

# Rahul Nandkishore: Combined Curriculum Vitae and List of Publications

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- EMPLOYMENT      **Assistant Professor of Physics** at the **University of Colorado - Boulder**, Boulder, Co, USA. August 2015 to present
- Postdoctoral fellow** at the Princeton Center for Theoretical Science, **Princeton University**, Princeton, NJ, USA. (September 2012-August 2015)
- EDUCATION      **Massachusetts Institute of Technology**, Cambridge, MA, USA
- Ph.D. in Physics
- Thesis Topic: “Quantum many body physics in single and bilayer graphene”
  - Advisor: Leonid Levitov
  - Degree granted: September 19, 2012
- Trinity College, Cambridge University**, Cambridge, UK (October 2004-June 2008)
- BA, MSci in Natural Sciences with first class honors.
- AWARDS
- DARPA program on ‘Driven and Non-equilibrium systems’ (DRINQS) (2018): \$3.99 million (Seven PIs, Dan Dessau is lead PI). Status: Active
  - NSF EAGER grant for ‘Braiding of Half-Flux Quantum Vortices’ (2018): \$ 300,000 (multi PI award with Gang Cao and Dan Dessau). Status: Active
  - U.S. Army Research Office (ARO) Young Investigator Award (2017) for ‘Disorder and Interactions in Dirac Materials.’ \$360,000 over 3 years. Status: Active
  - Alfred P. Sloan Research Fellowship in Physics (2017) \$ 60000. Status: Active
  - U.S. Air Force Office of Sponsored Research (AFOSR) Young Investigator Award (2016) for ‘Non-equilibrium Dynamics and Many Body Localization in Ultracold Atoms’ Status: Active
  - Foundational Questions Institute grant award for ‘Physics of the Observer’ (2016). Status: Completed
- SELECTED PUBLICATIONS
- **Chiral superconductivity from repulsive interactions in doped graphene.** Rahul Nandkishore, L.S. Levitov and A.V. Chubukov, *Nature Physics* **8**, 158-163 (2012) (*Cover article*, profiled in *Nature Physics* **8**, 111-112 (2012))
  - **Localization protected quantum order.** David A. Huse, Rahul Nandkishore, Vadim Oganesyan, Arijeet Pal and S.L.Sondhi, *Phys. Rev. B* **88**, 014206 (2013) (*Editor’s suggestions*, profiled in the July 2013 issue of the *Journal Club for Condensed Matter*)
  - **Rare region effects dominate weakly disordered 3D Dirac points.** Rahul Nandkishore, David A. Huse and S.L. Sondhi, *Phys. Rev. B* **89**, 245110 (2014)
  - **Nonlocal adiabatic response of a localized system to local manipulations.** Vedika Khemani, Rahul Nandkishore and S.L. Sondhi, *Nature Physics* **11**, 560-565 (2015)
  - **Many body localization and thermalization in quantum statistical mechanics.** Rahul Nandkishore and David A. Huse, *Annual Reviews of Condensed Matter Physics*, Volume **6**, pp 15-38 (2015)
  - **Many body localization and thermalization: insights from the entanglement spectrum** Scott D. Geraedts, Rahul Nandkishore and Nicolas Regnault, *Phys. Rev. B* **93**, 174202 (2016) [*Editor’s suggestions*]
  - **Many body localization with long range interactions**, Rahul M. Nandkishore and S. L. Sondhi, *Phys. Rev. X* **7** 041021 (2017). Selected for a research highlight in *Nature Physics* **13**, 1037 (2017)
  - **Localization in fractonic random circuits** Shriya Pai, Michael Pretko and Rahul M. Nandkishore, arXiv: 1807.09776

TEACHING  
EXPERIENCE

- Taught ‘Physics 7440: Theory of the Solid State I.’ (Graduate course) in Spring 2017 and 2018.
- Taught ‘Physics 3210: Classical Mechanics and Math Methods II’ at CU Boulder in Fall 2016 and 2017. (Upper division undergraduate course). Used clickers and active learning techniques.
- Attended American Association of Physics Teachers workshop for new faculty, November 2016
- Taught ‘Physics 7810: Disordered Quantum Systems’ at CU Boulder in Spring 2016. Advanced (special topics) graduate course.

