

Mathias S. Scheurer

List of Publications

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In total **46 publications**, 8 submitted, 1 book chapter, 1 News & Views article (Nature), and 36 published in peer-reviewed journals: Nature Physics (2), Nature Communications (2), Physical Review X (1), Proceedings of the National Academy of Sciences (3), Physical Review Letters (2), Nano Letters (1), npj Quantum Materials (1), Scientific Reports (1), Physical Review B (16), Physical Review Research (6), and Journal of Physical Chemistry C (1).

Complete list of publications available online:

Submitted

1. *Phonon Hall viscosity from phonon-spinon interactions*, Y. Zhang*, Y. Teng*, R. Samajdar, S. Sachdev, and M. S. Scheurer, [arXiv:2103.05650](https://arxiv.org/abs/2103.05650).
2. *Electric-field-tunable electronic nematic order in twisted double-bilayer graphene*, R. Samajdar*, M. S. Scheurer*, S. Turkel, C. Rubio-Verdú, A. Pasupathy, J. Venderbos, and R. Fernandes, [arXiv:2102.08385](https://arxiv.org/abs/2102.08385).
3. *Time-reversal symmetry breaking and multigap superconductivity in the noncentrosymmetric superconductor La_7Ni_3* , Arushi, D. Singh, A. D. Hillier, M. S. Scheurer, R. P. Singh, [arXiv:2012.05654](https://arxiv.org/abs/2012.05654).
4. *Learning crystal field parameters using convolutional neural networks*, N. Berthussen, Y. Sizyuk, M. S. Scheurer, and P. Orth, [arXiv:2011.12911](https://arxiv.org/abs/2011.12911).
5. *Universal moiré nematic phase in twisted graphitic systems*, C. Rubio Verdu, S. Turkel, Y. Song, L. Klebel, R. Samajdar, M. S. Scheurer, J. Venderbos, H. Ochoa, X. Ledé, D. Kennes, R. Fernandes, A. Rubio, and A. Pasupathy, [arXiv:2009.11645](https://arxiv.org/abs/2009.11645).
6. *Anomalous mirror symmetry breaking in a model insulating cuprate $Sr_2CuO_2Cl_2$* , A. de la Torre, K. L. Seyler, L. Zhao, S. Di Matteo, M. S. Scheurer, Y. Li, B. Yu, M. Greven, S. Sachdev, M. R. Norman, D. Hsieh, [arXiv:2008.06516](https://arxiv.org/abs/2008.06516).
7. *Generative models for sampling and phase transition indication in spin systems*, J. Singh, V. Arora, V. Gupta, M. S. Scheurer, [arXiv:2006.11868](https://arxiv.org/abs/2006.11868).
8. *Photocurrent-driven transient symmetry breaking in the Weyl semimetal TaAs*, N. Sirica, P. P. Orth, M. S. Scheurer, Y.M. Dai, M.-C. Lee, P. Padmanabhan, L.T. Mix, L.X. Zhao, G.F. Chen, B. Xu, R. Yang, B. Shen, C.-C. Lee, H. Lin, T.A. Cochran, S.A. Trugman, J.-X. Zhu, M.Z. Hasan, N. Ni, X.G. Qiu, A.J. Taylor, D.A. Yarotski, R.P. Prasankumar, [arXiv:2005.10308](https://arxiv.org/abs/2005.10308).

