

Effective Fractal Dimension Bibliography

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References

- [1] A. Abey. A correspondence principle for finite-state dimension. Master's thesis, Iowa State University, Ames, IA, USA, 2004. doi:10.31274/rtd-20201023-1.
- [2] M. Agrawal, D. Chakraborty, D. Das, and S. Nandakumar. Dimension, pseudorandomness and extraction of pseudorandomness. *Computability*, 6(3):277–305, 2017. doi:10.3233/COM-160066.
- [3] P. Albert, E. Mayordomo, and P. Moser. Bounded pushdown dimension vs Lempel Ziv information density. In A. Day, M. Fellows, N. Greenberg, B. Khoussainov, A. Melnikov, and F. Rosamond, editors, *Computability and Complexity: Essays Dedicated to Rodney G. Downey on the Occasion of His 60th Birthday*, pages 95–114. Springer International Publishing, 2017. arXiv:0704.2386, doi:10.1007/978-3-319-50062-1_7.
- [4] P. Albert, E. Mayordomo, P. Moser, and S. Perifel. Pushdown compression. In *Proceedings of the 25th Annual Symposium on Theoretical Aspects of Computer Science*, pages 39–48. Springer-Verlag, 2008. arXiv:0709.2346, doi:10.4230/LIPIcs.STACS.2008.1332.
- [5] K. Allen, L. Bienvenu, and T. Slaman. On zeros of Martin-Löf random Brownian motion. *Journal of Logic and Analysis*, 6(9):1–34, 2014. arXiv:1405.6312, doi:10.4115/jla.2014.6.9.
- [6] K. A. Allen. *Martin-Löf Randomness and Brownian Motion*. PhD thesis, University of California, Berkeley, 2014. URL: <https://www.proquest.com/dissertations-theses/martin-lf-randomness-brownian-motion/docview/1626767468/se-2>.
- [7] K. Ambos-Spies, W. Merkle, J. Reimann, and F. Stephan. Hausdorff dimension in exponential time. In *Proceedings of the 16th IEEE Conference on Computational Complexity*, pages 210–217. IEEE Computer Society, 2001. doi:10.1109/CCC.2001.933888.
- [8] L. Antunes, A. Costa, A. Matos, and P. Vitányi. Computational depth of infinite strings revisited. In *Computation and Logic in the Real World, Third Conference on Computability in Europe, CiE 2007: local proceedings*, pages 36–44. University of Amsterdam, Digital Academic Repository, 2007. URL: <https://hdl.handle.net/11245/1.279234>.

- [9] L. Antunes, A. Matos, A. Souto, and P. Vitányi. Depth as randomness deficiency. *Theory of Computing Systems*, 45(4):724–739, 2009. arXiv:0809.2546, doi:10.1007/s00224-009-9171-0.
- [10] L. Antunes and A. Souto. Information measures for infinite sequences. *Theoretical Computer Science*, 411(26):2602–2611, 2010. doi:10.1016/j.tcs.2010.03.026.
- [11] V. Arvind. Normal numbers and algorithmic randomness: a historical sketch. *Current Science*, 106(12):1687–1692, 2014. URL: <http://www.jstor.org/stable/24103002>.
- [12] K. B. Athreya, J. M. Hitchcock, J. H. Lutz, and E. Mayordomo. Effective strong dimension in algorithmic information and computational complexity. *SIAM Journal on Computing*, 37(3):671–705, 2007. arXiv:cs.CC/0211025, doi:10.1137/s0097539703446912.
- [13] M. Bachan. Finite-state dimension of the Kolakoski sequence. Master’s thesis, Iowa State University, Ames, IA, USA, 2005. URL: <https://dr.lib.iastate.edu/handle/20.500.12876/72842>.
- [14] G. Barmpalias. Compactness arguments with effectively closed sets for the study of relative randomness. *Journal of Logic and Computation*, 22(4):679–691, 2012. doi:10.1093/logcom/exq036.
- [15] G. Barmpalias, N. Fang, and A. Lewis-Pye. Monotonous betting strategies in warped casinos. *Information and Computation*, 271:104480, 2020. doi:10.1016/j.ic.2019.104480.
- [16] G. Barmpalias and A. Lewis-Pye. Compression of data streams down to their information content. *IEEE Transactions on Information Theory*, 65(7):4471–4485, 2019. doi:10.1109/TIT.2019.2896638.
- [17] G. Barmpalias and L. Liu. Aspects of Muchnik’s paradox in restricted betting. Technical Report 2201.07007, arXiv, 2022. arXiv:2201.07007.
- [18] G. Barmpalias and A. Shen. The Kučera–Gács theorem revisited by Levín. *Theoretical Computer Science*, 947:113693, 2023. doi:10.1016/j.tcs.2023.113693.
- [19] V. Becher, O. Carton, and S. Figueira. Rauzy dimension and finite-state dimension. Technical report, arXiv, 2024. arXiv:2406.18383, doi:10.48550/ARXIV.2406.18383.
- [20] V. Becher and P. A. Heiber. Normal numbers and finite automata. *Theoretical Computer Science*, 477:109–116, 2013. doi:10.1016/j.tcs.2013.01.019.
- [21] V. Becher, J. Reimann, and T. A. Slaman. Irrationality exponent, Hausdorff dimension and effectivization. *Monatshefte für Mathematik*, 185:167–188, 2018. doi:10.1007/s00605-017-1094-2.
- [22] R. Beigel, L. Fortnow, and F. Stephan. Infinitely-often autoreducible sets. *SIAM Journal on Computing*, 36(3):595–608, 2006. doi:10.1137/s0097539704441630.
- [23] L. Bienvenu. Kolmogorov-Loveland stochasticity and Kolmogorov complexity. In *Proceedings of the 24th Annual Symposium on Theoretical Aspects of Computer Science*, pages 260–271. Springer-Verlag, 2007. doi:10.1007/s00224-009-9232-4.

