Curriculum Vitae

Shane Chern
(Xiaohang Chen)

Department of Mathematics and Statistics
Dalhousie University
Halifax, NS, B3H 4R2, Canada

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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, The Pennsylvania State University
Thesis Advisor: George E. Andrews
Thesis Title: The World of p and q: Congruences, Identities and Asymptotics
Doctoral Committee: Ae Ja Yee
Wen-Ching Winnie Li
Donald St. P. Richards

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

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

Employment

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

Service

Seminars

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

Honors and Awards

- **Killam Postdoctoral Fellowship**, Dalhousie University, 2021–2023.
- **Raymond and Christine Ayoub Award** to recognize a graduate student for an outstanding thesis in algebra or number theory, Penn State University, 2021.
- **Pritchard Dissertation Fellowship**, Penn State University, 2020.
- **AMS Graduate Student Travel Grant** for attending 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, 2016–2021.
- **Academic Scholarship (Ph.D.)**, Zhejiang University, 2015.
- **First Prize Fellowship**, Zhejiang University, 2013 & 2014.
- **Third Prize Scholarship**, Xiamen University, 2012.

Teaching Experience

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

64. S. Chern and A. J. Yee, Diagonal hooks and a Schmidt-type partition identity, *Electron. J. Combin.* **29** (2022), no. 2, Paper No. 2.10, 14 pp. MR4410927.

63. S. Chern, Parity considerations for drops in cycles on $\{1, 2, \ldots, n\}$, *Discrete Math.* **345** (2022), no. 8, Paper No. 112934, 9 pp. MR4409977.

62. S. Chern and D. Tang, Vanishing coefficients and identities concerning Ramanujan's parameters, *Ramanujan J.* **57** (2022), no. 4, 1367–1385. MR4394011.

61. N. Chen, S. Chern, Y. Fan, and E. X. W. Xia, Some generating functions and inequalities for the Andrews–Stanley partition functions, *Proc. Edinb. Math. Soc. (2)* **65** (2022), no. 1, 120–135. MR4393364.

60. G. E. Andrews, S. Chern, and Z. Li, Linked partition ideals and the Alladi–Schur theorem, *J. Combin. Theory Ser. A* **189** (2022), Paper No. 105614, 19 pp. MR4389005.

59. S. Chern, Further results on biases in integer partitions, *Bull. Korean Math. Soc.* **59** (2022), no. 1, 111–117. MR4372179.

58. S. Chern, Weighted partition rank and crank moments. II. Odd-order moments, *Ramanujan J.* **57** (2022), no. 2, 471–485. MR4372228.

57. S. Chern, Weighted partition rank and crank moments. III. A list of Andrews–Beck type congruences modulo 5, 7, 11 and 13, *Int. J. Number Theory* **18** (2022), no. 1, 141–163. MR4369797.

56. S. Chern and D. Tang, 5-Dissections and sign patterns of Ramanujan's parameter and its companion, *Czechoslovak Math. J.* **71(146)** (2021), no. 4, 1115–1128. MR4339114.

55. S. Chern, Note on partitions with even parts below odd parts, *Math. Notes* **110** (2021), no. 3, 454–457. MR4335386.

54. S. Chern, Asymptotics for the Taylor coefficients of certain infinite products, *Ramanujan J.* **55** (2021), no. 3, 987–1014. MR4286771.

53. S. Chern, Partitions and the maximal excludant, *Electron. J. Combin.* **28** (2021), no. 3, Paper No. 3.13, 9 pp. MR4281690.

52. S. Chern, 1-Shell totally symmetric plane partitions (TSPPs) modulo powers of 5, *Ramanujan J.* **55** (2021), no. 2, 713–731. MR4260169.

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. MR4229493.

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), Paper No. 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. MR4245146.

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, Paper No. 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. MR4221109.

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; *Correction*, **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, Paper No. 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, Paper No. 14.3.2, 5 pp. MR3168684.

Accepted Manuscripts

5. S. Chern, Linked partition ideals and Andrews–Gordon type series for Alladi and Gordon's extension of Schur's identity, *Rocky Mountain J. Math.*, accepted.
4. S. Chern, On a congruence involving harmonic series and Bernoulli numbers, *Int. J. Number Theory*, accepted. doi: 10.1142/S1793042122500865.
3. S. Chern, On 0012-avoiding inversion sequences and a conjecture of Lin and Ma, *Quaest. Math.*, accepted. doi: 10.2989/16073606.2022.2039973.
2. G. Beck and S. Chern, Reciprocity between partitions and compositions, *Ramanujan J.*, accepted. doi: 10.1007/s11139-021-00541-5.
1. S. Chern, Weighted partition rank and crank moments. I. Andrews–Beck type congruences, *Proceedings of the Conference in Honor of Bruce Berndt*, accepted.

Submissions

6. J. M. Campbell and S. Chern, Nearly self-conjugate integer partitions, submitted.
5. S. Chern, Asymmetric Rogers–Ramanujan type identities. I. The Andrews–Uncu Conjecture, submitted. Available at arXiv:2203.15168.
4. S. Chern, Linked partition ideals and a Schur-type identity of Andrews, submitted.

