

References

- Abeylath S. C., Turos E., 2008, Expert opinion on drug delivery, 5, 931 pages 50, 63
- Aldana M., Dossetti V., Huepe C., Kenkre V. M., Larralde H., 2007, [Phys. Rev. Lett.](#), 98, 095702 pages 14
- Asakura S., Oosawa F., 1954, The Journal of chemical physics, 22, 1255 pages 70
- Balakrishnan V., 2021, Elements of Nonequilibrium Statistical Mechanics. Springer International Publishing pages 6
- Ballerini M., et al., 2008, [Proceedings of the National Academy of Science](#), 105, 1232 pages 3
- Bär M., Großmann R., Heidenreich S., Peruani F., 2020, Annual Review of Condensed Matter Physics, 11, 441 pages 8, 11
- Battle C., Broedersz C. P., Fakhri N., Geyer V. F., Howard J., Schmidt C. F., MacKintosh F. C., 2016, Science, 352, 604 pages 37
- Bechinger C., Di Leonardo R., Löwen H., Reichhardt C., Volpe G., Volpe G., 2016, [Rev. Mod. Phys.](#), 88, 045006 pages 10, 11, 23, 24, 39, 40, 51, 52, 63, 65, 66
- Bendix P., et al., 2008, [Biophysical Journal](#), 94, 3126 pages 4
- Berry J., Brangwynne C. P., Haataja M., 2018, Reports on Progress in Physics, 81, 046601 pages 70
- Bertin E., Droz M., Grégoire G., 2006, [Phys. Rev. E](#), 74, 022101 pages 12
- Bhattacharjee B., Mishra S., Manna S. S., 2015, [Phys. Rev. E](#), 92, 062134 pages 40
- Binder P. M., 1987, Complex Systems, 1, 559 pages 18
- Boltzmann L., 1964, Lectures on gas theory, Berkeley, CA, USA: U pages 1, 4
- Brangwynne C. P., Koenderink G. H., MacKintosh F. C., Weitz D. A., 2009, Trends in cell biology, 19, 423 pages 6
- Buttinoni I., Bialké J., Kümmel F., Löwen H., Bechinger C., Speck T., 2013, [Phys. Rev. Lett.](#), 110, 238301 pages 3, 16, 23
- Cates M. E., 2012, [Reports on Progress in Physics](#), 75, 042601 pages 4, 5, 68

- Cates M. E., Tailleur J., 2013, *EPL (Europhysics Letters)*, 101, 20010 pages 10, 39, 68
- Cates M. E., Tailleur J., 2015, *Annu. Rev. Condens. Matter Phys.*, 6, 219 pages 10, 52, 66, 68
- Cavagna A., Giardina I., 2014, *Annu. Rev. Condens. Matter Phys.*, 5, 183 pages 6, 66
- Chakrabarti J., Chakrabarti S., Löwen H., 2006, *Journal of Physics: Condensed Matter*, 18, L81 pages 68
- Chaté H., 2020, *Annual Review of Condensed Matter Physics*, 11, 189 pages 11, 13, 14
- Chaté H., Ginelli F., Grégoire G., 2007, *Phys. Rev. Lett.*, 99, 229601 pages 20
- Chaté H., Ginelli F., Grégoire G., Raynaud F., 2008, *Phys. Rev. E*, 77, 046113 pages 12, 13, 14, 20
- Chepizhko O., Altmann E. G., Peruani F., 2013, *Phys. Rev. Lett.*, 110, 238101 pages 24
- Choudhury U., Straube A. V., Fischer P., Gibbs J. G., Höfling F., 2017, *New Journal of Physics*, 19, 125010 pages 9, 11, 23
- Cohen E., Wang F., 1995, *Physica A: Statistical Mechanics and its Applications*, 219, 56 pages 18, 71
- Denk J., Frey E., 2020, *Proceedings of the National Academy of Sciences*, 117, 202010302 pages 40
- Ding E.-J., Aidun C. K., 2006, *Phys. Rev. Lett.*, 96, 204502 pages 58
- Dolai P., Simha A., Mishra S., 2018, *Soft Matter*, 14, 6137 pages 40
- Dombrowski C., Cisneros L., Chatkaew S., Goldstein R. E., Kessler J. O., 2004, *Phys. Rev. Lett.*, 93, 098103 pages 4
- Dziob D., Sokołowska D., 2020, *American Journal of Physics*, 88, 456 pages 76
- Dzubiella J., Chakrabarti J., Löwen H., 2009, *The Journal of chemical physics*, 131, 044513 pages 68
- Edelen A. L., Biedron S., Chase B., Edstrom D., Milton S., Stabile P., 2016, *IEEE Transactions on Nuclear Science*, 63, 878 pages 72, 76
- Elgeti J., Kaupp U. B., Gompper G., 2010, *Biophysical journal*, 99, 1018 pages 52
- Erdmann U., Ebeling W., Schimansky-Geier L., Schweitzer F., 2000, *The European Physical Journal B-Condensed Matter and Complex Systems*, 15, 105 pages 24
- Ernst M., Binder P., 1988, *Journal of Statistical Physics*, 51, 981 pages 18, 71
- Euler L., 1741, *Commentarii academiae scientiarum Petropolitanae*, pp 128–140 pages 79
- Fily Y., Marchetti M. C., 2012, *Phys. Rev. Lett.*, 108, 235702 pages 11, 12, 16, 42

