References

[1] P. Flory, *Principles of Polymer Chemistry* (Cornell University Press, Ithaca, 1953).

[2] P. de Gennes, *Scaling Concepts in Polymer Physics* (Cornell University Press, Ithaca, 1979).

[3] M. Doi and S. Edwards, *The Theory of Polymer Dynamics* (Oxford University Press, Oxford, 1986).

[4] C. Vanderzande, *Lattice Models of Polymers* (Cambridge University Press, Cambridge, 1998).

[5] M. Rubinstein and R. Colby, *Polymer Physics* (Oxford University Press, Oxford, 2003).

[6] "Introduction," in *Principles of Polymerization* (John Wiley & Sons, Ltd, 2004) Chap. 1, pp. 1–38.

[7] J. Cowie, *Polymers: chemistry and physics of modern materials* (Chapman and Hall, Newyork, 1991).

[8] C. Hall, *Polymer Materials* (Macmillan Publishers Limited, 1981).

[9] B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts, and J. D. Watson, *Molecular Biology of the Cell* (Garland Publishing, New York, 2002).

[10] A. Finkelstein and O. Galzitskaya, Physics of Life Reviews **1**, 23 (2004).

[11] E. Shakhnovich, Chemical Reviews **106**, 1559 (2006).

[12] W. Saenger, *Principles of nucleic acid structure* (Springer, 1988).

[13] G. M. Cooper, *The cell: a molecular approach* (Sinauer Associates, 2019).

[14] S. Connelly and J. L. Manley, **2**, 440 (1988).

[15] J. D. WATSON and F. H. C. CRICK, **171**, 737 (1953).

[16] F. Liu, E. Tøstesen, J. K. Sundet, T.-K. Jenssen, C. Bock, G. I. Jerstad, W. G. Thilly, and E. Hovig, PLoS Computational Biology **3**, e93 (2007).

[17] E. Werner, M. Reiter-Schad, T. Ambjörnsson, and B. Mehlig, Phys. Rev. E **91**, 060702 (2015).

[18] S. Kumar and M. S. Li, Physics Reports **486**, 1 (2010).

[19] P. Cluzel, A. Lebrun, C. Heller, R. Lavery, J.-L. Viovy, D. Chatenay, and F. Caron, Science **271**, 792 (1996).

[20] G. U. Lee, D. A. Kidwell, and R. J. Colton, Langmuir **10**, 354 (1994).

[21] K. C. Neuman and A. Nagy, Nature Methods **5**, 491 (2008).

[22] A. R. Singh, D. Giri, and S. Kumar, The Journal of Chemical Physics **131**, 065103 (2009).

[23] L. Dai, C. B. Renner, J. Yan, and P. S. Doyle, Scientific Reports **5**, 18438 (2015).

[24] P. K. Purohit, M. M. Inamdar, P. D. Grayson, T. M. Squires, J. Kondev, and R. Phillips, Biophysical Journal **88**, 851 (2005).

[25] E. C. Yusko, J. M. Johnson, S. Majd, P. Prangkio, R. C. Rollings, J. Li, J. Yang, and M. Mayer, Nature Nanotechnology **6**, 253 (2011).

[26] T. A. Rapoport, Nature **450**, 663 (2007).

[27] S. Kumar, S. Kumar, D. Giri, and S. Nath, **118**, 28001 (2017).

[28] Y. Tamada and Y. Ikada, Journal of Colloid and Interface Science **155**, 334 (1993).

[29] A. K. Chakraborty and A. J. Golumbfskie, Annual Review of Physical Chemistry **52**, 537 (2001).

[30] H. Li and L. Rothberg, Analytical Chemistry **77**, 6229 (2005).

[31] N. Farkhari, S. Abbasian, A. Moshaii, and M. Nikkhah, Colloids and Surfaces B: Biointerfaces **148**, 657 (2016).

[32] H. Li and L. Rothberg, Proceedings of the National Academy of Sciences **101**, 14036 (2004).