3. G. E. Andrews, S. Chern, and Z. Li, On the k-measure of partitions and distinct partitions, submitted. Available at arXiv:2105.01758.
2. S. Chern, A different look at Euclidean billiard partitions, submitted. Available at arXiv:2012.14485.
1. S. Chern, Nonmodular infinite products and a Conjecture of Seo and Yee, submitted. Available at arXiv:1912.10341.

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. Classical Poetry Ser.* **53** (2010), 21–22.

Contributed/Invited Talks

- **In 2022**

3. Reciprocity between partitions and compositions, *AMS Joint Mathematics Meetings 2022, Special Session on Partition Theory and Related Topics*, online (Apr 07, 2022).
2. Linked partition ideals and Schur's 1926 partition theorem, *Specialty Seminar in Partitions and q-Series*, Michigan Technological University, USA, online (Mar 10, 2021).
1. Linked partition ideals and Schur's 1926 partition theorem, Chongqing University, China, online (Jan 06, 2022).

- **In 2021**

11. Linked partition ideals and Schur's 1926 partition theorem, *International e-Conference on Number Theory and Differential Equations*, Central University of Karnataka, India, online (Dec 20, 2021).
10. Linked partition ideals and Schur's 1926 partition theorem, Zhejiang Sci-Tech University, China, online (Dec 14, 2021).
9. Ramanujan's legacies in the world of partitions and q-series, *Zu Chongzhi Colloquium Series*, Duke Kunshan University, China, online (Dec 10, 2021).
8. Linked partition ideals and Schur's 1926 partition theorem, Shanghai Normal University, China, online (Dec 07, 2021).
7. Linked partition ideals and Schur's 1926 partition theorem, *Mathematics Colloquium*, Dalhousie University, Halifax, NS, Canada (Nov 29, 2021).
6. Ramanujan's legacies in the world of partitions and q-series, *Honours Seminar*, Dalhousie University, Halifax, NS, Canada (Nov 17, 2021).
5. Euclidean billiard partitions, *Combinatorial and Additive Number Theory (CANT 2021)*, CUNY Graduate Center, USA, online (May 28, 2021).

4. The EGZ Theorem and a formula of Vladeta Jovovic, *Graduate Student Combinatorics Conference 2021*, University of Minnesota, USA, online (Apr 25, 2021).
3. Identities of Hecke type and Rogers–Ramanujan type, Changsha University of Science and Technology, China, online (Apr 24, 2021).
2. Euclidean billiard partitions, *Combinatorics/Partitions Seminar*, Penn State University, USA, online (Mar 02, 2021).
1. Identities of Hecke type and Rogers–Ramanujan type, *Specialty Seminar in Partitions and q-Series*, Michigan Technological University, USA, online (Feb 18, 2021).

- **In 2020**

3. Identities of Hecke type and Rogers–Ramanujan type, *Combinatorics/Partitions Seminar*, Penn State University, USA, 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, USA, online (Oct 04, 2020).
1. On a Rogers–Ramanujan type identity of Gleißberg, *Conference on q-Series and Special Functions*, Wuhan University, China, 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 (67 papers):
  - *Acta Math. Sci. Ser. B (Engl. Ed.)* (1 paper)
  - *Adv. Math.* (2 papers)
  - *Afr. Mat.* (1 paper)
  - *Amer. Math. Monthly* (1 paper)
  - *An. Ştiinţ. Univ. Al. I. Cuza Iaşi. Mat. (N.S.)* (1 paper)
  - *Ann. Comb.* (3 papers)
  - *Bull. Aust. Math. Soc.* (3 papers)
  - *Colloq. Math.* (1 paper)
  - *Commun. Math.* (1 paper)
  - *Comput. Geom.* (1 paper)
  - *Contrib. Discrete Math.* (1 paper)
  - *Discrete Appl. Math.* (1 paper)
  - *Discrete Math. Theor. Comput. Sci.* (1 paper)
  - *Electron. J. Combin.* (3 papers)

  - *European J. Combin.* (3 papers)
  - *Int. J. Number Theory* (8 papers)
  - *Integers* (4 papers)
  - *Integral Transforms Spec. Funct.* (1 paper)
  - *Involve* (1 paper)
  - *J. Anal.* (1 paper)
  - *J. Difference Equ. Appl.* (1 paper)
  - *J. Integer Seq.* (1 paper)
  - *J. Number Theory* (1 paper)
  - *J. Ramanujan Math. Soc.* (1 paper)
  - *Kuwait J. Sci.* (1 paper)
  - *Math. Inequal. Appl.* (1 paper)
  - *New Zealand J. Math.* (1 paper)
  - *Open Math.* (1 paper)
  - *Quaest. Math.* (2 papers)
  - *Ramanujan J.* (9 papers)
  - *Res. Number Theory* (2 papers)
  - *Rev. Mat. Iberoam.* (1 paper)
  - *Rev. R. Acad. Cienc. Exactas Fs. Nat. Ser. A Mat. RACSAM* (2 papers)
  - *Rocky Mountain J. Math.* (1 paper)
  - *Rose-Hulman Undergrad. Math. J.* (1 paper)
  - *Tamsui Oxf. J. Inf. Math. Sci.* (1 paper)
  - *Vietnam J. Math.* (1 paper)
- Referee for the following book chapters (1 paper):
  - *Advances in Applied Analysis and Number Theory*, Springer (1 paper)
- Referee for the following conference proceedings (1 paper):
  - *Transient Transcendence in Transylvania* (1 paper)

Last update: April 25, 2022