- Fily Y., Kafri Y., Solon A. P., Tailleur J., Turner A., 2018, *Journal of Physics A Mathematical General*, 51, 044003 pages 39
- Fletcher D. A., Mullins R. D., 2010, *Nature*, 463, 485 pages 76
- Foffano G., Lintuvuori J. S., Stratford K., Cates M. E., Marenduzzo D., 2012, *Phys. Rev. Lett.*, 109, 028103 pages 14
- Foley L. A., 1951, *The New Scholasticism*, 25, 318 pages 1
- Fowler 1967, *Statistical mechanics*. CUP Archive pages 1, 2, 3
- Franke K., Gruler H., 1990, *European Biophysics Journal*, 18, 334 pages 25
- Fu Y., Yu H., Zhang X., Malgaretti P., Kishore V., Wang W., 2022, *Micromachines*, 13, 295 pages 9
- Gale D., 1993, *The Mathematical Intelligencer*, 15, 56 pages 71
- Garrido P., De los Santos F., Munoz M., 1998, *Physical Review E*, 57, 752 pages 6
- Gates D., Westcott M., 1982, *Journal of Physics A: Mathematical and General*, 15, L267 pages 71
- Ghosh A., Fischer P., 2009, *Nano letters*, 9, 2243 pages 51, 52
- Giannini J. A., Puckett J. G., 2020, *Physical Review E*, 101, 062605 pages 40
- Ginelli F., 2016, *The European Physical Journal Special Topics*, 225, 2099 pages 52
- Giomi L., Liverpool T. B., Marchetti M. C., 2010, *Phys. Rev. E*, 81, 051908 pages 3
- Golding I., Cox E. C., 2006, *Physical review letters*, 96, 098102 pages 72
- Gonnella G., Marenduzzo D., Suma A., Tiribocchi A., 2015, *Comptes Rendus Physique*, 16, 316 pages 40, 52
- Gowrishankar K., Rao M., 2016, *Soft matter*, 12, 2040 pages 40
- Grant I., Phillips W., 2013, *Electromagnetism*. Manchester Physics Series, Wiley, <https://books.google.co.in/books?id=Wi073n5G-8oC> pages 1
- Green M. S., 1954, *The Journal of chemical physics*, 22, 398 pages 32
- Green P. J., Sibson R., 1978, *The computer journal*, 21, 168 pages 76, 86
- Grégoire G., Chaté H., 2004, *Phys. Rev. Lett.*, 92, 025702 pages 12, 13, 14
- Grosfils P., Boon J. P., Cohen E., Bunimovich L., 1999, *Journal of Statistical Physics*, 97, 575 pages 71
- Gruler H., Nuccitelli R., 1991, *Cell motility and the cytoskeleton*, 19, 121 pages 25