[33] M. Muthukumar, *Polymer translocation* (CRC Press, Boca Raton, 2011).

[34] J. M. Polson and D. R. Heckbert, Phys. Rev. E **100**, 012504 (2019).

[35] C. T. A. Wong and M. Muthukumar, The Journal of Chemical Physics **133**, 045101 (2010).

[36] D. Wei, W. Yang, X. Jin, and Q. Liao, The Journal of Chemical Physics **126**, 204901 (2007).

[37] Y. He, M. Tsutsui, R. H. Scheicher, F. Bai, M. Taniguchi, and T. Kawai, ACS Nano **7**, 538 (2013), pMID: 23199225.

[38] D. Braun and A. Libchaber, **1**, P1 (2004).

[39] I. Popa, P. Kosuri, J. Alegre-Cebollada, S. Garcia-Manyes, and J. M. Fernandez, Nature Protocols **8**, 1261 (2013).

[40] M. I. Giannotti and G. J. Vancso, ChemPhysChem **8**, 2290 (2007), https://chemistry-europe.onlinelibrary.wiley.com/doi/pdf/10.1002/cphc.200700175 .

[41] D. Poland and H. A. Scheraga, The Journal of Chemical Physics **45**, 1456 (1966).

[42] M. E. Fisher, The Journal of Chemical Physics **45**, 1469 (1966).

[43] M. Peyrard and A. R. Bishop, Phys. Rev. Lett. **62**, 2755 (1989).

[44] B. Duplantier, Journal of Statistical Physics **54**, 581 (1989).

[45] S. Kumar, D. Giri, and S. M. Bhattacharjee, Phys. Rev. E **71**, 051804 (2005).

[46] K. Binder, ed., *Monte Carlo Methods in Statistical Physics* (Springer Berlin Heidelberg, 1986).

[47] T. WÃijst and D. P. Landau, The Journal of Chemical Physics **137**, 064903 (2012).

[48] T. Wüst and D. P. Landau, Phys. Rev. Lett. **102**, 178101 (2009).

[49] N. Lesh, M. Mitzenmacher, and S. Whitesides, in *Proceedings of the Seventh Annual International Conference on Research in Computational Molecular Biology*, RECOMB '03 (Association for Computing Machinery, New York, NY, USA, 2003) p. 188âĂŞ195.

[50] W. H. Roos, I. L. Ivanovska, A. Evilevitch, and G. J. L. Wuite, Cellular and Molecular Life Sciences **64**, 1484 (2007).

[51] J. Frank, H. Gao, J. Sengupta, N. Gao, and D. J. Taylor, Proceedings of the National Academy of Sciences **104**, 19671 (2007).

[52] W. Couter, *MEANS FOR COUNTING PARTICLES SUSPENDED IN A FLUID* (US PATENT, 1953).

[53] I. H. G. S. Consortium, Nature **431**, 931 (2004).

[54] I. Braslavsky, B. Hebert, E. Kartalov, and S. R. Quake, Proceedings of the National Academy of Sciences of the United States of America **100**, 3960 (2003), 12651960[pmid].

[55] R. Staden, Nucleic acids research **6**, 2601 (1979), 461197[pmid].

[56] J. Clarke, H.-C. Wu, L. Jayasinghe, A. Patel, S. Reid, and H. Bayley, Nature Nanotechnology **4**, 265 (2009).

[57] V. V. Palyulin, T. Ala-Nissila, and R. Metzler, Soft Matter **10**, 9016 (2014).

[58] M. L. Metzker, Nature Reviews Genetics **11**, 31 (2010).