Published

9. *Superconductivity, correlated insulators, and Wess-Zumino-Witten terms in twisted bilayer graphene*, M. Christos, S. Sachdev, M. S. Scheurer, *PNAS* **117**, 29543 (2020) [[arXiv:2007.00007](#)].
10. *Time-reversal-symmetry breaking and unconventional pairing in the noncentrosymmetric superconductor La_7Rh_3 probed by μ SR*, D. Singh, M. S. Scheurer, A. D. Hillier, R. P. Singh, *Phys. Rev. B* **102**, 134511 (2020) [[arXiv:1802.01533](#)].
11. *Bilocal quantum criticality*, H. D. Scammell, M. S. Scheurer, S. Sachdev, *Phys. Rev. Research* **2**, 033390 (2020) [[arXiv:2006.01834](#)].
12. *Protection of parity-time symmetry in topological many-body systems: non-Hermitian toric code and fracton models*, H. Shackleton, M. S. Scheurer, *Phys. Rev. Research* **2**, 033022 (2020) [[arXiv:2005.09668](#)].
13. *Unquantized thermal Hall effect in quantum spin liquids with spinon Fermi surfaces*, Y. Teng, Y. Zhang, M. S. Scheurer, S. Sachdev, *Phys. Rev. Research* **2**, 033283 (2020) [[arXiv:2005.02396](#)].
14. *Microscopic theory of superconductivity in twisted double-bilayer graphene*, R. Samajdar and M. S. Scheurer, *Phys. Rev. B* **102**, 064501 (2020) [[arXiv:2001.07716](#)].
15. *Not all doped Mott insulators have a pseudogap: key role of van Hove singularities*, W. Wu, M. S. Scheurer, M. Ferrero, A. Georges, *Phys. Rev. Research* **2**, 033067 (2020) [[arXiv:2001.00019](#)].
16. *Pairing in twisted double-bilayer graphene and related moiré superlattice systems*, M. S. Scheurer and R. Samajdar, *Phys. Rev. Research* **2**, 033062 (2020) [[arXiv:1906.03258](#)].
17. *Unsupervised machine learning and band topology*, M. S. Scheurer, R.-J. Slager, *Phys. Rev. Lett.* **124**, 226401 (2020) [[arXiv:2001.01711](#)].
18. *Phases of $SU(2)$ gauge theory with multiple adjoint Higgs fields in $2+1$ dimensions*, H. D. Scammell, K. Patekar, M. S. Scheurer, S. Sachdev, *Phys. Rev. B* **101**, 205124 (2020) [[arXiv:1912.06108](#)].
19. *Gauge Theories for the Thermal Hall Effect*, H. Guo, R. Samajdar, M. S. Scheurer, S. Sachdev, *Phys. Rev. B* **101**, 195126, *Editors' Suggestion* (2020) [[arXiv:2002.01947](#)].
20. *Electron irradiation effects on superconductivity in $PdTe_2$: an application of a generalized Anderson theorem*, E. I. Timmons, S. Teknowijoyo, M. Kończykowski, O. Cavani, M. A. Tanatar, S. Ghimire, K. Cho, Y. Lee, L. Ke, N. H. Jo, S. L. Bud'ko, P. C. Canfield, P. P. Orth, M. S. Scheurer, R. Prozorov, *Phys. Rev. Research* **2**, 023140 (2020) [[arXiv:2001.04673](#)].

21. *Enhanced thermal Hall effect in the square-lattice Néel state*, R. Samajdar, M. S. Scheurer, S. Chatterjee, H. Guo, C. Xu, and S. Sachdev, [Nature Physics](#) **15**, 1290-1294 (2019) [arXiv:1903.01992].
22. *Spectroscopy of graphene with a magic twist*, M. S. Scheurer, [Nature](#) **572**, 40-41 (2019).
23. *Identifying topological order through unsupervised machine learning*, J. F. Rodriguez-Nieva and M. S. Scheurer, [Nature Physics](#) **15**, 790-795 (2019) [arXiv:1805.05961].
24. *Thermal Hall effect in square-lattice spin liquids: a Schwinger boson mean-field study*, R. Samajdar, S. Chatterjee, S. Sachdev, M. S. Scheurer, [Phys. Rev. B](#) **99**, 165126 (2019) [arXiv:1812.08792].
25. *Gauge theory for the cuprates near optimal doping*, S. Sachdev, H. D. Scammell, M. S. Scheurer, and G. Tarnopolsky, [Phys. Rev. B](#) **99**, 054516, [Editors' Suggestion](#) (2019) [arXiv:1811.04930].
26. *Fermi surface reconstruction in electron-doped cuprates without antiferromagnetic long-range order*, J.-F. He, C. R. Rotundu, M. S. Scheurer, Y. He, M. Hashimoto, K. Xu, Y. Wang, E. W. Huang, T. Jia, S.-D. Chen, B. Moritz, D.-H. Lu, Y. S. Lee, T. P. Devereaux, and Z. X. Shen, [PNAS](#) **116** (9) 3449 (2019) [arXiv:1811.04992].
27. *Designing morphotropic phase composition in BiFeO₃*, A. Herklotz, S. F. Rus, N. B. Wisinger, C. Rouleau, E. J. Guo, A. Huon, S. KC, R. Roth, X. Yang, C. Vaswani, J. Wang, P. P. Orth, M. S. Scheurer, T. Z. Ward, [Nano Letters](#) **19**, 2, 1033 (2019).
28. *Orbital currents in insulating and doped antiferromagnets*, M. S. Scheurer and S. Sachdev, [Phys. Rev. B](#) **98**, 235126 (2018) [arXiv:1808.04826].
29. *Friedel oscillations and Majorana zero modes in inhomogeneous superconductors*, L. Lauke, M. S. Scheurer, A. Poenicke, J. Schmalian, [Phys. Rev. B](#) **98**, 134502 (2018) [arXiv:1803.11421].
30. *Triangular antiferromagnetism on the honeycomb lattice of twisted bilayer graphene*, A. Thomson, S. Chatterjee, S. Sachdev, M. S. Scheurer, [Phys. Rev. B](#) **98**, 075109 (2018) [arXiv:1806.02837].
31. *Nodeless superconductivity in type-II Dirac semimetal PdTe₂: low-temperature London penetration depth and symmetry analysis*, S. Teknowijoyo, N. H. Jo, M. S. Scheurer, M. A. Tanatar, K. Cho, S. L. Bud'ko, P. P. Orth, P. C. Canfield, R. Prozorov, [Phys. Rev. B](#) **98**, 024508 (2018) [arXiv:1804.00723].
32. *Hierarchy of Information Scrambling, Thermalization, and Hydrody-*

