Curriculum Vitae

Shane Chern
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Department of Mathematics
Pennsylvania State University
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Research Interests

- *Enumerative Combinatorics*: Partitions, Permutations, Sequences
- *Number Theory*: Circle and Sieve methods, Diophantine equations
- *Special Functions*: q-Series and Basic hypergeometric functions
- *Mathematics of Ramanujan*: Theta and Mock Theta functions

Education

2016 – 2021 Ph.D. in Mathematics, Pennsylvania State University
Thesis Advisor: George E. Andrews
Thesis Title: The World of p and q: Congruences, Identities and Asymptotics

2013 – 2016 M.S. in Mathematics (*incomplete*), Zhejiang University

2009 – 2013 B.E. in Software Engineering, Xiamen University

Academic Employment

2021 – Killam Postdoctoral Fellow, Dalhousie University
Mentor: Karl Dilcher

Service

2020 – 2021 **Coorganizer of the Combinatorics/Partitions Seminar**
Penn State University

Honors and Awards

- **Pritchard Dissertation Fellowship**, Penn State University, 2020.
- **AMS Graduate Student Travel Grant** to attend the AMS Fall Southeastern Sectional Meeting 2019 at Gainesville, FL, 2019.
- **Vollmer-Kleckner Scholarship in Science**, Penn State University, 2017.
- **Jack and Eleanor Pettit Scholarship in Science**, Penn State University, 2016 & 2018.
- **Teaching Assistantship**, Penn State University, 2016 to present.
- **Academic Scholarship (Ph.D.)**, Zhejiang University, 2015.
- **First Prize Fellowship**, Zhejiang University, 2013 & 2014.
- **Third Prize Scholarship**, Xiamen University, 2012.

Teaching Experiences

Penn State University

2021	Spring	MATH 021	College Algebra I (Remote)
2019	Fall	MATH 022	College Algebra II
2019	Spring	MATH 021	College Algebra I
2018	Fall	MATH 021	College Algebra I
2017	Fall	MATH 021	College Algebra I

Publications and Preprints

Publications

51. S. Chern and D. Tang, The Rogers–Ramanujan continued fraction and related eta-quotient representations, *Bull. Aust. Math. Soc.* **103** (2021), no. 2, 248–259.
50. S. Chern, Note on the square-root partition into distinct parts, *Ramanujan J.* **54** (2021), no. 2, 449–461. MR4204766.
49. S. Chern and M. D. Hirschhorn, Some results concerning partitions with designated summands, *Ramanujan J.* **54** (2021), no. 2, 385–395. MR4204762.
48. G. E. Andrews and S. Chern, A proof of Lin's conjecture on inversion sequences avoiding patterns of relation triples, *J. Combin. Theory Ser. A* **179** (2021), 105388, 20 pp. MR4190575.
47. S. Chern and D. Tang, Vanishing coefficients in quotients of theta functions of modulus five, *Bull. Aust. Math. Soc.* **102** (2020), no. 3, 387–398. MR4176682.

46. C. Wang and S. Chern, Some basic hypergeometric transformations and Rogers–Ramanujan type identities, *Integral Transforms Spec. Funct.* **31** (2020), no. 11, 873–890. MR4161758.

45. S. Chern, Linked partition ideals, directed graphs and q-multi-summations, *Electron. J. Combin.* **27** (2020), no. 3, Paper No. 3.33, 29 pp.

44. M. Bian, S. Chern, D. D. M. Sang, and E. X. W. Xia, Ramanujan's theta function identities and the relations between sums of squares and sums of triangular numbers, *Int. J. Number Theory* **16** (2020), no. 6, 1275–1294. MR4120476.

43. S. Chern, D. Tang, and E. X. W. Xia, Arithmetic properties for 7-regular partition triples, *Indian J. Pure Appl. Math.* **51** (2020), no. 2, 717–733. MR4115620.

42. S. Chern and Z. Li, Linked partition ideals and Kanade–Russell conjectures, *Discrete Math.* **343** (2020), no. 7, 111876, 24 pp. MR4072958.

41. S. Chern, S. Fu, and D. Tang, Multi-dimensional q-summations and multi-colored partitions, *Ramanujan J.* **51** (2020), no. 2, 297–306. MR4056853.

40. S. Chern, Unlimited parity alternating partitions, *Quaest. Math.* **42** (2019), no. 9, 1345–1352. MR4040863.

39. S. Chern and M. D. Hirschhorn, Partitions into distinct parts modulo powers of 5, *Ann. Comb.* **23** (2019), no. 3-4, 659–682. MR4039555. Also in: *George E. Andrews 80 Years of Combinatory Analysis*, 305–328, Birkhäuser/Springer, Cham, 2021.