- [24] L. Bienvenu. *Caractérisations de l’aléatoire par les jeux: imprédicibilité et stochasticité*. PhD thesis, Université de Provence, 2008.
- [25] L. Bienvenu, D. Doty, and F. Stephan. Constructive dimension and Turing degrees. *Theory of Computing Systems*, 45(4):740–755, 2009. [arXiv:cs/0701089](https://arxiv.org/abs/cs/0701089), doi:10.1007/s00224-009-9170-1.
- [26] L. Bienvenu and W. Merkle. Reconciling data compression and Kolmogorov complexity. In *Proceedings of the 34th International Colloquium on Automata, Languages, and Programming*, pages 643–654. Springer-Verlag, 2007. doi:10.1007/978-3-540-73420-8_56.
- [27] S. Binns. Π_1^0 classes with complex elements. *Journal of Symbolic Logic*, 73(4):1341–1353, 2008. doi:10.2178/jsl/1230396923.
- [28] S. Binns. Relative Kolmogorov complexity and geometry. *The Journal of Symbolic Logic*, 76(4):1211–1239, 2011. URL: <http://www.jstor.org/stable/23208214>.
- [29] S. Binns. Completeness, compactness, effective dimensions. *Mathematical Logic Quarterly*, 59(3):206–218, 2013. doi:10.1002/malq.201100096.
- [30] S. Binns and M. Nicholson. Compressibility and Kolmogorov complexity. *Notre Dame Journal of Formal Logic*, 54(1):105–123, 2013. doi:10.1215/00294527-1731416.
- [31] C. Bourke. Finite-state dimension of individual sequences. Master’s thesis, University of Nebraska-Lincoln, 2004.
- [32] C. Bourke, J. M. Hitchcock, and N. V. Vinodchandran. Entropy rates and finite-state dimension. *Theoretical Computer Science*, 349(3):392–406, 2005. doi:10.1016/j.tcs.2005.09.040.
- [33] C. S. Calude, K. Salomaa, and T. K. Roblot. Finite state complexity. *Theoretical Computer Science*, 412(41):5668–5677, 2011. doi:10.1016/j.tcs.2011.06.021.
- [34] C. S. Calude, L. Staiger, and F. Stephan. Finite state incompressible infinite sequences. *Information and Computation*, 247:23–36, 2016. doi:10.1016/J.IC.2015.11.003.
- [35] C. S. Calude, L. Staiger, and S. A. Terwijn. On partial randomness. *Annals of Pure and Applied Logic*, 138(1–3):20–30, 2006. doi:10.1016/j.apal.2005.06.004.
- [36] C. S. Calude and M. Zimand. Algorithmically independent sequences. *Information and Computation*, 208(3):292–308, 2010. [arXiv:0802.0487](https://arxiv.org/abs/0802.0487), doi:10.1016/J.IC.2009.05.004.
- [37] W. Calvert, E. Gruner, E. Mayordomo, D. Turetsky, and J. D. Villano. Normality, relativization, and randomness. Preprint 2312.10204v2, arXiv, February 2025. [arXiv:2312.10204](https://arxiv.org/abs/2312.10204).
- [38] A. Case. Bounded Turing reductions and data processing inequalities for sequences. *Theory of Computing Systems*, 62(7):1586–1598, 2018. [arXiv:1608.04764](https://arxiv.org/abs/1608.04764), doi:10.1007/S00224-017-9804-7.
- [39] A. Case and J. H. Lutz. Mutual dimension. *ACM Transactions on Computation Theory (TOCT)*, 7(3):1–26, 2015. [arXiv:1410.4135](https://arxiv.org/abs/1410.4135), doi:10.1145/2786566.

- [40] A. Case and J. H. Lutz. Mutual dimension and random sequences. *Theoretical Computer Science*, 731:68–87, 2018. [arXiv:1603.09390](#), doi:10.1016/j.tcs.2018.04.003.
- [41] A. Case and J. H. Lutz. Finite-state mutual dimension. In *2022 58th Annual Allerton Conference on Communication, Control, and Computing*, pages 1–8, 2022. [arXiv:2109.14574](#), doi:10.1109/Allerton49937.2022.9929362.
- [42] A. Case and C. P. Porter. The intersection of algorithmically random closed sets and effective dimension. *ACM Trans. Comput. Log.*, 23(4):24:1–24:19, 2022. [arXiv:2103.03965](#), doi:10.1145/3545114.
- [43] A. T. Case. *Mutual dimension, data processing inequalities, and randomness*. Phd thesis, Iowa State University, 2016. URL: <https://www.proquest.com/docview/1831366816>.
- [44] C. J. Conidis. Effective Packing Dimension Of Π_1^0 -Classes. *Proceedings of the American Mathematical Society*, 136(10):3655–3662, 2008. doi:10.1090/S0002-9939-08-09335-0.
- [45] C. J. Conidis. *Applications of computability theory*. PhD thesis, University of Chicago, 2009. URL: <https://www.proquest.com/dissertations-theses/applications-computability-theory/docview/305050711/se-2>.
- [46] C. J. Conidis. A real of strictly positive effective packing dimension that does not compute a real of effective packing dimension one. *The Journal of Symbolic Logic*, 77(2):447–474, 2012. doi:10.2178/jsl/1333566632.
- [47] J. J. Dai, J. I. Lathrop, J. H. Lutz, and E. Mayordomo. Finite-state dimension. *Theoretical Computer Science*, 310(1–3):1–33, 2004. doi:10.1016/s0304-3975(03)00244-5.
- [48] D. Diamondstone and B. Kjos-Hanssen. Members of random closed sets. In *Proceedings of the 5th Conference on Computability in Europe*, pages 144–153, 2009. doi:10.1007/978-3-642-03073-4_16.
- [49] D. Doty. Every sequence is decompressible from a random one. In *Proceedings of the Second Conference on Computability in Europe*, pages 153–162. Springer-Verlag, 2006. [arXiv:cs.IT/0511074](#), doi:10.1007/11780342_17.
- [50] D. Doty. Dimension extractors and optimal decompression. *Theory of Computing Systems*, 43(3–4):425–463, 2008. [arXiv:cs/0606078](#), doi:10.1007/s00224-007-9024-7.
- [51] D. Doty, X. Gu, J. H. Lutz, E. Mayordomo, and P. Moser. Zeta-dimension. In *Proceedings of the 30th International Symposium on Mathematical Foundations of Computer Science (MFCS 2005)*, pages 283–294. Springer-Verlag, 2005. [arXiv:cs/0503052](#), doi:10.1007/11549345_25.
- [52] D. Doty, J. H. Lutz, and S. Nandakumar. Finite-state dimension and real arithmetic. *Information and Computation*, 205(11):1640–1651, 2007. [arXiv:cs.CC/0602032](#), doi:10.1016/j.ic.2007.05.003.
- [53] D. Doty and P. Moser. Finite-state dimension and lossy decompressors. Technical Report arXiv:cs/0609096 [cs.CC], arXiv, 2006. [arXiv:cs/0609096](#).

- [54] D. Doty and P. Moser. Feasible depth. In *Proceedings of the 3rd Conference on Computability in Europe*, pages 228–237. Springer-Verlag, 2007. [arXiv:cs/0701123](https://arxiv.org/abs/cs/0701123), doi: 10.1007/978-3-540-73001-9_24.
- [55] D. Doty and J. Nichols. Pushdown dimension. *Theoretical Computer Science*, 381(1–3):105–123, 2007. [arXiv:cs/0504047](https://arxiv.org/abs/cs/0504047), doi:10.1016/j.tcs.2007.04.005.
- [56] R. Dougherty, J. Lutz, R. D. Mauldin, and J. Teutsch. Translating the Cantor set by a random real. *Transactions of the American Mathematical Society*, 366(6):3027–3041, 2014. URL: <https://www.jstor.org/stable/23813942>.
- [57] R. Downey. Some recent progress in algorithmic randomness. In *Proceedings of the 29th International Symposium on Mathematical Foundations of Computer Science (MFCS 2004)*, pages 42–83. Springer-Verlag, 2004. doi:10.1007/b99679.
- [58] R. Downey. Algorithmic randomness and computability. Manuscript, 2009.
- [59] R. Downey. Randomness, computation and mathematics. In S. B. Cooper, A. Dawar, and B. Löwe, editors, *How the World Computes*, pages 162–181, Berlin, Heidelberg, 2012. Springer Berlin Heidelberg. doi:10.1007/978-3-642-30870-3_17.
- [60] R. Downey. Computability theory, algorithmic randomness and Turing’s anticipation. In R. Downey, editor, *Turing’s Legacy: Developments from Turing’s Ideas in Logic*, Lecture Notes in Logic, pages 90–123. Cambridge University Press, 2014. doi:10.1017/CBO9781107338579.005.
- [61] R. Downey. Turing and randomness. In J. Copeland, J. P. Bowen, M. D. Sprevak, and R. Wilson, editors, *The Turing Guide*, pages 427–435. Oxford University Press, 2017. doi: 10.1093/oso/9780198747826.003.0051.
- [62] R. Downey and N. Greenberg. Turing degrees of reals of positive effective packing dimension. *Information Processing Letters*, 108(5):298–303, 2008. doi:10.1016/j IPL.2008.05.028.
- [63] R. Downey and D. Hirschfeldt. *Algorithmic Randomness and Complexity*. Springer-Verlag, 2010. doi:10.1007/978-0-387-68441-3.
- [64] R. Downey and D. R. Hirschfeldt. Algorithmic randomness. *Communications of the ACM*, 62(5):70–80, 2019. doi:10.1145/3319408.
- [65] R. Downey and D. R. Hirschfeldt. Computability and randomness. *Notices of the American Mathematical Society*, 66(7):1001–1012, 2019. doi:10.1090/noti1905.
- [66] R. Downey, D. R. Hirschfeldt, A. Nies, and S. A. Terwijn. Calibrating randomness. *Bulletin of Symbolic Logic*, 12(3):411–491, 2006. doi:10.2178/bsl/1154698741.
- [67] R. Downey, W. Merkle, and J. Reimann. Schnorr dimension. *Mathematical Structures in Computer Science*, 16(5):789–811, 2006. doi:10.1017/S0960129506005469.
- [68] R. Downey and K. M. Ng. Effective Packing Dimension and Traceability. *Notre Dame Journal of Formal Logic*, 51(2):279 – 290, 2010. doi:10.1215/00294527-2010-017.