SERVICE

Referee for *Nature*, *Nature Physics*, *Nature Communications*, *Physical Review Letters*, *Physical Review B*, *Physical Review X*, *New Journal of Physics*, *Annalen der Physik*, *SciPost* and *Proceedings of the Royal Society*. Contributor to the *Journal Club for Condensed Matter Physics*. Referee for the National Science Foundation (NSF), the US-Israel Binational Science Foundation (BSF), the Natural Science and Engineering Research Council of Canada (NSERC), the Swiss National Science Foundation (SNSF), and the Research Foundation of Flanders (FWO).

PUBLICATIONS

As of 01-21-2019 these publications have received 3954 citations with an h-index of 27 according to Google Scholar, or 2673 citations with an h-index of 23 according to ISI Web of Knowledge.

REFEREED  
PUBLICATIONS

1. **Kohn Luttinger superconductivity on two orbital honeycomb lattice** Yu-Ping Lin and Rahul M. Nandkishore, *Phys. Rev. B* **98**, 214521 (2018)
2. **Pinch point singularities of tensor spin liquids** Abhinav Prem, Sagar Vijay, Yang-Zhi Chou, Michael Pretko and Rahul M. Nandkishore, *Phys. Rev. B* **98**, 165140 (2018)
3. **AC conductivity crossover in localized superconductors** A.T. Schmitz, Michael Pretko and Rahul M. Nandkishore, *Phys. Rev. B* **98**, 144203 (2018)
4. **Localization of extended quantum objects**, Michael Pretko and Rahul M. Nandkishore, *Phys. Rev. B* **98**, 134301 (2018)
5. **Non-saturating large magnetoresistance in semimetals**, Ian A. Leahy, Yu-Ping Lin, Peter E. Siegfried, Andrew C. Treglia, Justin C.W. Song, Rahul M. Nandkishore and Minhyea Lee, *Proceedings of the National Academy of Sciences* (2018). Advance online publication at <https://doi.org/10.1073/pnas.1808747115>
6. **Symmetry breaking and localization in a random Schwinger model with commensuration** A.A. Akhtar, Rahul M. Nandkishore and S.L. Sondhi, *Phys. Rev. B* **98**, 115109 (2018)
7. **Gapless insulating edges of dirty interacting topological insulators**, Yang-Zhi Chou, Rahul M. Nandkishore and Leo Radzihovsky, *Phys. Rev. B* **98**, 054205 (2018)
8. **Remnants of Anderson localization in pre-thermalization induced by white noise**, S. Lorenzo, T. Apollaro, G. M. Palma, R. Nandkishore, A. Silva, J. Marino. *Phys. Rev. B* **98**, 054302 (2018)
9. **Mott glass from localization and confinement** Yang-Zhi Chou, Rahul Nandkishore and Leo Radzihovsky, *Phys. Rev. B* **97**, 184205 (2018)
10. **Exotic Superconductivity with Enhanced Energy Scales in Materials with Three Band Crossings** Yu-Ping Lin and Rahul M. Nandkishore, *Phys. Rev. B* **97**, 134521 (2018)
11. **Recoverable information and emergent conservation laws in fracton stabilizer codes**, A.T. Schmitz, Han Ma, Rahul M. Nandkishore and S.A. Parameswaran, *Phys. Rev. B* **97**, 134426 (2018) (*Editor’s Suggestion*)
12. **Coulomb interactions and disorder in three dimensional quadratic band crossings without time-reversal or particle-hole symmetry**, Ipsita Mandal and Rahul M. Nandkishore, *Phys. Rev. B* **97**, 125121 (2018)