[59] D. Branton, D. W. Deamer, A. Marziali, H. Bayley, S. A. Benner, T. Butler, M. D. Ventra, S. Garaj, A. Hibbs, X. Huang, S. B. Jovanovich, P. S. Krstic, S. Lindsay, X. S. Ling, C. H. Mastrangelo, A. Meller, J. S. Oliver, Y. V. Pershin, J. M. Ramsey, R. Riehn, G. V. Soni, V. Tabard-Cossa, M. Wanunu, M. Wiggin, and J. A. Schloss, "The potential and challenges of nanopore sequencing," in *Nanoscience and Technology*, pp. 261–268, https://www.worldscientific.com/doi/pdf/10.1142/9789814287005$_0$027 .

[60] M. Wanunu, Physics of Life Reviews **9**, 125 (2012).

[61] J. M. Polson and D. R. Heckbert, Phys. Rev. E **100**, 012504 (2019).

[62] A. Cacciuto and E. Luijten, Phys. Rev. Lett. **96**, 238104 (2006).

[63] P. Y. Lee, J. Costumbrado, C.-Y. Hsu, and Y. H. Kim, Journal of visualized experiments : JoVE , 3923 (2012), 3923[PII].

[64] B. Luan, G. Stolovitzky, and G. Martyna, Nanoscale **4**, 1068 (2012).

[65] M. H. Lam, K. Briggs, K. Kastritis, M. Magill, G. R. Madejski, J. L. McGrath, H. W. de Haan, and V. Tabard-Cossa, ACS Applied Nano Materials **2**, 4773 (2019).

[66] S. Kwon and B. J. Sung, The Journal of Chemical Physics **149**, 244907 (2018).

[67] K. Luo, I. Huopaniemi, T. Ala-Nissila, and S.-C. Ying, The Journal of Chemical Physics **124**, 114704 (2006).

[68] C. T. A. Wong and M. Muthukumar, The Journal of Chemical Physics **133**, 045101 (2010).

[69] S. Buyukdagli, Phys. Rev. E **97**, 062406 (2018).

[70] M. Tsutsui, Y. He, M. Furuhashi, S. Rahong, M. Taniguchi, and T. Kawai, Scientific Reports **2**, 394 (2012).

[71] C. Lörscher, T. Ala-Nissila, and A. Bhattacharya, Phys. Rev. E **83**, 011914 (2011).

[72] P. G. de Gennes and T. A. Witten, Physics Today **33**, 51 (1980).

[73] A. Nikoubashman and C. N. Likos, The Journal of Chemical Physics **133**, 074901 (2010).

[74] A. Ajdari and J. Prost, Proceedings of the National Academy of Sciences **88**, 4468 (1991).

[75] J. Regtmeier, T. T. Duong, R. Eichhorn, D. Anselmetti, and A. Ros, Analytical Chemistry **79**, 3925 (2007).

[76] M. Muthukumar, *Polymer Translocation* (CRC Press, 2016).

[77] L.-Z. Sun, W.-P. Cao, and M.-B. Luo, The Journal of Chemical Physics **131**, 194904 (2009).

[78] A. Gopinathan and Y. W. Kim, Phys. Rev. Lett. **99**, 228106 (2007).

[79] J. M. Polson and T. R. Dunn, The Journal of Chemical Physics **140**, 184904 (2014).

[80] J. M. Polson and A. C. M. McCaffrey, The Journal of Chemical Physics **138**, 174902 (2013).

[81] S. Zhang, C. Wang, L.-Z. Sun, C.-Y. Li, and M.-B. Luo, The Journal of Chemical Physics **139**, 044902 (2013).

[82] C. Vanderzande, *Lattice Models of Polymers*, Cambridge Lecture Notes in Physics (Cambridge University Press, 1998).

[83] S. Kumar and M. S. Li, Physics Reports **486**, 1 (2010).

[84] D. Mohanta, D. Giri, and S. Kumar, Journal of Statistical Mechanics Theory and Experiment **2019**, 043501 (2019).

[85] D. Mohanta, D. Giri, and S. Kumar, Physica A: Statistical Mechanics and its Applications **562**, 125379 (2021).

[86] K. Luo, T. Ala-Nissila, S.-C. Ying, and R. Metzler, EPL (Europhysics Letters) **88**, 68006 (2009).