- [69] R. Downey and J. Stephenson. Avoiding effective packing dimension 1 below array non-computable c.e. degrees. *The Journal of Symbolic Logic*, 83(2):717–739, 2018. doi: 10.1017/jsl.2017.78.
- [70] A. Drucker. High-confidence predictions under adversarial uncertainty. *ACM Transactions on Computation Theory*, 5(3):12:1–12:18, 2013. arXiv:1101.4446, doi:10.1145/2493252.2493257.
- [71] N. Fang. *Restricted Coding and Betting*. PhD thesis, Heidelberg University, Germany, 2019. doi:10.11588/heidok.00026977.
- [72] S. A. Fenner. Gales and supergales are equivalent for defining constructive Hausdorff dimension. Technical Report 0208044, arXiv, 2002. arXiv:0208044.
- [73] J. B. Fiedler and D. M. Stull. Dimension of pinned distance sets for semi-regular sets. Technical Report 2309.11701, arXiv, 2023. arXiv:2309.11701.
- [74] J. B. Fiedler and D. M. Stull. Pinned distances of planar sets with low dimension. Technical Report 2408.00889, arXiv, 2025. arXiv:2408.00889.
- [75] J. B. Fiedler and D. M. Stull. Universal sets for projections. Technical Report 2411.16001, arXiv, 2025. arXiv:2411.16001.
- [76] L. Fortnow, J. M. Hitchcock, A. Pavan, N. V. Vinodchandran, and F. Wang. Extracting Kolmogorov complexity with applications to dimension zero-one laws. *Information and Computation*, 209(4):627–636, 2011. doi:10.1016/j.ic.2010.09.006.
- [77] L. Fortnow and J. H. Lutz. Prediction and dimension. *Journal of Computer and System Sciences*, 70(4):570–589, 2005. doi:10.1016/j.jcss.2004.10.007.
- [78] C. Fraize. *Aspects of Algorithmically Random Objects*. PhD thesis, University of Florida, 2023. URL: <https://www.proquest.com/dissertations-theses/aspects-algorithmically-random-objects/docview/2881072073/se-2>.
- [79] C. Fraize and C. P. Porter. Kolmogorov complexity and generalized length functions. Technical Report 1611.05819, arXiv, 2016. arXiv:1611.05819.
- [80] J. N. Y. Franklin and C. P. Porter. Key developments in algorithmic randomness. In J. N. Y. Franklin and C. P. Porter, editors, *Algorithmic Randomness: Progress and Prospects*, volume 50 of *Lecture Notes in Logic*, page 1–39. Cambridge University Press, 2020. doi: 10.1017/9781108781718.002.
- [81] R. Gavaldà, M. López-Valdés, E. Mayordomo, and N. V. Vinodchandran. Resource-bounded dimension in computational learning theory. Technical Report 1010.5470, arXiv, 2010. arXiv: 1010.5470.
- [82] J. L. Goh, J. S. Miller, M. I. Soskova, and L. Westrick. Redundancy of information: lowering dimension. Technical Report 2307.11690, arXiv, 2023. arXiv:2307.11690.

- [83] N. Greenberg and J. S. Miller. Diagonally non-recursive functions and effective Hausdorff dimension. *Bulletin of the London Mathematical Society*, 43(4):636–654, 2011. doi:10.1112/blms/bdr003.
- [84] N. Greenberg, J. S. Miller, A. Shen, and L. B. Westrick. Dimension 1 sequences are close to randoms. *Theoretical Computer Science*, 705:99–112, 2018. arXiv:1709.05266, doi: 10.1016/j.tcs.2017.09.031.
- [85] X. Gu. A note on dimensions of polynomial size circuits. *Theoretical Computer Science*, 359(1–3):176–187, 2006. doi:10.1016/j.tcs.2006.02.022.
- [86] X. Gu. *Fractals in complexity and geometry*. PhD thesis, Iowa State University, 2009. URL: <https://www.proquest.com/dissertations-theses/fractals-complexity-geometry/docview/304907670/se-2>.
- [87] X. Gu and J. H. Lutz. Dimension characterizations of complexity classes. *Computational Complexity*, 17:459–474, 2008. doi:10.1007/s00037-008-0257-x.
- [88] X. Gu and J. H. Lutz. Effective dimensions and relative frequencies. *Theor. Comput. Sci.*, 412(48):6696–6711, 2011. arXiv:cs.CC/0703085, doi:10.1016/J.TCS.2011.08.023.
- [89] X. Gu, J. H. Lutz, and E. Mayordomo. Points on computable curves. In *Proceedings of the 47th Annual IEEE Symposium on Foundations of Computer Science*, pages 469–474. IEEE Computer Society, 2006. arXiv:cs.CC/0512042.
- [90] X. Gu, J. H. Lutz, E. Mayordomo, and P. Moser. Dimension spectra of random subfractals of self-similar fractals. *Ann. Pure Appl. Log.*, 165(11):1707–1726, 2014. doi:10.1016/J.APAL.2014.07.001.
- [91] X. Gu, J. H. Lutz, and P. Moser. Dimensions of Copeland-Erdős sequences. *Information and Computation*, 205(9):1317–1333, 2007. doi:10.1016/J.IC.2006.01.006.
- [92] R. C. Harkins and J. M. Hitchcock. Dimension, halfspaces, and the density of hard sets. *Theory of Computing Systems*, 49(3):601–614, 2011. doi:10.1007/S00224-010-9288-1.
- [93] M. Hauptmann. Scaled dimension and the Berman-Hartmanis conjecture. Technical Report 85300-CS, University of Bonn, 2008.
- [94] P. A. Heiber. *Una perspectiva computacional sobre números normales*. PhD thesis, University of Buenos Aires, 2014. URL: https://bibliotecadigital.exactas.uba.ar/download/tesis/tesis_n5556_Heiber.pdf.
- [95] I. Herbert. A perfect set of reals with finite self-information. *The Journal of Symbolic Logic*, 78(4):1229–1246, 2013. arXiv:1210.7779, doi:10.2178/jsl.7804130.
- [96] I.-C. R. Herbert. *Weak Lowness Notions for Kolmogorov Complexity*. PhD thesis, University of California, Berkeley, 2013. URL: <https://www.proquest.com/dissertations-theses/weak-lowness-notions-kolmogorov-complexity/docview/1441349900/se-2>.