- Hatwalne Y., Ramaswamy S., Rao M., Simha R. A., 2004, [Phys. Rev. Lett.](#), 92, 118101 pages 3
- Hemingway E. J., Cates M., Fielding S., 2016, *Physical Review E*, 93, 032702 pages 6
- Henkes S., Marchetti M. C., Sknepnek R., 2018, *Physical Review E*, 97, 042605 pages 11
- Hill T. L., 2013, *Statistical mechanics: principles and selected applications*. Courier Corporation pages 2
- Huang K., 1987, *Statistical Mechanics*, 2 edn. John Wiley & Sons pages 1, 2
- Huang K., 2008, *Statistical mechanics*. John Wiley & Sons pages 1, 2
- Huang Z.-F., Menzel A. M., Löwen H., 2020, *Physical Review Letters*, 125, 218002 pages 10
- Hubbard S., Babak P., Sigurdsson S. T., Magnússon K. G., 2004, [Ecological Modelling](#), 174, 359 pages 3
- Ihle T., 2011, [Phys. Rev. E](#), 83, 030901 pages 12
- Iliev A., Kyurkchiev N., 2018, *New Trends in Practical Algorithms: Some Computational and Approximation Aspects*. LAP LAMBERT Academic Publishing pages 75
- Kaiser A., Wensink H., Löwen H., 2012, *Physical review letters*, 108, 268307 pages 24
- Katz Y., Tunstrøm K., Ioannou C. C., Huepe C., Couzin I. D., 2011, [Proceedings of the National Academy of Science](#), 108, 18720 pages 3, 6
- Keaveny E. E., Shelley M. J., 2009, *Physical Review E*, 79, 051405 pages 52
- Keaveny E. E., Walker S. W., Shelley M. J., 2013, *Nano letters*, 13, 531 pages 52
- Kierfeld J., Frentzel K., Kraikivski P., Lipowsky R., 2008, *The European Physical Journal Special Topics*, 157, 123 pages 9
- Kim M. J., Breuer K. S., 2004, *Physics of fluids*, 16, L78 pages 40
- Kirkpatrick T., Cohen E., Dorfman J., 1982, *Physical Review A*, 26, 950 pages 6
- Klamser J. U., Kapfer S. C., Krauth W., 2018, *Nature communications*, 9, 1 pages 53, 59
- Klein M. J., 1990, [Physics Today](#), 43, 40 pages 1
- Kolmogoroff A., 1936, *Mathematische Annalen*, 112, 155 pages 4
- Kraft D. J., Wittkowski R., Ten Hagen B., Edmond K. V., Pine D. J., Löwen H., 2013, *Physical Review E*, 88, 050301 pages 52
- Kubo R., Yokota M., Nakajima S., 1957, *Journal of the Physical Society of Japan*, 12, 1203 pages 32
- Kumar S., Mishra S., 2019, *Journal of Statistical Physics*, 176, 1161 pages 18, 71, 72

- Kumar N., Soni H., Ramaswamy S., Sood A., 2014, *Nature communications*, 5, 1 pages 40, 51
- Kumar N., Gupta R. K., Soni H., Ramaswamy S., Sood A., 2019, *Physical Review E*, 99, 032605 pages 8, 9, 24
- Kumar S., Singh J. P., Giri D., Mishra S., 2021, *Phys. Rev. E*, 104, 024601 pages 40, 52
- Kümmel F., Ten Hagen B., Wittkowski R., Buttinoni I., Eichhorn R., Volpe G., Löwen H., Bechinger C., 2013, *Physical review letters*, 110, 198302 pages 24, 40, 52, 66
- Kurka D. B., Godoy A., Von Zuben F. J., 2015, arXiv preprint arXiv:1504.05655 pages 76
- Langton C. G., 1986, *Physica D: Nonlinear Phenomena*, 22, 120 pages 71
- Lax M., 1960, *Reviews of modern physics*, 32, 25 pages 6
- Lechner W., Dellago C., 2008, *The Journal of chemical physics*, 129, 114707 pages 60
- Lekkerkerker H. N., Poon W.-K., Pusey P. N., Stroobants A., Warren P. ., 1992, *EPL (Europhysics Letters)*, 20, 559 pages 70
- Leptos K. C., Guasto J. S., Gollub J. P., Pesci A. I., Goldstein R. E., 2009, *Physical Review Letters*, 103, 198103 pages 40, 52
- Levis D., Liebchen B., 2018, *Journal of Physics: Condensed Matter*, 30, 084001 pages 51, 52
- Liao G.-J., Klapp S. H., 2018, *Soft matter*, 14, 7873 pages 51, 52
- Liverpool T. B., Marchetti M. C., 2006, *Phys. Rev. Lett.*, 97, 268101 pages 3
- Löwen H., 2016, *The European Physical Journal Special Topics*, 225, 2319 pages 52
- Ma Z., Ni R., 2022, *The Journal of Chemical Physics*, 156, 021102 pages 10, 52, 53
- Maggi C., Simmchen J., Saglimbeni F., Katuri J., Dipalo M., De Angelis F., Sanchez S., Di Leonardo R., 2016, *Small*, 12, 446 pages 24
- Mandal R., Bhuyan P. J., Chaudhuri P., Dasgupta C., Rao M., 2020, *Nature communications*, 11, 1 pages 40
- Marchetti M. C., Joanny J. F., Ramaswamy S., Liverpool T. B., Prost J., Rao M., Simha R. A., 2013, *Rev. Mod. Phys.*, 85, 1143 pages 4, 5, 8, 9, 11, 20, 39, 66
- Martys N. S., Mountain R. D., 1999, *Physical Review E*, 59, 3733 pages 27
- Masoliver J., Lindenberg K., Weiss G. H., 1989, *Physica A: Statistical Mechanics and its Applications*, 157, 891 pages 25, 76
- Maxwell J. C., 1995, *Maxwell on heat and statistical mechanics: on "avoiding all personal enquiries" of molecules*. Lehigh University Press pages 1, 2
- Meng H.-F., Cohen E., 1994, *Physical Review E*, 50, 2482 pages 71