[87] A. Milchev, V. Yamakov, and K. Binder, Phys. Chem. Chem. Phys. **1**, 2083 (1999).

[88] S. E. Halford and J. F. Marko, Nucleic Acids Research **32**, 3040 (2004), https://academic.oup.com/nar/article-pdf/32/10/3040/3597745/gkh624.pdf .

[89] G. Grossi, M. D. E. Jepsen, J. Kjems, and E. S. Andersen, Nature Communications **8** (2017), 10.1038/s41467-017-01072-8.

[90] N. Farkhari, S. Abbasian, A. Moshaii, and M. Nikkhah, Colloids and Surfaces B: Biointerfaces **148**, 657 (2016).

[91] C. M. Cobley, J. Chen, E. C. Cho, L. V. Wang, and Y. Xia, Chem. Soc. Rev. **40**, 44 (2011).

[92] D. Marenduzzo, C. Micheletti, E. Orlandini, and D. W. Sumners, Proceedings of the National Academy of Sciences **110**, 20081 (2013).

[93] S. Piana and A. Bilic, The Journal of Physical Chemistry B **110**, 23467 (2006).

[94] H. Li and L. Rothberg, Proceedings of the National Academy of Sciences **101**, 14036 (2004).

[95] D. Peled, R. Naaman, and S. S. Daube, The Journal of Physical Chemistry B **114**, 8581 (2010).

[96] D. Peled, S. S. Daube, and R. Naaman, Langmuir **24**, 11842 (2008).

[97] R. Kapri and S. M. Bhattacharjee, EPL (Europhysics Letters) **83**, 68002 (2008).

[98] W. Firshein, Annual Review of Microbiology **43**, 89 (1989).

[99] J. O. Radler, Science **275**, 810 (1997).

[100] R. Kapri, S. M. Bhattacharjee, and F. Seno, Phys. Rev. Lett. **93**, 248102 (2004).

[101] R. Kapri and S. M. Bhattacharjee, Phys. Rev. Lett. **98**, 098101 (2007).

[102] S. Kumar, D. Giri, and S. M. Bhattacharjee, Phys. Rev. E **71**, 051804 (2005).

[103] A. R. Singh, D. Giri, and S. Kumar, The Journal of Chemical Physics **132**, 235105 (2010).

[104] D. Mohanta, Physica A: Statistical Mechanics and its Applications **588**, 126573 (2022).

[105] A. I. Zotin, *Thermodynamic Bases of Biological Processes: Physiological Reactions and Adaptations* (De Gruyter, 2013).

[106] C. Dekker, Nature Nanotechnology **2**, 209 (2007).

[107] A. Meller, L. Nivon, E. Brandin, J. Golovchenko, and D. Branton, Proceedings of the National Academy of Sciences **97**, 1079 (2000).

[108] R. F. Purnell, K. K. Mehta, and J. J. Schmidt, Nano Letters **8**, 3029 (2008), pMID: 18698831.

[109] A. H. Laszlo, I. M. Derrington, and J. H. Gundlach, Methods **105**, 75 (2016).

[110] T. Z. Butler, M. Pavlenok, I. M. Derrington, M. Niederweis, and J. H. Gundlach, Proceedings of the National Academy of Sciences **105**, 20647 (2008), https://www.pnas.org/content/105/52/20647.full.pdf .

[111] M. Niederweis, Molecular Microbiology **49**, 1167 (2003), https://onlinelibrary.wiley.com/doi/pdf/10.1046/j.1365-2958.2003.03662.x .

[112] M. Faller, M. Niederweis, and G. E. Schulz, Science **303**, 1189 (2004).

[113] M. ODonnell, L. Langston, and B. Stillman, Cold Spring Harbor Perspectives in Biology **5**, a010108 (2013).

[114] W. Reisner, J. N. Pedersen, and R. H. Austin, Reports on Progress in Physics **75**, 106601 (2012).