38. S. Chern, An extension of a formula of Jovovic, *Integers* **19** (2019), Paper No. A47, 7 pp. MR4017188.

37. S. Chern, Note on sums involving the Euler function, *Bull. Aust. Math. Soc.* **100** (2019), no. 2, 194–200. MR4001535; *Erratum*, **103** (2021), no. 1, 174–175. MR4205772.

36. S. Chern, On a problem of George Andrews concerning partitions with even parts below odd parts, *Afr. Mat.* **30** (2019), no. 5-6, 691–695. MR3993626.

35. S. Chern, D. Tang, and L. Wang, Some inequalities for Garvan's bicrank function of 2-colored partitions, *Acta Arith.* **190** (2019), no. 2, 171–191. MR3984264.

34. T. Cai, H. Zhong, and S. Chern, A congruence involving the quotients of Euler and its applications. III (in Chinese), *Acta Math. Sinica (Chin. Ser.)* **62** (2019), no. 4, 529–540. MR3970566.

33. C. Wang and S. Chern, Some q-transformation formulas and Hecke type identities, *Int. J. Number Theory* **15** (2019), no. 7, 1349–1367. MR3982813.

32. S. Chern, Combinatorial proof of an identity of Andrews and Yee, *Ramanujan J.* **49** (2019), no. 3, 505–513. MR3979687.

31. S. Chern, A further look at the truncated pentagonal number theorem, *Acta Arith.* **189** (2019), no. 4, 397–403. MR3962837.

30. S. Chern and S. Qiu, Partitions, geometric progressions and a Putnam problem, *Math. Gaz.* **103** (2019), no. 557, 337–343. MR3961649.

29. S. Chern, On a conjecture of George Beck. II, *Math. Student* **88** (2019), no. 1-2, 159–164. MR3930713.

28. S. Chern and L.-J. Hao, Congruences for two restricted overpartitions, *Proc. Indian Acad. Sci. Math. Sci.* **129** (2019), no. 3, Art. 31, 16 pp. MR3938513.

27. W. Lin, S. Li, S. Chern, and J. E. Zhang, Pricing VIX derivatives with free stochastic volatility model, *Rev. Deriv. Res.* **22** (2019), no. 1, 41–75.

26. S. Chern, Asymptotics for the Fourier coefficients of eta-quotients, *J. Number Theory* **199** (2019), 168–191. MR3926193.

25. S. Chern and L.-J. Hao, Congruences for partition functions related to mock theta functions, *Ramanujan J.* **48** (2019), no. 2, 369–384. MR3911794.

24. S. Chern and D. Tang, On certain weighted 7-colored partitions, *Ramanujan J.* **48** (2019), no. 2, 305–322. MR3911790.

23. S. Chern, On the power mean of a sum analogous to the Kloosterman sum, *Bull. Math. Soc. Sci. Math. Roumanie (N.S.)* **62(110)** (2019), no. 1, 77–92. MR3930926.

22. S. Chern, Note on the truncated generalizations of Gauss's square exponent theorem, *Rocky Mountain J. Math.* **48** (2018), no. 7, 2211–2222. MR3892131.

21. S. Chern and M. G. Dastidar, Some congruences modulo 5 and 25 for overpartitions, *Ramanujan J.* **47** (2018), no. 2, 435–445. MR3863649.

20. P. Adansie, S. Chern, and E. X. W. Xia, New infinite families of congruences for the number of tagged parts over partitions with designated summands, *Int. J. Number Theory* **14** (2018), no. 7, 1935–1942. MR3831401.

19. S. Chern, S. Fu, and D. Tang, Some inequalities for k-colored partition functions, *Ramanujan J.* **46** (2018), no. 3, 713–725. MR3826751.

18. S. Chern, On a conjecture of George Beck, *Int. J. Number Theory* **14** (2018), no. 3, 647–651. MR3786639.

17. S. Chern, T. Cai, and H. Zhong, On the cardinality and sum of reciprocals of primitive sequences, *Adv. Math. (China)* **47** (2018), no. 1, 150–154. MR3816359.

16. S. Chern and A. J. Yee, Overpartitions with bounded part differences, *European J. Combin.* **70** (2018), 317–324. MR3779621.

15. S. Chern and M. G. Dastidar, Congruences and recursions for the cubic partition, *Ramanujan J.* **44** (2017), no. 3, 559–566. MR3723441.

14. S. Chern, Arithmetic properties for cubic partition pairs modulo powers of 3, *Acta Math. Sin. (Engl. Ser.)* **33** (2017), no. 11, 1504–1512. MR3712396.

13. S. Chern, Remarks on the distribution of the primitive roots of a prime, *Funct. Approx. Comment. Math.* **57** (2017), no. 1, 39–46. MR3704224.