- [97] D. R. Hirschfeldt and S. A. Terwijn. Limit computability and constructive measure. In *Computational Prospects of Infinity*, pages 131–141. World Scientific, 2008. doi:10.1142/9789812796554_0007.
- [98] D. R. Hirschfeldt and R. Weber. Finite self-information. *Computability*, 1(1):85–98, 2012. doi:10.3233/COM-2012-003.
- [99] J. M. Hitchcock. Resource-bounded dimension, nonuniform complexity, and approximation of MAX3SAT. Master’s thesis, Iowa State University, Ames, IA, USA, 2001. doi:10.31274/rtd-20201118-233.
- [100] J. M. Hitchcock. MAX3SAT is exponentially hard to approximate if NP has positive dimension. *Theoretical Computer Science*, 289(1):861–869, 2002. doi:10.1016/S0304-3975(01)00340-1.
- [101] J. M. Hitchcock. *Effective Fractal Dimension: Foundations and Applications*. PhD thesis, Iowa State University, 2003. URL: <https://www.proquest.com/dissertations-theses/effective-fractal-dimension-foundations/docview/305335849/se-2>.
- [102] J. M. Hitchcock. Fractal dimension and logarithmic loss unpredictability. *Theoretical Computer Science*, 304(1–3):431–441, 2003. doi:10.1016/S0304-3975(03)00138-5.
- [103] J. M. Hitchcock. Gales suffice for constructive dimension. *Information Processing Letters*, 86(1):9–12, 2003. arXiv:cs/0208043, doi:10.1016/S0020-0190(02)00454-4.
- [104] J. M. Hitchcock. Small spans in scaled dimension. *SIAM Journal on Computing*, 34(1):170–194, 2004. arXiv:cs/0304030, doi:10.1137/S0097539703426416.
- [105] J. M. Hitchcock. Correspondence principles for effective dimensions. *Theory of Computing Systems*, 38(5):559–571, 2005. doi:10.1007/s00224-004-1122-1.
- [106] J. M. Hitchcock. Hausdorff dimension and oracle constructions. *Theoretical Computer Science*, 355(3):382–388, 2006. doi:10.1016/j.tcs.2006.01.025.
- [107] J. M. Hitchcock. Online learning and resource-bounded dimension: Winnow yields new lower bounds for hard sets. *SIAM Journal on Computing*, 36(6):1696–1708, 2007. arXiv:cs/0512053, doi:10.1137/050647517.
- [108] J. M. Hitchcock. Limitations of efficient reducibility to the Kolmogorov random strings. *Computability*, 1(1):39–43, 2012. doi:10.3233/COM-2012-006.
- [109] J. M. Hitchcock. Effective dimension bibliography. <https://www.eecs.uwyo.edu/~jhitchco/bib/dim/>, 2025.
- [110] J. M. Hitchcock. Resource-bounded measure and dimension bibliography. <https://www.eecs.uwyo.edu/~jhitchco/bib/rbmd/>, 2025.
- [111] J. M. Hitchcock, M. López-Valdés, and E. Mayordomo. Scaled dimension and the Kolmogorov complexity of Turing-hard sets. *Theory of Computing Systems*, 43(3-4):471–497, 2008. doi:10.1007/s00224-007-9013-x.

- [112] J. M. Hitchcock, J. H. Lutz, and E. Mayordomo. Scaled dimension and nonuniform complexity. *Journal of Computer and System Sciences*, 69(2):97–122, 2004. doi:10.1016/j.jcss.2003.09.001.
- [113] J. M. Hitchcock, J. H. Lutz, and E. Mayordomo. The fractal geometry of complexity classes. *SIGACT News*, 36(3):24–38, September 2005. doi:10.1145/1086649.1086662.
- [114] J. M. Hitchcock, J. H. Lutz, and S. A. Terwijn. The arithmetical complexity of dimension and randomness. *ACM Transactions on Computational Logic*, 8(2):article 13, 2007. arXiv: cs/0408043, doi:10.1145/1227839.1227845.
- [115] J. M. Hitchcock and E. Mayordomo. Base invariance of feasible dimension. *Information Processing Letters*, 113(14-16):546–551, 2013. doi:10.1016/j.ipl.2013.04.004.
- [116] J. M. Hitchcock and A. Pavan. Resource-bounded strong dimension versus resource-bounded category. *Information Processing Letters*, 95(3):377–381, 2005. doi:10.1016/j.ipl.2005.05.001.
- [117] J. M. Hitchcock and A. Pavan. Hardness hypotheses, derandomization, and circuit complexity. *Computational Complexity*, 17(1):119–146, 2008. doi:10.1007/s00037-008-0241-5.
- [118] J. M. Hitchcock, A. Pavan, and N. V. Vinodchandran. Partial bi-immunity, scaled dimension, and NP-completeness. *Theory of Computing Systems*, 42(2):131–142, 2008. doi:10.1007/s00224-007-9000-2.
- [119] J. M. Hitchcock and N. V. Vinodchandran. Dimension, entropy rates, and compression. *Journal of Computer and System Sciences*, 72(4):760–782, 2006. doi:10.1016/j.jcss.2005.10.002.
- [120] M. Hoyrup. The dimension of ergodic random sequences. In *29th International Symposium on Theoretical Aspects of Computer Science (STACS 2012)*, volume 14 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 567–576, 2012. arXiv:1107.1149, doi:10.4230/LIPIcs.STACS.2012.567.
- [121] X. Huang, J. H. Lutz, E. Mayordomo, and D. M. Stull. Asymptotic divergences and strong dichotomy. *IEEE Trans. Inf. Theory*, 67(10):6296–6305, 2021. arXiv:1910.13615, doi:10.1109/TIT.2021.3085425.
- [122] W. M. P. Hudelson. *Partial randomness and Kolmogorov complexity*. PhD thesis, The Pennsylvania State University, 2013. URL: <https://www.proquest.com/dissertations-theses/partial-randomness-kolmogorov-complexity/docview/1437204485/se-2>.
- [123] H. Imai, M. Kumabe, K. Miyabe, Y. Mizusawa, and T. Suzuki. Rational sequences converging to left-c.e. reals of positive effective Hausdorff dimension. In *Computability Theory and Foundations of Mathematics*, pages 97–121, 2022. doi:10.1142/9789811259296_0005.
- [124] J. J. Joosten, F. Soler-Toscano, and H. Zenil. Fractal dimension versus process complexity. *Advances in Mathematical Physics*, 2016(1):5030593, 2016. doi:10.1155/2016/5030593.