dynamic Flow in Graphene, M. J. Klug, [M. S. Scheurer](#), J. Schmalian, *Phys. Rev. B* **98**, 045102 (2018) [[arXiv:1712.08813](#)].

33. *Topological order in the pseudogap metal*, [M. S. Scheurer](#), S. Chatterjee, W. Wu, M. Ferrero, A. Georges, S. Sachdev, *PNAS* **115**, E3665 (2018) [[arXiv:1711.09925](#)].
34. *Pseudogap and Fermi surface topology in the two-dimensional Hubbard model*, W. Wu, [M. S. Scheurer](#), S. Chatterjee, S. Sachdev, A. Georges, M. Ferrero, *Phys. Rev. X* **8**, 021048 (2018) [[arXiv:1707.06602](#)].
35. *Intertwining topological order and broken symmetry in a theory of fluctuating spin density waves*, S. Chatterjee, S. Sachdev, and [M. S. Scheurer](#), *Phys. Rev. Lett.* **119**, 227002 (2017) [[arXiv:1705.06289](#)].
36. *Limits on dynamically generated spin-orbit coupling: Absence of $l = 1$ Pomeranchuk instabilities in metals*, E. I. Kiselev, [M. S. Scheurer](#), P. Wölfle, J. Schmalian, *Phys. Rev. B* **95**, 125122 (2017) [[arXiv:1611.01442](#)].
37. *Selection rules for Cooper pairing in two-dimensional interfaces and sheets*, [M. S. Scheurer](#), D. F. Agterberg, and J. Schmalian, *npj Quantum Materials* **2**, 9 (2017) [[arXiv:1503.03646](#)].
38. *Mechanism, time-reversal symmetry, and topology of superconductivity in noncentrosymmetric systems*, [M. S. Scheurer](#), *Phys. Rev. B* **93**, 174509 (2016) [[arXiv:1601.05459](#)].
39. *Pair breaking in multiorbital superconductors: An application to oxide interfaces*, [M. S. Scheurer](#), M. Hoyer, and J. Schmalian, *Phys. Rev. B* **92**, 014518 (2015) [[arXiv:1505.04919](#)].
40. *Anomalous quantum criticality in an itinerant ferromagnet*, C. L. Huang, D. Fuchs, M. Wissinger, R. Schneider, M. C. Ling, [M. S. Scheurer](#), J. Schmalian, and H. v. Löhneysen, *Nat. Commun.* **6**, 8188 (2015).
41. *Pair breaking due to orbital magnetism in iron-based superconductors*, M. Hoyer, [M. S. Scheurer](#), S. V. Syzranov, and J. Schmalian, *Phys. Rev. B* **91**, 054501 (2015) [[arXiv:1410.2555](#)].
42. *Dimensional crossover and cold-atom realization of topological Mott insulators*, [M. S. Scheurer](#), S. Rachel, and P. P. Orth, *Sci. Rep.* **5**, 8386 (2015) [[arXiv:1406.7396](#)].
43. *Topological superconductivity and unconventional pairing in oxide interfaces*, [M. S. Scheurer](#) and J. Schmalian, *Nat. Commun.* **6**, 6005 (2015) [[arXiv:1404.4039](#)].

44. *Nonadiabatic processes in Majorana qubit systems*, M. S. Scheurer and A. Shnirman, *Phys. Rev. B* **88**, 064515 (2013) [[arXiv:1305.4923](#)].
45. *Damping of Plasmons of Closely Coupled Sphere Chains Due to Disordered Gaps*, M. S. Scheurer, M. D. Arnold, J. Setiadi, and M. J. Ford, *J. Phys. Chem. C* **116**, 1335-1343 (2012).

Book chapters

46. *Surface and Interface Superconductivity*, S. Gariglio, M. S. Scheurer, J. Schmalian, A. M. R. V. L. Monteiro, S. Goswami, and A. D. Caviglia in *The Oxford Handbook of Small Superconductors* (Oxford University Press, Oxford, 2017).

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