12. S. Chern, An overpartition analogue of partitions with bounded differences between largest and smallest parts, *Discrete Math.* **340** (2017), no. 12, 2834–2839. MR3698071.
11. S. Chern, A curious identity and its applications to partitions with bounded part differences, *New Zealand J. Math.* **47** (2017), 23–26. MR3691619.
10. S. Chern, Distribution of reducible polynomials with a given coefficient set, *Bull. Math. Soc. Sci. Math. Roumanie (N.S.)* **60(108)** (2017), no. 2, 141–146. MR3676583.
9. S. Chern, New congruences for ℓ-regular overpartitions, *Integers* **17** (2017), Paper No. A22, 8 pp. MR3657408.
8. S. Chern, Congruences for 1-shell totally symmetric plane partitions, *Integers* **17** (2017), Paper No. A21, 7 pp. MR3657407.
7. W. Lin, S. Li, X. Luo, and S. Chern, Consistent pricing of VIX and equity derivatives with the 4/2 stochastic volatility plus jumps model, *J. Math. Anal. Appl.* **447** (2017), no. 2, 778–797. MR3573114.
6. S. Chern, Integral right triangle and rhombus pairs with a common area and a common perimeter, *Forum Geom.* **16** (2016), 25–27. MR3474530.
5. S. Chern, New congruences for 2-color partitions, *J. Number Theory* **163** (2016), 474–481. MR3459582.
4. S. Chern, Formulas for partition k-tuples with t-cores, *J. Math. Anal. Appl.* **437** (2016), no. 2, 841–852. MR3456201.
3. S. Chern, A note on balancing binomial coefficients, *Proc. Japan Acad. Ser. A Math. Sci.* **91** (2015), no. 8, 110–111. MR3403941.
2. S. Chern and A. Cui, Fibonacci numbers close to a power of 2, *Fibonacci Quart.* **52** (2014), no. 4, 344–348. MR3276060.
1. S. Chern, Fermat numbers in multinomial coefficients, *J. Integer Seq.* **17** (2014), no. 3, Article 14.3.2, 5 pp. MR3168684.

Accepted Manuscripts

6. S. Chern and D. Tang, Vanishing coefficients and identities concerning Ramanujan's parameters, to appear in *Ramanujan J.* doi: 10.1007/s11139-021-00385-z.
5. S. Chern, Weighted partition rank and crank moments. II. Odd-order moments, to appear in *Ramanujan J.* doi: 10.1007/s11139-020-00365-9.
4. S. Chern, Weighted partition rank and crank moments. I. Andrews–Beck type congruences, to appear in *Proceedings of the Conference in Honor of Bruce Berndt.*
3. S. Chern, 1-Shell totally symmetric plane partitions (TSPPs) modulo powers of 5, to appear in *Ramanujan J.* doi: 10.1007/s11139-020-00306-6.

2. S. Chern and D. Tang, 5-Dissections and sign patterns of Ramanujan's parameter and its companion, to appear in *Czechoslovak Math. J.* doi: 10.21136/CMJ.2021.0218-20.
1. S. Chern, Asymptotics for the Taylor coefficients of certain infinite products, to appear in *Ramanujan J.* doi: 10.1007/s11139-020-00273-y.

Preprints

7. S. Chern, Further results on biases in integer partitions, submitted.
6. S. Chern, A different look at Euclidean billiard partitions, submitted. Available at arXiv:2012.14485.
5. S. Chern, Proof of a conjecture of Lin and Ma on 0012-avoiding inversion sequences, submitted. Available at arXiv:2006.04318.
4. N. Chen, S. Chern, Y. Fan, and E. X. W. Xia, Some generating functions and inequalities for the Andrews–Stanley partition functions, submitted.
3. S. Chern, Weighted partition rank and crank moments. III. A list of Andrews–Beck type congruences modulo 5, 7, 11 and 13, submitted.
2. S. Chern, Nonmodular infinite products and a Conjecture of Seo and Yee, submitted. Available at arXiv:1912.10341.
1. S. Chern, Partitions and the maximal excludant, submitted. Available at arXiv:1905.06304.

Other Publications

2. X. Chen, Liu shao qing (in Chinese), *Chinese Poetry Monthly* **14** (2010), 23.
1. X. Chen, Selected poems of Xiao-Hang (in Chinese), *Chien Kun Poetry Quart. Classic Poetry Ser.* **53** (2010), 21–22.

Contributed/Invited Talks

- **In 2021**

  2. Euclidean billiard partitions, *Combinatorics/Partitions Seminar*, Penn State University, online (Mar 02, 2021).
  1. Identities of Hecke type and Rogers–Ramanujan type, *Specialty Seminar in Partitions and q-Series*, Michigan Tech, online (Feb 18, 2021).