- Menzel A. M., 2015, *Physics reports*, 554, 1 pages 6, 52
- Mermin N. D., 1968, *Physical Review*, 176, 250 pages 60
- Mijalkov M., Volpe G., 2013, *Soft Matter*, 9, 6376 pages 63
- Mijalkov M., McDaniel A., Wehr J., Volpe G., 2016, *Physical Review X*, 6, 011008 pages 23, 24
- Mishra S., Bhattacharya S., Webb B., Cohen E., 2016, *Journal of Statistical Physics*, 162, 855 pages 18, 71, 72
- Morin A., Desreumaux N., Caussin J.-B., Bartolo D., 2017, *Nature Physics*, 13, 63 pages 3
- Needleman D., Dogic Z., 2017, *Nature reviews materials*, 2, 1 pages 8
- Nelson P., 2007, *Biological Physics: Energy, Information, Life Paperback* – 31 August 2007. Vol. Updated 1st edition (31 August), W. H. Freeman pages 6
- Newman M. E., Watts D. J., Strogatz S. H., 2002, *Proceedings of the national academy of sciences*, 99, 2566 pages 76
- Nourhani A., Crespi V. H., Lammert P. E., 2015, *Physical review letters*, 115, 118101 pages 63
- Okabe A., Satoh T., Furuta T., Suzuki A., Okano K., 2008, *International Journal of Geographical Information Science*, 22, 965 pages 76
- Omar A. K., Klymko K., GrandPre T., Geissler P. L., 2021, *Phys. Rev. Lett.*, 126, 188002 pages 53
- Palacci J., Sacanna S., Steinberg A. P., Pine D. J., Chaikin P. M., 2013, *Science*, 339, 936 pages 3, 24
- Paoluzzi M., Di Leonardo R., Angelani L., 2014, *Journal of Physics: Condensed Matter*, 26, 375101 pages 24
- Pathria R. K., 1996, *Principles of condensed matter physics*. Oxford ; Boston : Butterworth-Heinemann, 1996. pages 1, 2, 3, 15
- Pattanayak S., Mishra S., 2018, *Journal of Physics Communications*, 2, 045007 pages 40
- Pattanayak S., Das R., Kumar M., Mishra S., 2019, *The European Physical Journal E*, 42 pages 12, 24
- Patteson A. E., Gopinath A., Purohit P. K., Arratia P. E., 2016, *Soft matter*, 12, 2365 pages 9, 40, 45, 66
- Paxton W. F., et al., 2004, *Journal of the American Chemical Society*, 126, 13424 pages 12
- Pelton M., Ladavac K., Grier D. G., 2004, *Physical Review E*, 70, 031108 pages 24
- Peruani F., Bär M., 2013, *New Journal of Physics*, 15, 065009 pages 51