13. **Topological entanglement entropy of fracton stabilizer codes**, Han Ma, Albert T. Schmitz, S.A. Parameswaran, Michael Hermele and Rahul M. Nandkishore, *Phys. Rev. B* **97**, 125101 (2018)
14. **Many body localization proximity effects in platforms of coupled spins and bosons**, J. Marino and R. M. Nandkishore, *Phys. Rev. B* **97**, 054201 (2018)
15. **Emergent phases of fractonic matter**, Abhinav Prem, Michael Pretko and Rahul M. Nandkishore, *Phys. Rev. B* **97**, 085116 (2018)
16. **Characterizing the many-body localization transition through the entanglement spectrum**, Scott D. Geraedts, Nicolas Regnault, Rahul M. Nandkishore, *New Journal of Physics* Vol. **19**, Num. **11**, pp.113021 (2017)
17. **Many body localization with long range interactions**, Rahul M. Nandkishore and S. L. Sondhi, *Phys. Rev. X* **7** 041021 (2017). Selected for a research highlight in *Nature Physics* **13**, 1037 (2017)
18. **Interplay between short-range correlated disorder and Coulomb interaction in nodal-line semimetals**, Yuxuan Wang and Rahul M. Nandkishore, *Phys. Rev. B* **96**, 115130 (2017)
19. **Exploring many body localization and thermalization using semiclassical methods**, O. L. Acevedo, A. Safavi-Naini, J. Schachenmayer, M. L. Wall, R. Nandkishore, A. M. Rey, *Phys. Rev. A* **96**, 033604 (2017)
20. **Valley-selective Landau-Zener oscillations in semi-Dirac p-n junctions** Kush Saha, Rahul Nandkishore and S.A. Parameswaran, *Phys. Rev. B* **96**, 045424 (2017)
21. **Single-particle excitations in disordered Weyl fluids**, J. H. Pixley, Yang-Zhi Chou, Pallab Goswami, David A. Huse, Rahul Nandkishore, Leo Radzihovsky, and S. Das Sarma, *Phys. Rev. B* **95**, 235101 (2017) (*Editor's suggestions*)
22. **Disorder-driven destruction of a non-Fermi liquid semimetal studied by renormalization group analysis** Rahul M. Nandkishore and S.A. Parameswaran, *Phys. Rev. B* **95**, 205106 (2017)
23. **Glassy dynamics in translation invariant fracton models** Abhinav Prem, Jeongwan Haah and Rahul Nandkishore, *Phys. Rev. B* **95**, 155133 (2017)
24. **Topological surface superconductivity in doped Weyl loop materials** Yuxuan Wang and Rahul Nandkishore, *Phys Rev. B* **95**, 060506(R) (2017)
25. **Emergent local integrals of motion without a complete set of localized eigenstates** Scott D. Geraedts, R.N. Bhatt and Rahul Nandkishore, *Phys. Rev. B* **95**, 064204 (2017)
26. **Instabilities of Weyl loop semimetals** Shouvik Sur and Rahul Nandkishore, *New Journal of Physics*, **18**, **11**, 115006 (2016), *Special issue on topological semimetals*
27. **Many body localized systems weakly coupled to baths.** Rahul Nandkishore and Sarang Gopalakrishnan. *Annalen der Physik* **529**, 1600181 (2017) *Special issue on many body localization*
28. **Many-body localization and thermalization: Insights from the entanglement spectrum.** Scott D. Geraedts, Rahul Nandkishore and Nicolas Regnault, *Phys. Rev. B* **93**, 174202 (2016) [*Editor's suggestions*]
29. **Floquet thermalization: symmetries and random matrix ensembles** Nicolas Regnault and Rahul Nandkishore, *Phys. Rev. B.* **93**, 104203 (2016)
30. **Weyl and Dirac loop superconductors** Rahul Nandkishore, *Phys. Rev. B* **93**, 020506(R) (2016)
31. **Many body localization proximity effect** Rahul Nandkishore, *Phys. Rev. B* **92**, 245141 (2015)