[115] R. L. Welch, R. Sladek, K. Dewar, and W. W. Reisner, Lab on a Chip **12**, 3314 (2012).

[116] W. Reisner, N. B. Larsen, A. Silahtaroglu, A. Kristensen, N. Tommerup, J. O. Tegenfeldt, and H. Flyvbjerg, Proceedings of the National Academy of Sciences **107**, 13294 (2010), https://www.pnas.org/content/107/30/13294.full.pdf .

[117] E. Werner, M. Reiter-Schad, T. Ambjörnsson, and B. Mehlig, Physical Review E **91** (2015), 10.1103/physreve.91.060702.

[118] M. Reiter-Schad, E. Werner, J. O. Tegenfeldt, B. Mehlig, and T. Ambjörnsson, The Journal of Chemical Physics **143**, 115101 (2015).

[119] P. Grayson, L. Han, T. Winther, and R. Phillips, Proceedings of the National Academy of Sciences **104**, 14652 (2007), https://www.pnas.org/content/104/37/14652.full.pdf .

[120] L. C. Pauling, *General Chemistry* (Dover Publications, New York, 1998).

[121] A. Guttmann, *Phase Transition and Critical Phenomena vol 13, C Domb and J L Lebowitz* (New York: Academic, 1989).

[122] D. Giri and S. Kumar, Phys. Rev. E **73**, 050903 (2006).

[123] G. Mishra, D. Giri, and S. Kumar, Physical Review E **79** (2009), 10.1103/physreve.79.031930.

[124] G. Mishra, D. Giri, M. S. Li, and S. Kumar, The Journal of Chemical Physics **135**, 035102 (2011).

[125] S. Kumar and D. Giri, The Journal of Chemical Physics **125**, 044905 (2006).

[126] S. Kumar, D. Giri, and S. M. Bhattacharjee, Physical Review E **71** (2005), 10.1103/physreve.71.051804.

[127] F. Vargas-Lara, F. W. Starr, and J. F. Douglas, Soft Matter **13**, 8309 (2017).

[128] D. Wendell, P. Jing, J. Geng, V. Subramaniam, T. J. Lee, C. Montemagno, and P. Guo, Nature Nanotechnology **4**, 765 (2009).

[129] F. Haque, S. Wang, C. Stites, L. Chen, C. Wang, and P. Guo, Biomaterials **53**, 744 (2015).

[130] K. Briggs, H. Kwok, and V. Tabard-Cossa, Small **10**, 2077 (2014).

[131] S. Kumar, S. Kumar, D. Giri, and S. Nath, EPL (Europhysics Letters) **118**, 28001 (2017).

[132] K. Binder, *Monte Carlo and molecular dynamics simulations in polymer science* (Oxford University Press, New York, 1995).

[133] N. Lane and W. F. Martin, Cell **151**, 1406 (2012).

[134] D. Deamer, Nature **514**, 302 (2014).

[135] D. Braun and A. Libchaber, Physical Biology **1**, P1 (2004).

[136] S. F. Jordan, H. Rammu, I. N. Zheludev, A. M. Hartley, A. Maréchal, and N. Lane, Nature Ecology & Evolution **3**, 1705 (2019).

[137] J. H. E. Cartwright and M. J. Russell, Interface Focus **9**, 20190104 (2019).

[138] D. Deamer, Academia Letters (2020), 10.20935/al105.

[139] D. Braun and A. Libchaber, Physical Review Letters **89** (2002), 10.1103/physrevlett.89.188103.

[140] C. B. Mast and D. Braun, Physical Review Letters **104** (2010), 10.1103/physrevlett.104.188102.

[141] C. Mast, D. Braun, and E. Agerschou, Synlett **28**, 56 (2016).

[142] P. Baaske, F. M. Weinert, S. Duhr, K. H. Lemke, M. J. Russell, and D. Braun, Proceedings of the National Academy of Sciences **104**, 9346 (2007), https://www.pnas.org/content/104/22/9346.full.pdf .