- Peruani F., Starruß J., Jakovljevic V., Søgaaard-Andersen L., Deutsch A., Bär M., 2012, [Phys. Rev. Lett.](#), 108, 098102 pages 4
- Picu R., 2011, *Soft Matter*, 7, 6768 pages 71
- Rafai S., Jibuti L., Peyla P., 2010, [Phys. Rev. Lett.](#), 104, 098102 pages 4
- Ramaswamy S., 2010, [Annual Review of Condensed Matter Physics](#), 1, 323 pages 5, 8, 9, 20
- Ramaswamy S., 2017, [Journal of Statistical Mechanics: Theory and Experiment](#), 2017, 054002 pages 4, 5, 8, 53
- Ramaswamy S., Simha R. A., Toner J., 2003, [Europhysics Letters \(EPL\)](#), 62, 196 pages 7, 66
- Ray D., Reichhardt C., Reichhardt C. O., 2014, *Physical Review E*, 90, 013019 pages 24
- Roerdink J., Shuler K., 1985, *Journal of statistical physics*, 41, 581 pages 71
- Romanczuk P., Bär M., Ebeling W., Lindner B., Schimansky-Geier L., 2012, [European Physical Journal Special Topics](#), 202, 1 pages 9, 15, 24, 25, 27, 44, 65, 66
- Sampat P. B., Kumar S., Mishra S., 2020, *Journal of Statistical Physics*, 181, 1986 pages 18
- Saracco G. P., Gonnella G., Marenduzzo D., Orlandini E., 2011, [Phys. Rev. E](#), 84, 031930 pages 6
- Saracco G. P., Gonnella G., Marenduzzo D., Orlandini E., 2012, [Central European Journal of Physics](#), 10, 1109 pages 6
- Schienbein M., Gruler H., 1993, *Bulletin of mathematical biology*, 55, 585 pages 25, 37
- Schmittmann B., Zia R., 1991, *Physical review letters*, 66, 357 pages 6
- Schweitzer F., Ebeling W., Tilch B., 2001, *Physical Review E*, 64, 021110 pages 24
- Semwal V., Dikshit S., Mishra S., 2021, *The European Physical Journal E*, 44, 1 pages 9, 40, 42, 44, 53, 66, 71
- Sen P., 2021, *Einstein's Fridge: How the Difference Between Hot and Cold Explains the Universe*. Scribner, <https://books.google.co.in/books?id=nPrtDwAAQBAJ> pages 1
- Shaebani M. R., Wysocki A., Winkler R. G., Gompper G., Rieger H., 2020, *Nature Reviews Physics*, 2, 181 pages 8, 9, 10, 11, 16, 23, 40, 43, 44, 51, 66, 71
- Shi X.-Q., Ma Y.-Q., 2013, [Nature Communications](#), 4, 3013 pages 12
- Singh J. P., Pattanayak S., Mishra S., 2021, [Journal of Physics A: Mathematical and Theoretical](#), 54, 115001 pages 40
- Singh J. P., Pattanayak S., Mishra S., Chakrabarti J., 2022, *The Journal of Chemical Physics*, 156, 214112 pages 68