- [125] L. Jordon. *An Investigation of Feasible Logical Depth and Complexity Measures Via Automata and Compression Algorithms*. PhD thesis, Maynooth University, 2022. URL: <https://www.proquest.com/dissertations-theses/investigation-feasible-logical-depth-complexity/docview/2748384759/se-2>.
- [126] L. Jordon, P. Maguire, and P. Moser. Pebble-depth. *Theoretical Computer Science*, 1009:114638, 2024. doi:10.1016/j.tcs.2024.114638.
- [127] L. Jordon and P. Moser. On the difference between finite-state and pushdown depth. In A. Chatzigeorgiou, R. Dondi, H. Herodotou, C. A. Kapoutsis, Y. Manolopoulos, G. A. Papadopoulos, and F. Sikora, editors, *SOFSEM 2020: Theory and Practice of Computer Science - 46th International Conference on Current Trends in Theory and Practice of Informatics, SOFSEM 2020, Limassol, Cyprus, January 20-24, 2020, Proceedings*, volume 12011 of *Lecture Notes in Computer Science*, pages 187–198. Springer, 2020. doi:10.1007/978-3-030-38919-2_16.
- [128] B. Kastermans and S. Lempp. Comparing notions of randomness. *Theoretical Computer Science*, 411(3):602–616, 2010. doi:10.1016/j.tcs.2009.09.036.
- [129] B. Kjos-Hanssen. Infinite subsets of random sets of integers. Technical Report 1408.2881, arXiv, 2014. arXiv:1408.2881.
- [130] B. Kjos-Hanssen and A. Nerode. Effective dimension of points visited by Brownian motion. *Theoretical Computer Science*, 410(4–5):347–354, 2008. arXiv:1408.2883, doi:10.1016/j.tcs.2008.09.045.
- [131] B. Kjos-Hanssen and D. J. Webb. KL-randomness and effective dimension under strong reducibility. In L. D. Mol, A. Weiermann, F. Manea, and D. Fernández-Duque, editors, *Connecting with Computability - 17th Conference on Computability in Europe, CiE 2021, Virtual Event, Ghent, July 5-9, 2021, Proceedings*, volume 12813 of *Lecture Notes in Computer Science*, pages 457–468. Springer, 2021. arXiv:2104.13511, doi:10.1007/978-3-030-80049-9_45.
- [132] A. Kozachinskiy and A. Shen. Two characterizations of finite-state dimension. In *Fundamentals of Computation Theory*, pages 80–94. Springer International Publishing, 2019. doi:10.1007/978-3-030-25027-0_6.
- [133] A. Kozachinskiy and A. Shen. Automatic kolmogorov complexity, normality, and finite-state dimension revisited. *Journal of Computer and System Sciences*, 118:75–107, 2021. doi:10.1016/j.jcss.2020.12.003.
- [134] V. Kreinovich and L. Longpré. Kolmogorov complexity leads to a representation theorem for idempotent probabilities (σ -maxitive measures). *SIGACT News*, 36(3):107–112, September 2005. doi:10.1145/1086649.1086650.
- [135] G. Lagarde and S. Perifel. Lempel-Ziv: a “one-bit catastrophe” but not a tragedy. In *Proceedings of the 2018 Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 1478–1495, 2018. arXiv:1707.04312, doi:10.1137/1.9781611975031.97.

- [136] S. Lempp, J. S. Miller, K. M. Ng, D. D. Turetsky, and R. Weber. Lowness for effective Hausdorff dimension. *Journal of Mathematical Logic*, 14(02):1450011, 2014. doi:10.1142/S0219061314500111.
- [137] M. Y. Li. *Algorithmic Randomness and Complexity for Continuous Measures*. PhD thesis, The Pennsylvania State University, 2020. URL: <https://etda.libraries.psu.edu/catalog/17958mx11038>.
- [138] L. Liu. Cone avoiding closed sets. *Transactions of the American Mathematical Society*, 367(3):1609–1630, 2015. doi:10.1090/S0002-9947-2014-06049-2.
- [139] M. López-Valdés. Lempel-Ziv dimension for Lempel-Ziv compression. In *Proceedings of the 31st International Symposium on Mathematical Foundations of Computer Science (MFCS 2006)*, pages 693–703. Springer-Verlag, 2006. URL: <http://eccc.hpi-web.de/eccc-reports/2006/TR06-077/index.html>.
- [140] M. López-Valdés. Scaled dimension of individual strings. Technical Report TR06-047, Electronic Colloquium on Computational Complexity, 2006. URL: <https://eccc.weizmann.ac.il/eccc-reports/2006/TR06-047/>.
- [141] M. López-Valdés and E. Mayordomo. Dimension is compression. *Theory of Computing Systems*, 52(1):95–112, 2013. doi:10.1007/S00224-012-9417-0.
- [142] J. H. Lutz. Gales and the constructive dimension of individual sequences. In *Proceedings of the 27th International Colloquium on Automata, Languages, and Programming*, pages 902–913. Springer-Verlag, 2000. Revised as [144].
- [143] J. H. Lutz. Dimension in complexity classes. *SIAM Journal on Computing*, 32(5):1236–1259, 2003. arXiv:cs/0203016, doi:10.1137/S0097539701417723.
- [144] J. H. Lutz. The dimensions of individual strings and sequences. *Information and Computation*, 187(1):49–79, 2003. arXiv:cs/0203017, doi:10.1016/S0890-5401(03)00187-1.
- [145] J. H. Lutz. The dimension of a point: Computability meets fractal geometry. In *Proceedings of New Computational Paradigms: First Conference on Computability in Europe*, page 299. Springer-Verlag, 2005. doi:10.1007/11494645_37.
- [146] J. H. Lutz. Effective fractal dimensions. *Mathematical Logic Quarterly*, 51(1):62–72, 2005. doi:10.1002/malq.200310127.
- [147] J. H. Lutz. A divergence formula for randomness and dimension. *Theoretical Computer Science*, 412(1):166–177, 2011. arXiv:0906.4162, doi:10.1016/j.tcs.2010.09.005.
- [148] J. H. Lutz. Algorithmic fractal dimensions: Lecture slides. Presented at the 2024 NSF-CBMS Regional Conference, Drake University, 2024. URL: <https://cbmsweb.org/regional-conferences/2024-conferences/algorithmic-fractal-dimensions-lecture-slides/>.
- [149] J. H. Lutz and N. Lutz. Algorithmic information, plane kakeya sets, and conditional dimension. *ACM Trans. Comput. Theory*, 10(2), 2018. arXiv:1511.00442, doi:10.1145/3201783.

