, Commentarii Mathematici
- Graphs and Combinatorics
- Houston Journal of Mathematics
- Integers
- International Journal of Mathematics and Mathematical Sciences
- International Journal of Number Theory
- International Mathematical Research Notices
- JP Journal of Algebra, Number Theory and Applications
- Journal de Théorie de Nombres de Bordeaux
- Journal of Analysis and Number Theory
- Journal of Combinatorial Theory Series A
- Journal of Combinatorics and Number Theory
- Journal of Integer Sequences
- Journal of the London Mathematical Society
- Journal of Mathematical Analysis and Applications
- Journal of Number Theory
- Journal of the Ramanujan Mathematical Society
- Kragujevac Journal of Mathematics
- Mathematica Bohemica
- Mathematica Slovaca
- Mathematical Communications
- Mathematics of Computation
- Mathematika
- Mediterranean Journal of Mathematics
- Miskolc Mathematical Notes
- Monatshefte für Mathematik
- New Zealand Journal of Mathematics
- Pacific Journal of Mathematics
- Proceedings of the American Mathematical Society

- Proceedings of the Edinburgh Mathematical Society
- Proceedings of the Estonian Academy of Sciences
- Proceedings of the Indian Academy of Sciences - Mathematical Sciences
- Proceedings of the London Mathematical Society
- Proceedings of the National Academy of Sciences (USA)
- Publicationes Mathematicae Debrecen
- Quarterly Journal of Mathematics
- Ramanujan Journal
- Research in the Mathematical Sciences
- Rocky Mountain Journal of Mathematics
- SIAM Journal on Discrete Mathematics
- Tamsui Oxford Journal of Information and Mathematical Sciences
- Turkish Journal of Mathematics

#### Funding agencies

- National Science Foundation
- National Security Agency

### Reviewing

- AMS Mathematical Reviews (195 reviews)
- Zentralblatt MATH (155 reviews)
- Book reviewer for Prentice-Hall
- Book reviewer for Cambridge University Press

### Languages

English	Native speaker
French	Fluent
Dutch	Intermediate

### References

George Andrews, Penn State University

Ken Ono, Emory University

Bruce Berndt, University of Illinois at Urbana-Champaign