- Sokolov A., Aranson I. S., Kessler J. O., Goldstein R. E., 2007, [Phys. Rev. Lett.](#), 98, 158102 pages 6
- Solon A. P., Cates M. E., Tailleur J., 2015, [European Physical Journal Special Topics](#), 224 pages 9, 39, 40, 41
- Struckmeier J., Riedel C., 2001, [Phys. Rev. E](#), 64, 026503 pages 3
- Sumino Y., Nagai K., Shitaka Y., Tanaka D., Yoshikawa K., Chaté H., Oiwa K., 2012, [Nature](#), 483, 448 pages 3, 4
- Swope W. C., Andersen H. C., Berens P. H., Wilson K. R., 1982, *The Journal of chemical physics*, 76, 637 pages 27
- Szabó B., Szöllösi G. J., Gönci B., Jurányi Z., Selmeczi D., Vicsek T., 2006, [Phys. Rev. E](#), 74, 061908 pages 4
- Taylor group F., 2013, *Physical Biology of the Cell*. Vol. 2nd edition, Rob Phillips, Jané Kondev, Julie Theriot, Hernan Garcia, Rob Phillips, Jane Kondev, Julie Theriot, Hernan Garcia pages 6
- Theurkauff I., Cottin-Bizonne C., Palacci J., Ybert C., Bocquet L., 2012, [Phys. Rev. Lett.](#), 108, 268303 pages 3
- Thiffeault J.-L., Childress S., 2010, *Physics Letters A*, 374, 3487 pages 40
- Toner J., Tu Y., 1995, [Phys. Rev. Lett.](#), 75, 4326 pages 17
- Toner J., Tu Y., 1998, [Phys. Rev. E](#), 58, 4828 pages 17
- Toner J., Tu Y., Ramaswamy S., 2005, [Annals of Physics](#), 318, 170 pages 4, 5, 17, 39, 51
- Uffink J., 2017, in Zalta E. N., ed., , *The Stanford Encyclopedia of Philosophy*, Spring 2017 edn, Metaphysics Research Lab, Stanford University pages 1, 3
- Uhlenbeck G. E., Ornstein L. S., 1930, *Physical review*, 36, 823 pages 27, 53
- Van Gunsteren W. F., Berendsen H. J., 1988, *Molecular Simulation*, 1, 173 pages 15
- Vicsek T., Zafeiris A., 2012, [Physics Reports](#), 517, 71 pages 4, 5, 39
- Vicsek T., Czirók A., Ben-Jacob E., Cohen I., Shochet O., 1995, [Phys. Rev. Lett.](#), 75, 1226 pages 12, 13, 14, 20
- Vutukuri H. R., et al., 2020, *Nature*, 586, 52 pages 40
- Webb B., Cohen E., 2015, *Journal of Physics A: Mathematical and Theoretical*, 48, 485203 pages 71
- Winkler R. G., 2016, *The European Physical Journal Special Topics*, 225, 2079 pages 52
- Wu X.-L., Libchaber A., 2000, *Physical review letters*, 84, 3017 pages 40, 45

- Yates C., Baker R., Erban R., Maini P., 2010, Canadian Applied Mathematics Quarterly pages 4, 5
- Zeitz M., Stark H., 2016, [The European Physical Journal E](#), 40 pages 16
- Zeitz M., Wolff K., Stark H., 2017, The European Physical Journal E, 40, 1 pages 28
- Zemansky M., Dittman R., 1997, Heat and Thermodynamics: An Intermediate Textbook. International Series in Pure and Applied Physics, McGraw-Hill, <https://books.google.co.in/books?id=4vVAAQAIAAJ> pages 2, 3, 15
- Zhang J., Luijten E., Grzybowski B. A., Granick S., 2017, Chemical Society Reviews, 46, 5551 pages 9, 40
- de Castro P., Rocha F. M., Diles S., Soto R., Sollich P., 2021, Soft Matter, 17, 9926 pages 40
- For tumbling rate larger than 2×10^{-3} , the crossover time from early time ballistic to late time diffusion is small and hence no interesting results are found pages 43
- van Damme R., Rodenburg J., van Roij R., Dijkstra M., 2019, [The Journal of Chemical Physics](#), 150, 164501 pages 16

List of Publications

Published

1. **Vivek Semwal**, et.al. "Dynamics of a collection of active particles on a two-dimensional periodic undulated surface ", *Euro. Phys. J. E.* , 44 (2021).

2. Harshit Rathore, **Vivek Semwal**; et.al. "Dynamics of a Single Particle Moving on a Random Lorentz Lattice-Gas ", *J. of Stat. Phys.*, 188 (2022).

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3*.Jay Prakash Singh, **Vivek Semwal** et.al. "Collection of self-propelled particles across an order-disorder interface" *preprint available* (2021).

4. **Vivek Semwal**, et.al. "Macro to micro phase separation in a collection of chiral active swimmers" *preprint available* (2022).

5. **Vivek Semwal**, et.al. "Dynamics of passive particle in active run and tumble medium" *preprint available* (2021).

6. Pragya Kushwaha, **Vivek Semwal**; et.al. "Phase separation of passive collidal particles in active suspensions of bacteria", *preprint available*(2022).

Note* 3 is not the part of this thesis.