- [150] J. H. Lutz and N. Lutz. Who asked us? how the theory of computing answers questions about analysis. In D. Du and J. Wang, editors, *Complexity and Approximation - In Memory of Ker-I Ko*, volume 12000 of *Lecture Notes in Computer Science*, pages 48–56. Springer, 2020. [arXiv:1912.00284](https://arxiv.org/abs/1912.00284), doi:10.1007/978-3-030-41672-0_4.
- [151] J. H. Lutz, N. Lutz, and E. Mayordomo. The dimensions of hyperspaces. *CoRR*, abs/2004.07798v1, 2020. Revised as [153]. [arXiv:2004.07798v1](https://arxiv.org/abs/2004.07798).
- [152] J. H. Lutz, N. Lutz, and E. Mayordomo. Dimension and the structure of complexity classes. *Theory of Computing Systems*, 67:473–490, 2023. [arXiv:2109.05956](https://arxiv.org/abs/2109.05956), doi:10.1007/s00224-022-10096-7.
- [153] J. H. Lutz, N. Lutz, and E. Mayordomo. Extending the reach of the point-to-set principle. *Information and Computation*, 294:105078, 2023. [arXiv:2004.07798](https://arxiv.org/abs/2004.07798), doi:10.1016/j.ic.2023.105078.
- [154] J. H. Lutz and E. Mayordomo. Dimensions of points in self-similar fractals. *SIAM Journal on Computing*, 38:1080–1112, 2008.
- [155] J. H. Lutz and E. Mayordomo. Algorithmic fractal dimensions in geometric measure theory. In V. Brattka and P. Hertling, editors, *Handbook of Computability and Complexity in Analysis*, pages 271–302. Springer International Publishing, 2021. [arXiv:2007.14346](https://arxiv.org/abs/2007.14346), doi:10.1007/978-3-030-59234-9_8.
- [156] J. H. Lutz and E. Mayordomo. Computing absolutely normal numbers in nearly linear time. *Information and Computation*, 281:104746, 2021. [arXiv:1611.05911](https://arxiv.org/abs/1611.05911), doi:10.1016/J.IC.2021.104746.
- [157] J. H. Lutz and A. N. Miguňov. Algorithmic Dimensions via Learning Functions. In R. Královič and A. Kučera, editors, *49th International Symposium on Mathematical Foundations of Computer Science (MFCS 2024)*, volume 306 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 72:1–72:13, Dagstuhl, Germany, 2024. Schloss Dagstuhl – Leibniz-Zentrum für Informatik. [arXiv:2407.01747](https://arxiv.org/abs/2407.01747), doi:10.4230/LIPIcs.MFCS.2024.72.
- [158] J. H. Lutz, S. Nandakumar, and S. Pulari. A Weyl criterion for finite-state dimension and applications. In J. Leroux, S. Lombardy, and D. Peleg, editors, *48th International Symposium on Mathematical Foundations of Computer Science, MFCS 2023, August 28 to September 1, 2023, Bordeaux, France*, volume 272 of *LIPIcs*, pages 65:1–65:16. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2023. [arXiv:2111.04030](https://arxiv.org/abs/2111.04030), doi:10.4230/LIPIcs.MFCS.2023.65.
- [159] J. H. Lutz, R. Qi, and L. Yu. The point-to-set principle and the dimensions of Hamel bases. *Computability*, 13(2):105–112, 2024. [arXiv:2109.10981](https://arxiv.org/abs/2109.10981), doi:10.3233/COM-210383.
- [160] J. H. Lutz and K. Weihrauch. Connectivity properties of dimension level sets. *Mathematical Logic Quarterly*, 54(5):483–491, 2008. doi:10.1002/malq.200710060.
- [161] N. Lutz. A note on pointwise dimensions. Technical Report 1612.05849, arXiv, 2016. [arXiv:1612.05849](https://arxiv.org/abs/1612.05849).

- [162] N. Lutz. Some open problems in algorithmic fractal geometry. *ACM SIGACT News*, 48(4):35–41, 2017. doi:10.1145/3173127.3173134.
- [163] N. Lutz. Fractal intersections and products via algorithmic dimension. *ACM Transactions on Computation Theory*, 13(3), 2021. arXiv:1612.01659, doi:10.1145/3460948.
- [164] N. Lutz and D. Stull. Dimension spectra of lines. *Computability*, 11:85–112, 2022. arXiv:1701.04108, doi:10.3233/COM-190292.
- [165] N. Lutz and D. Stull. Projection theorems using effective dimension. *Information and Computation*, 297:105137, 2024. arXiv:1711.02124, doi:10.1016/j.ic.2024.105137.
- [166] N. Lutz and D. M. Stull. Bounding the dimension of points on a line. *Information and Computation*, 275:104601, 2020. arXiv:1612.00143, doi:10.1016/j.ic.2019.104601.
- [167] N. J. Lutz. *Algorithmic Information, Fractal Geometry, and Distributed Dynamics*. PhD thesis, Rutgers The State University of New Jersey, 2017. URL: <https://www.proquest.com/dissertations-theses/algorithmic-information-fractal-geometry/docview/2025980846/se-2>.
- [168] M. López-Valdés. *Aplicaciones de la dimensión efectiva a la complejidad computacional y a los algoritmos de comprensión de datos*. PhD thesis, Universidad de Zaragoza, 2011. URL: <https://zaguan.unizar.es/record/7035>.
- [169] A. Marcone and M. Valenti. Effective aspects of Hausdorff and Fourier dimension. *Computability*, 11:299–333, 2022. doi:10.3233/COM-210372.
- [170] E. Mayordomo. A Kolmogorov complexity characterization of constructive Hausdorff dimension. *Information Processing Letters*, 84(1):1–3, 2002. doi:10.1016/S0020-0190(02)00343-5.
- [171] E. Mayordomo. Effective Hausdorff dimension. In B. Löwe, B. Piwinger, and T. Räsch, editors, *Classical and New Paradigms of Computation and their Complexity Hierarchies*, volume 23 of *Trends in Logic*, pages 171–186. Kluwer Academic Press, 2004. doi:10.1007/978-1-4020-2776-5_10.
- [172] E. Mayordomo. Two open problems on effective dimension. In *Proceedings of Second Conference on Computability in Europe*, pages 353–359. Springer-Verlag, 2006. doi:10.1007/11780342_37.
- [173] E. Mayordomo. Effective fractal dimension in algorithmic information theory. In S. B. Cooper, B. Löwe, and A. Sorbi, editors, *New Computational Paradigms: Changing Conceptions of What is Computable*, pages 259–285. Springer-Verlag, 2008. doi:10.1007/978-0-387-68546-5_12.
- [174] E. Mayordomo. Effective Hausdorff dimension in general metric spaces. *Theory of Computing Systems*, 62:1620–1636, 2018. doi:10.1007/s00224-018-9848-3.
- [175] E. Mayordomo. A point to set principle for finite-state dimension. *CoRR*, abs/2208.00157, 2022. arXiv:2208.00157, doi:10.48550/ARXIV.2208.00157.

- [176] E. Mayordomo. Una generalización del teorema de proyección de Marstrand. *La Gaceta de la RSME*, 25(2):343–352, 2022.
- [177] E. Mayordomo, P. Moser, and S. Perifel. Polylog space compression, pushdown compression, and Lempel-Ziv are incomparable. *Theory of Computing Systems*, 48:731–766, 2011. doi: 10.1007/s00224-010-9267-6.
- [178] E. Mayordomo and A. Nies. Fractal dimensions and profinite groups. Technical Report 2502.09995, arXiv, 2025. arXiv:2502.09995.
- [179] W. Merkle, J. S. Miller, A. Nies, J. Reimann, and F. Stephan. Kolmogorov-Loveland randomness and stochasticity. *Annals of Pure and Applied Logic*, 138(1–3):183–210, 2006. doi:10.1016/j.apal.2005.06.011.
- [180] A. N. Migunov. *Randomness and Dimension in Computational Learning and Analog Computation*. PhD thesis, Iowa State University, 2022. URL: <https://www.proquest.com/dissertations-theses/randomness-dimension-computational-learning/docview/2716962505/se-2>.
- [181] J. S. Miller. Extracting information is hard: a Turing degree of non-integral effective Hausdorff dimension. *Advances in Mathematics*, 226(1):373–384, 2011. doi:10.1016/j.aim.2010.06.024.
- [182] J. S. Miller and A. Nies. Randomness and computability: open questions. *Bulletin of Symbolic Logic*, 12(3):390–410, 2006. doi:10.2178/bsl/1154698740.
- [183] K. Miyabe, A. Nies, and F. Stephan. Randomness and Solovay degrees. *Journal of Logic & Analysis*, 10(3):1–13, 2018. doi:10.4115/jla.2018.10.3.
- [184] B. Moldagaliyev, L. Staiger, and F. Stephan. On the values for factor complexity. In C. Câmpeanu, editor, *Implementation and Application of Automata - 23rd International Conference, CIAA 2018, Proceedings*, volume 10977 of *Lecture Notes in Computer Science*, pages 274–285. Springer, 2018. doi:10.1007/978-3-319-94812-6_23.
- [185] P. Moser. BPP has effective dimension at most $1/2$ unless $\text{BPP} = \text{EXP}$. Technical Report TR03-029, Electronic Colloquium on Computational Complexity, 2003. URL: <https://eccc.weizmann.ac.il/eccc-reports/2006/TR06-047/>.
- [186] P. Moser. *Derandomization and Quantitative Complexity*. PhD thesis, Université de Genève, 2004.
- [187] P. Moser. Generic density and small span theorem. *Information and Computation*, 206(1):1–14, 2008. URL: <http://dx.doi.org/10.1016/j.ic.2007.10.001>.
- [188] P. Moser. Martingale families and dimension in P. *Theoretical Computer Science*, 400(1–3):46–61, 2008. doi:10.1016/j.tcs.2008.02.013.
- [189] P. Moser. A zero-one SUBEXP-dimension law for BPP. *Information Processing Letters*, 111(9):429–432, 2011. doi:<http://dx.doi.org/10.1016/j.ipl.2011.01.019>.