[143] M. Kreysing, L. Keil, S. Lanzmich, and D. Braun, Nature Chemistry **7**, 203 (2015).

[144] R. Cerbino, Y. Sun, A. Donev, and A. Vailati, Scientific Reports **5** (2015), 10.1038/srep14486.

[145] C. J. Wienken, P. Baaske, U. Rothbauer, D. Braun, and S. Duhr, Nature Communications **1** (2010), 10.1038/ncomms1093.

[146] Y. T. Maeda, T. Tlusty, and A. Libchaber, Proceedings of the National Academy of Sciences **109**, 17972 (2012), https://www.pnas.org/content/109/44/17972.full.pdf .

[147] E. L. Talbot, J. Kotar, L. Parolini, L. D. Michele, and P. Cicuta, Nature Communications **8** (2017), 10.1038/ncomms15351.

[148] S. Nath, D. P. Foster, D. Giri, and S. Kumar, Phys. Rev. E **88**, 054601 (2013).

[149] J. Giddings, Science **260**, 1456 (1993).

[150] L. Dai, J. J. Jones, J. R. C. van der Maarel, and P. S. Doyle, Soft Matter **8**, 2972 (2012).

[151] Y.-L. Chen, M. D. Graham, J. J. de Pablo, G. C. Randall, M. Gupta, and P. S. Doyle, Physical Review E **70** (2004), 10.1103/physreve.70.060901.

[152] L. Dai, C. B. Renner, J. Yan, and P. S. Doyle, Scientific Reports **5** (2015), 10.1038/srep18438.

[153] J. J. Jones, J. R. C. van der Maarel, and P. S. Doyle, Nano Letters **11**, 5047 (2011).

[154] H.-R. Jiang, H. Wada, N. Yoshinaga, and M. Sano, Phys. Rev. Lett. **102**, 208301 (2009).

[155] S. P. Adiga and D. W. Brenner, Journal of Functional Biomaterials **3**, 239 (2012).

[156] C. Mast, D. Braun, and E. Agerschou, Synlett **28**, 56 (2016).

[157] J. Burelbach, D. B. Brückner, D. Frenkel, and E. Eiser, Soft Matter **14**, 7446 (2018).

[158] L. Keil, M. Hartmann, S. Lanzmich, and D. Braun, Physical Chemistry Chemical Physics **18**, 20153 (2016).

[159] F. Wang and D. P. Landau, Phys. Rev. Lett. **86**, 2050 (2001).

[160] C. J. Wienken, P. Baaske, S. Duhr, and D. Braun, Nucleic Acids Research **39**, e52 (2011), https://academic.oup.com/nar/article-pdf/39/8/e52/7193056/gkr035.pdf .

List of Publications:

1. Statistical mechanics of DNA melting in confined geometry,
   Dibyajyoti Mohanta, Debaprasad Giri, and Sanjay Kumar,
   J. Stat. Mech., 043501 (2019).

2. Effect of solvent gradient on DNA confined in a strip,
   Dibyajyoti Mohanta, Debaprasad Giri, and Sanjay Kumar,
   Physica A **562**, 125379 (2021).

3. Effect of solvent gradient inside the entropic trap on polymer migration,
   Dibyajyoti Mohanta, Debaprasad Giri, and Sanjay Kumar,
   under review **(Phys. Rev. E)**.

4. Forced induced melting of DNA in presence of an attractive surface,
   Dibyajyoti Mohanta, Debaprasad Giri, and Sanjay Kumar,
   (Pre-Print).

5. DNA migration through semi-circular gradient channel,
   Dibyajyoti Mohanta,
   Physica A **588**, 126573 (2022). [1]

6. Melting of Confined DNA: Static and Dynamic Properties,
   Dibyajyoti Mohanta,
   under review **(Phys. Rev. E)**. [2]

[1] Not included in thesis.
[2] Not included in thesis.