32. **Localized systems coupled to small baths: from *Anderson* to *Zeno*** David A. Huse, Rahul Nandkishore, F. Pietracaprina, V. Ros and A. Scardicchio, *Phys. Rev. B* **92**, 014203 (2015)
33. **Nonlocal adiabatic response of a localized system to local manipulations.** Vedika Khemani, Rahul Nandkishore and S.L. Sondhi, *Nature Physics* **11**, 560-565 (2015)
34. **Disorder tuned selection of order in bilayer graphene.** Junhua Zhang, Rahul Nandkishore and Enrico Rossi, *Phys. Rev. B* **91**, 205425 (2015)
35. **Many-Body Localization in Imperfectly Isolated Quantum Systems.** Sonika Johri, Rahul Nandkishore and R.N.Bhatt. *Phys. Rev. Lett.* **114**, 117401 (2015)
36. **Mean-field theory of nearly many-body localized metals.** Sarang Gopalakrishnan and Rahul Nandkishore, *Phys. Rev. B* **90**, 224203 (2014)
37. **Many body localization and delocalization in the two dimensional continuum:** Rahul Nandkishore, *Phys. Rev. B* **90**, 184204 (2014)
38. **Polar Kerr effect from chiral-nematic charge order.** Yuxuan Wang, Andrey Chubukov and Rahul Nandkishore, *Phys. Rev. B* **90**, 205130 (2014)
39. **Marginal Anderson localization and many body delocalization:** Rahul Nandkishore and Andrew C. Potter, *Phys. Rev. B* **90**, 195115 (2014)
40. **Phenomenology of fully many body localized systems:** David A. Huse, Rahul Nandkishore and Vadim Oganesyan, *Phys. Rev. B* **90**, 174202 (2014)
41. **Superconductivity of disordered Dirac fermions in graphene:** Dragos Potirniche, Joseph Maciejko, Rahul Nandkishore and S.L. Sondhi, *Phys. Rev. B*, **90**, 094516 (2014)
42. **Spectral features of a many-body-localized system weakly coupled to a bath.** Rahul Nandkishore, Sarang Gopalakrishnan and David A. Huse, *Phys. Rev. B*, **90**, 064203 (2014)
43. **Weyl semimetals with short range interactions.** Joseph Maciejko and Rahul Nandkishore, *Phys. Rev. B* **90**, 035126 (2014)
44. **Rare region effects dominate weakly disordered 3D Dirac points.** Rahul Nandkishore, David A. Huse and S.L. Sondhi, *Phys. Rev. B* **89**, 245110 (2014)
45. **Superconductivity from weak repulsion in hexagonal lattice systems.** Rahul Nandkishore, Ronny Thomale and Andrey V. Chubukov, *Phys. Rev. B* **89** 144501 (2014) (*Editor's suggestions*).
46. **Localization protected quantum order.** David A. Huse, Rahul Nandkishore, Vadim Oganesyan, Arijeet Pal and S.L.Sondhi, *Phys. Rev. B* **88**, 014206 (2013) (*Editor's suggestions*, profiled in the July 2013 issue of the *Journal Club for Condensed Matter*)
47. **Common path interference in Zener tunneling is a universal phenomenon.** Sonika Johri, Rahul Nandkishore, R.N.Bhatt and E.J.Mele. *Phys. Rev. B* **87**, 235413 (2013) (*Editor's suggestions*).
48. **Superconductivity of disordered Dirac fermions,** Rahul Nandkishore, Joseph Maciejko, David A. Huse and S.L.Sondhi, *Phys. Rev. B* **87**, 174511 (2013)
49. **Flat bands with Berry curvature in multilayer graphene.** Akshay Kumar and Rahul Nandkishore, *Phys. Rev. B* **87**, 241108(R) (2013)
50. **Interplay of superconductivity and spin density wave order in doped graphene.** Rahul Nandkishore and A.V.Chubukov, *Phys. Rev. B* **86**, 115426 (2012)
51. **Prediction and description of a chiral pseudogap phase.** Rahul Nandkishore, *Phys. Rev. B* **86**, 045101 (2012)
52. **Broken translational symmetry in an emergent paramagnetic phase of graphene.** Gia-Wei Chern, Rafael M. Fernandes, Rahul Nandkishore and A.V. Chubukov, *Phys. Rev. B* **86**, 115443 (2012)