- [190] S. Nandakumar. A characterization of constructive dimension. *Mathematical Logic Quarterly*, 55(2):185–200, 2009. doi:10.1002/malq.200710087.
- [191] S. Nandakumar. *Dynamics, Measure, and Dimension in the Theory of Computing*. PhD thesis, Iowa State University, 2009. URL: <https://www.proquest.com/docview/304906577>.
- [192] S. Nandakumar and S. Pulari. Real numbers equally compressible in every base. In P. Berenbrink, P. Bouyer, A. Dawar, and M. M. Kanté, editors, *40th International Symposium on Theoretical Aspects of Computer Science, STACS 2023, March 7-9, 2023, Hamburg, Germany*, volume 254 of *LIPICS*, pages 48:1–48:20. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2023. arXiv:2208.06340, doi:10.4230/LIPICS.STACS.2023.48.
- [193] S. Nandakumar, S. Pulari, and A. S. Finite-state relative dimension, dimensions of A. P. subsequences and a finite-state van Lambalgen’s theorem. *Inf. Comput.*, 298:105156, 2024. doi:10.1016/J.IC.2024.105156.
- [194] S. Nandakumar, S. Pulari, and A. S. Point-to-set principle and constructive dimension faithfulness. In R. Královic and A. Kucera, editors, *49th International Symposium on Mathematical Foundations of Computer Science, MFCS 2024, August 26-30, 2024, Bratislava, Slovakia*, volume 306 of *LIPICS*, pages 76:1–76:15. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2024. arXiv:2403.08278, doi:10.4230/LIPICS.MFCS.2024.76.
- [195] S. Nandakumar, S. Pulari, A. S, and S. Sarma. One-way functions and polynomial time dimension. Technical Report 2411.02392, arXiv, 2025. arXiv:2411.02392.
- [196] S. Nandakumar, A. S, and P. Vishnoi. Effective continued fraction dimension versus effective Hausdorff dimension of reals. In J. Leroux, S. Lombardy, and D. Peleg, editors, *48th International Symposium on Mathematical Foundations of Computer Science, MFCS 2023, August 28 to September 1, 2023, Bordeaux, France*, volume 272 of *LIPICS*, pages 70:1–70:15. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2023. arXiv:2308.07594, doi:10.4230/LIPICS.MFCS.2023.70.
- [197] S. Nandakumar and S. K. Vangapelli. Normality and finite-state dimension of Liouville numbers. *Theory Comput. Syst.*, 58(3):392–402, 2016. doi:10.1007/S00224-014-9554-8.
- [198] S. Nandakumar and P. Vishnoi. Randomness and Effective Dimension of Continued Fractions. In J. Esparza and D. Král’, editors, *45th International Symposium on Mathematical Foundations of Computer Science (MFCS 2020)*, volume 170 of *Leibniz International Proceedings in Informatics (LIPICS)*, pages 73:1–73:13, Dagstuhl, Germany, 2020. Schloss Dagstuhl – Leibniz-Zentrum für Informatik. doi:10.4230/LIPICS.MFCS.2020.73.
- [199] K. M. Ng. *Computability, Traceability and Beyond*. PhD thesis, Victoria University of Wellington, 2009. URL: <https://ir.wgtn.ac.nz/items/43ca305d-15f2-4fd2-8c0e-9a4adafca87b>.
- [200] J. Nichols. Pushdown gamblers and pushdown dimension. Master’s thesis, Iowa State University, Ames, IA, USA, 2004. URL: <https://dr.lib.iastate.edu/handle/20.500.12876/97583>, doi:10.31274/rtd-20200817-9.

- [201] A. Nies. *Computability and randomness*, volume 51 of *Oxford Logic Guides*. Oxford University Press, 2009.
- [202] A. Nies and J. Reimann. A lower cone in the wtt degrees of non-integral effective dimension. In *Computational Prospects of Infinity*, pages 249–260, 2008. doi:10.1142/9789812796554_0013.
- [203] K. Okamura. Random sequences with respect to a measure defined by two linear fractional transformations. *Theory of Computing Systems*, 57(1):226–237, 2015. doi:10.1007/S00224-014-9585-1.
- [204] T. Orponen. Combinatorial proofs of two theorems of Lutz and Stull. *Mathematical Proceedings of the Cambridge Philosophical Society*, 171(3):503–514, 2021. doi:10.1017/S0305004120000328.
- [205] C. P. Porter. Length functions and the dimension of points in self-similar fractal trees. *IEEE Transactions on Information Theory*, 69(10):6221–6230, 2023. doi:10.1109/TIT.2023.3287411.
- [206] J. Ratsaby. Fractal information density. *Chaos, Solitons & Fractals*, 192:115989, 2025. doi:10.1016/j.chaos.2025.115989.
- [207] S. Reid. The classes of algorithmically random reals. Master’s thesis, Victoria University of Wellington, 2003. URL: <https://ir.wgtn.ac.nz/handle/123456789/23487>.
- [208] J. Reimann. *Computability and fractal dimension*. PhD thesis, Ruprecht-Karls Universität Heidelberg, 2004. doi:10.11588/heidok.00005543.
- [209] J. Reimann. Effectively closed sets of measures and randomness. *Annals of Pure and Applied Logic*, 156:170–182, 2008. doi:10.1016/j.apal.2008.06.015.
- [210] J. Reimann. Randomness beyond Lebesgue measure. In *Proceedings of Logic Colloquium 2006*, 2009.
- [211] J. Reimann. Information vs. dimension: An algorithmic perspective. In *Structure And Randomness In Computability And Set Theory*, pages 111–151. World Scientific Publishing, 2020. arXiv:2408.05121, doi:10.1142/9789813228238_0004.
- [212] J. Reimann and F. Stephan. Effective Hausdorff dimension. In M. Baaz, S.-D. Friedman, and J. Krajíček, editors, *Logic Colloquium ’01*, volume 20 of *Lecture Notes in Logic*, pages 369–385. Cambridge University Press, 2005. doi:10.1017/9781316755860.015.
- [213] J. Reimann and F. Stephan. Hierarchies of randomness tests. In *Mathematical Logic in Asia*, pages 215–232. World Scientific Publishing, 2006. doi:10.1142/9789812772749_0016.
- [214] L. Richter. Co-analytic counterexamples to marstrand’s projection theorem. Technical Report 2301.06684, arXiv, 2023. arXiv:2301.06684.
- [215] L. Richter. *On the Definability and Complexity of Sets and Structures*. PhD thesis, Victoria University of Wellington, 2024. doi:10.26686/wgtn.25573695.