- **In 2020**

  3. Identities of Hecke type and Rogers–Ramanujan type, *Combinatorics/Partitions Seminar*, Penn State University, online (Oct 20, 2020).
  2. The EGZ Theorem and a formula of Vladeta Jovovic, *AMS Fall Eastern Sectional Meeting 2020, Special Session on q-Series and Related Areas in*

Combinatorics and Number Theory, Penn State University, online (Oct 04, 2020).

1. On a Rogers–Ramanujan type identity of Gleißberg, *Conference on q-Series and Special Functions*, Wuhan University, online (Jun 13, 2020).

- **In 2019**

7. The EGZ Theorem and a formula of Vladeta Jovovic, *Combinatorics/Partitions Seminar*, Penn State University, University Park, PA, USA (Nov 12, 2019).
6. Linked partition ideals, directed graphs and q-multi-summations, *AMS Fall Southeastern Sectional Meeting 2019, Special Session on Partition Theory and Related Topics*, University of Florida, Gainesville, FL, USA (Nov 03, 2019).
5. Linked partition ideals, directed graphs and q-multi-summations, *Combinatorics/Partitions Seminar*, Penn State University, University Park, PA, USA (Sep 24, 2019).
4. Kanade–Russell conjectures and linked partition ideals, Chongqing University, Chongqing, China (Jun 26, 2019).
3. Kanade–Russell conjectures and linked partition ideals, Jiangsu University, Zhenjiang, China (Jun 18, 2019).
2. Weighted partition rank and crank moments, *Analytic and Combinatorial Number Theory: The Legacy of Ramanujan — A Conference in Honor of Bruce C. Berndt's 80th Birthday*, UIUC, Urbana, IL, USA (Jun 08, 2019).
1. Kanade–Russell conjectures and linked partition ideals, *AMS Joint Mathematics Meetings 2019, Special Session on Partition Theory and Related Topics*, Baltimore, MD, USA (Jan 19, 2019).

- **In 2018**

2. An infinite family of congruences for 1-shell totally symmetric plane partitions, *Combinatory Analysis 2018: A Conference in Honor of George Andrews' 80th Birthday*, Penn State University, University Park, PA, USA (Jun 21, 2018).
1. The probabilistic method, *Graduate Student Seminar*, Penn State University, University Park, PA, USA (Mar 29, 2018).

- **In 2017**

6. Partitions with even parts below odd parts: A combinatorial interpretation and other observations, *Combinatorics/Partitions Seminar*, Penn State University, University Park, PA, USA (Nov 28, 2017).
5. Some congruences for overpartitions, *Combinatorics/Partitions Seminar*, Penn State University, University Park, PA, USA (Oct 31, 2017).

4. Overpartitions with bounded part differences, Nankai University, Tianjin, China (Jun 27, 2017).
3. Some congruences for overpartitions, Jiangsu University, Zhenjiang, China (Jun 20, 2017).
2. On the distribution of the primitive roots of a prime, *Number Theory Seminar*, Zhejiang University, Hangzhou, China (Jun 01, 2017).
1. An overpartition analogue of partitions with bounded differences between largest and smallest parts, *Combinatorics/Partitions Seminar*, Penn State University, University Park, PA, USA (Mar 28, 2017).

Reviewing and Refereeing Activities

- Reviewer for *Mathematical Reviews*.
- Reviewer for *zbMATH* (*Zentralblatt MATH*).
- Referee for the following journals (36 papers):
  - *Acta Math. Sci. Ser. B (Engl. Ed.)* (1 paper)
  - *Adv. Math.* (1 paper)
  - *Afr. Mat.* (1 paper)
  - *Amer. Math. Monthly* (1 paper)
  - *An. Ştiinţ. Univ. Al. I. Cuza Iaşi. Mat. (N.S.)* (1 paper)
  - *Ann. Comb.* (1 paper)
  - *Bull. Aust. Math. Soc.* (3 papers)
  - *Commun. Math.* (1 paper)
  - *Electron. J. Combin.* (1 paper)
  - *European J. Combin.* (2 papers)
  - *Int. J. Number Theory* (6 papers)
  - *Integers* (2 papers)
  - *Integral Transforms Spec. Funct.* (1 paper)
  - *J. Anal.* (1 paper)
  - *J. Integer Seq.* (1 paper)
  - *Kuwait J. Sci.* (1 paper)
  - *New Zealand J. Math.* (1 paper)
  - *Ramanujan J.* (5 papers)
  - *Res. Number Theory* (1 paper)
  - *Rev. R. Acad. Cienc. Exactas Fs. Nat. Ser. A Mat. RACSAM* (1 paper)
  - *Rocky Mountain J. Math.* (1 paper)
  - *Rose-Hulman Undergrad. Math. J.* (1 paper)
  - *Tamsui Oxf. J. Inf. Math. Sci.* (1 paper)
- Referee for the following conference proceedings (1 paper):
  - *Transient Transcendence in Transylvania*, 2020 (1 paper)

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