53. **Itinerant half-metal spin density wave state on the hexagonal lattice.** Rahul Nandkishore, Gia-Wei Chern and Andrey V. Chubukov, *Phys. Rev. Lett.* **108**, 227204 (2012)
54. **Chiral superconductivity from repulsive interactions in doped graphene.** Rahul Nandkishore, L.S. Levitov and A.V. Chubukov, *Nature Physics* **8**, 158-163 (2012) (*Cover article*, profiled in *Nature Physics* **8**, 111-112 (2012))
55. **Orthogonal metals: the simplest non-Fermi liquids.** Rahul Nandkishore, Max A. Metlitski and T. Senthil, *Phys. Rev. B* **86**, 045128 (2012) (*Editor's suggestion*, profiled in *Physics* **5**, 82 (2012))
56. **Common-path interference and Zener tunneling in bilayer graphene p-n junctions.** Rahul Nandkishore and L.S. Levitov, *PNAS* **108**, 14021-14025 (2011)
57. **Polar Kerr effect and time reversal symmetry breaking in bilayer graphene.** Rahul Nandkishore and L.S. Levitov, *Phys. Rev. Lett.* **107**, 097402 (2011)
58. **Quantum anomalous Hall state in bilayer graphene.** Rahul Nandkishore and Leonid Levitov, *Phys. Rev. B* **82**, 115124 (2010)
59. **Electron interactions in bilayer graphene: marginal Fermi liquid behavior and zero bias anomaly.** Rahul Nandkishore and L.S. Levitov, *Phys. Rev. B* **82**, 115431 (2010)
60. **Dynamical screening and ferroelectric-type excitonic instability in bilayer graphene.** Rahul Nandkishore and L.S. Levitov, *Phys. Rev. Lett.* **104**, 156803 (2010)

#### PREPRINTS

1. **Localized surfaces of three dimensional topological insulators,** Yang-Zhi Chou, Rahul M. Nandkishore and Leo Radzihovsky, arXiv: 1901.05464
2. **A chiral twist on the high-Tc phase diagram in Moire heterostructures** Yu-Ping Lin and Rahul M. Nandkishore, arXiv: 1901.00500
3. **Weak measurements limit entanglement to area law** Amos Chan, Rahul M. Nandkishore, Michael Pretko and Graeme Smith, arXiv: 1808.05949
4. **Localization in fractonic random circuits** Shriya Pai, Michael Pretko and Rahul M. Nandkishore, arXiv: 1807.09776
5. **Quantum dynamics of disordered spin chains with power-law interactions** A. Safavi-Naini, M.L. Wall, O.L. Acevedo, A.M. Rey and R.M. Nandkishore, arXiv: 1806.03339
6. **Fractons** Rahul M. Nandkishore and Michael Hermele, arXiv: 1803.11196
7. **Non-local response in the disordered Majorana chain** Sonika Johri and Rahul Nandkishore arXiv: 1608.00022
8. **Flavor symmetry and competing orders in bilayer graphene** Rahul Nandkishore and Leonid Levitov, arXiv: 1002.1966

#### REVIEWS

1. **Many body localization and thermalization in quantum statistical mechanics:** Rahul Nandkishore and David A. Huse, *Annual Reviews of Condensed Matter Physics*, Volume **6**, pp 15-38 (2015)
2. **Spontaneously ordered states in bilayer graphene.** Rahul Nandkishore and L.S. Levitov, *Phys. Scr.* **T146** (2012) 014011

INVITED TALKS

1. Condensed matter seminar at CUNY graduate center, December 2018
2. Invited talk at Princeton Center for Theoretical Science conference on *Fracton phases of matter and topological crystalline order*, December 2018.
3. Condensed matter seminar at Caltech, October 2018
4. Condensed matter seminar at UC Santa Cruz, October 2018
5. Invited talk at Max Planck Institute for Complex Systems, Dresden, workshop on *Anderson localization and interactions*. September 2018. *Note: I was unable to travel for personal reasons and the talk was given by my postdoc instead*
6. Chalk talk (public lecture) at KITP, September 2018
7. Summer school lectures at *Princeton Summer School on Condensed Matter Physics*, August 2018
8. Condensed matter seminar at Oxford University, May 2018
9. Condensed matter seminar at Cambridge University, May 2018
10. Invited talk at Boston University conference on *Non-thermal quantum systems*, March 2018
11. Condensed matter seminar at the Texas A&M university, March 2018
12. Invited talk at Banff International Research Station conference on *Relativistic fermions and nodal semimetals from topology*, February 2018
13. Condensed matter seminar at the Karlsruhe Institute of Technology, Nov. 2017
14. Invited talk at workshop on ‘Chaos, duality and topology’ at the University of Illinois Urbana Champaign, Nov. 2017
15. Physics department colloquium at Colorado State University, September 2017
16. Condensed matter seminar at Harvard University, May 2017
17. Condensed matter seminar at the Massachusetts Institute of Technology, May 2017
18. Condensed matter seminar at Boston University, April 2017
19. Physics department colloquium at Florida State University, February 2017
20. Condensed matter seminar at University of Florida, February 2017
21. Condensed matter seminar at University of Utah, November 2016
22. Invited talk at Conference on Quantum Criticality and Topology in Itinerant Electron Systems, Albuquerque, August 2016
23. Invited talk at Max Planck Institute for Complex Systems, Dresden, workshop on ‘Disorder, Interactions and Coherence,’ July 2016
24. Invited talk at Princeton Center for Theoretical Science (PCTS) workshop ‘PCTS at ten’, May 2016
25. Invited talk at Princeton Center for Theoretical Science (PCTS) workshop on Dirac semimetals,’ March 2016
26. Condensed matter seminar at University of California Irvine, December 2015
27. Invited talk at KITP conference on many body localization, November 2015
28. Condensed matter seminar at University of Maryland College Park, October 2015
29. ICTP Trieste invited conference talk, September 2015
30. Condensed matter seminar at Stanford University, May 2015
31. Condensed matter seminar at University of California Berkeley, May 2015
32. Aspen winter conference invited talk, April 2015
33. **APS March Meeting Invited talk, March 2015**

34. Physics department special colloquium, University of Colorado at Boulder, February 2015
35. Condensed matter seminar at University of California San Diego, February 2015
36. Condensed matter seminar at University of Michigan, February 2015
37. Condensed matter seminar at Cornell University, February 2015
38. Condensed matter seminar at University of Wisconsin Madison, February 2015
39. Physics department colloquium at University of California at Santa Cruz January 2015
40. Physics department special colloquium at University of Texas at Austin, January 2015
41. Physics department special colloquium at Emory University, January 2015
42. Condensed matter seminar at the Max Planck Institute for Complex systems in Dresden, Germany, November 2014
43. Condensed matter seminar at Cornell University, September 2014
44. Condensed matter seminar at Rice University, September 2014
45. Invited talk at Princeton Center for Theoretical Science (PCTS) workshop on Many Body Localization, April 2014
46. Condensed matter seminar at University of Wisconsin Madison, March 2014
47. Electrical engineering special colloquium, Princeton University, February 2014
48. Invited talk at conference at Helmholtz virtual institute, Berlin, March 2013
49. Condensed matter seminar at University of Wisconsin Madison, March 2013
50. Condensed matter seminar at University of Toronto, March 2013
51. Condensed matter seminar at Columbia University, February 2013
52. Condensed matter seminar at University of Pennsylvania, October 2012
53. Condensed matter seminar at Yale University, July 2012
54. Condensed matter seminar at University of Wisconsin Madison, November 2011

SYNERGISTIC  
ACTIVITIES

- Lead organizer for a conference entitled *Novel approaches to quantum dynamics* at the KITP, August 2018
- Co-organizer for a program entitled *Dynamics of quantum information*, which took place at the KITP in Fall 2018
- Lead organizer for a conference entitled *Statistical mechanics out of equilibrium* at the Princeton Center for Theoretical Science, Princeton, May 2018
- Invited contributor to the *Journal Club for Condensed Matter* (a website highlighting major developments in the field) (2015, 2016, 2017, 2018)
- Lead organizer for a conference titled *Many Body Localization and Related Experiments* at the Princeton Center for Theoretical Science, Princeton, NJ, 2014
- Lead organizer for a conference titled *Many Body Localization and Related Theory* at the Princeton Center for Theoretical Science, Princeton, NJ, 2014
- Co-organized a conference titled *Symmetry in Topological Phases* at the Princeton Center for Theoretical Science, Princeton, NJ, 2014
- Participated in Workshops at the Aspen Center for Physics (Winter 2015), Kavli Institute for Theoretical Physics (Fall 2012, Fall 2015, Fall 2016, Fall 2018, Spring 2019), Princeton Center for Theoretical Science (2012, 2013, 2014, 2015, 2016, 2018), International Centre for Theoretical Physics - Trieste (Fall 2015), Max Planck Institute in Dresden (Spring 2013, Summer 2016), Helmholtz Virtual Institute Berlin (Spring 2013), and Banff International Research Station (2018)