- [216] A. Shen. Around Kolmogorov complexity: Basic notions and results. In V. Vovk, H. Papadopoulos, and A. Gammerman, editors, *Measures of Complexity: Festschrift for Alexey Chervonenkis*, pages 75–115. Springer International Publishing, 2015. doi:10.1007/978-3-319-21852-6_7.
- [217] S. G. Simpson. Mass problems associated with effectively closed sets. *Tohoku Mathematical Journal, Second Series*, 63(4):489–517, 2011. doi:10.2748/tmj/1325886278.
- [218] T. Slaman. On capacitability for co-analytic sets. *New Zealand Journal of Mathematics*, 52:865–869, 2021. doi:10.53733/170.
- [219] S. Song and L. Yu. On the Hausdorff dimension of maximal chains and antichains of Turing and hyperarithmetic degrees. Technical Report 2504.04957, arXiv, 2025. arXiv:2504.04957.
- [220] L. Staiger. Constructive dimension equals Kolmogorov complexity. *Information Processing Letters*, 93(3):149–153, 2005. URL: <http://dx.doi.org/10.1016/j.ipl.2004.09.023>.
- [221] L. Staiger. A correspondence principle for exact constructive dimension. In S. B. Cooper, A. Dawar, and B. Löwe, editors, *How the World Computes - Turing Centenary Conference and 8th Conference on Computability in Europe, CiE 2012, Cambridge, UK, June 18–23, 2012. Proceedings*, volume 7318 of *Lecture Notes in Computer Science*, pages 686–695. Springer, 2012. doi:10.1007/978-3-642-30870-3_69.
- [222] L. Staiger. Exact constructive and computable dimensions. *Theory of Computing Systems*, 61(4):1288–1314, 2017. doi:10.1007/s00224-017-9790-9.
- [223] L. Staiger. Finite automata and randomness. In S. Konstantinidis and G. Pighizzini, editors, *Descriptional Complexity of Formal Systems*, pages 1–10. Springer International Publishing, 2018. doi:10.1007/978-3-319-94631-3_1.
- [224] L. Staiger. On the incomputability of computable dimension. *Logical Methods in Computer Science*, 16(2), May 2020. arXiv:1904.13112, doi:10.23638/LMCS-16(2:5)2020.
- [225] F. Stephan. Hausdorff-dimension and weak truth-table reducibility. In D. Z. K. Kearnes, A. Andretta, editor, *Logic Colloquium 2004*, volume 29 of *Lecture Notes in Logic*, pages 157–167. Association for Symbolic Logic, 2008. doi:10.1017/CBO9780511721151.010.
- [226] J. Stephenson. *Topics in computability theory: Boolean algebras and effective packing dimension*. PhD thesis, University of Chicago, 2014. URL: <https://www.proquest.com/dissertations-theses/topics-computability-theory-boolean-algebras/docview/1559962160/se-2>.
- [227] J. Stephenson. Controlling effective packing dimension of Δ_2^0 degrees. *Notre Dame Journal of Formal Logic*, 57(1):73–93, 2016. doi:10.1215/00294527-3328401.
- [228] D. M. Stull. *Algorithmic Randomness and Analysis*. PhD thesis, Iowa State University, 2017. URL: <https://www.proquest.com/dissertations-theses/algorithmic-randomness-analysis/docview/2019695603/se-2>.

- [229] D. M. Stull. Results on the Dimension Spectra of Planar Lines. In *43rd International Symposium on Mathematical Foundations of Computer Science (MFCS 2018)*, pages 79:1–79:15, 2018. doi:10.4230/LIPIcs.MFCS.2018.79.
- [230] D. M. Stull. Resource bounded randomness and its applications. In J. N. Y. Franklin and C. P. Porter, editors, *Algorithmic Randomness: Progress and Prospects*, volume 50 of *Lecture Notes in Logic*, page 301–348. Cambridge University Press, Cambridge, 2020. doi:10.1017/9781108781718.010.
- [231] D. M. Stull. The dimension spectrum conjecture for planar lines. In *49th International Colloquium on Automata, Languages, and Programming, ICALP 2022, July 4-8, 2022, Paris, France*, pages 133:1–133:20, 2022. arXiv:2102.00134, doi:10.4230/LIPIcs.ICALP.2022.133.
- [232] D. M. Stull. Optimal oracles for point-to-set principles. In *Proceedings of the 39th International Symposium on Theoretical Aspects of Computer Science, STACS 2022*, pages 57:1–57:17, 2022. arXiv:2101.11152, doi:10.4230/LIPIcs.STACS.2022.57.
- [233] D. M. Stull. Pinned distance sets using effective dimension. Technical Report 2207.12501, arXiv, 2022. arXiv:2207.12501, doi:10.48550/ARXIV.2207.12501.
- [234] C. Sureson. Subcomputable Hausdorff function dimension. *Theoretical Computer Science*, 891:59–83, 2021. doi:10.1016/j.tcs.2021.08.028.
- [235] K. Tadaki. Partial randomness and dimension of recursively enumerable reals. In *Proceedings of the 34th International Symposium on Mathematical Foundations of Computer Science (MFCS 2009)*, pages 687–699, 2009. doi:10.1007/978-3-642-03816-7_58.
- [236] S. A. Terwijn. Complexity and randomness. *Rendiconti del Seminario Matematico di Torino*, 62(1):1–38, 2004.
- [237] F. Toska. *Effective Symbolic Dynamics and Complexity*. PhD thesis, University of Florida, 2013. URL: <https://ufdc.ufl.edu/UFE0045340/00001>.
- [238] F. Toska. Strict process machine complexity. *Archive for Mathematical Logic*, 53:525–538, 2014. doi:10.1007/s00153-014-0378-7.
- [239] D. Turetsky. Connectedness properties of dimension level sets. *Theoretical Computer Science*, 412(29):3598–3603, 2011. doi:10.1016/j.tcs.2011.03.006.
- [240] P. W. Tveite. *Effectivizations of Dimension and Cardinal Characteristics*. PhD thesis, University of Wisconsin-Madison, 2017. URL: <https://www.proquest.com/dissertations-theses/effectivizations-dimension-cardinal/docview/1909953747/se-2>.
- [241] A. van der Hulst. Kolmogorov complexity as a tool for computing Hausdorff dimension. Master’s thesis, Radboud University Nijmegen, 2025.

- [242] V. Vassilevska, R. Williams, and S. L. M. Woo. Confronting hardness using a hybrid approach. Technical Report CMU-CS-05-125, School of Computer Science, Carnegie Mellon University, April 2005. URL: <http://reports-archive.adm.cs.cmu.edu/anon/2005/abstracts/05-125.html>.
- [243] F. Wang. Kolmogorov extraction and resource-bounded zero-one laws. Master's thesis, Iowa State University, 2006. URL: <https://dr.lib.iastate.edu/handle/20.500.12876/73024>.
- [244] R. D. Wasson. Data compression and fractal dimension for measures. Master's thesis, The Pennsylvania State University, 2015. URL: <https://etda.libraries.psu.edu/catalog/26517>.
- [245] D. J. Webb. *On New Notions of Algorithmic Dimension, Immunity, and Medvedev Degree*. PhD thesis, University of Hawaii at Manoa, 2022. URL: <https://www.proquest.com/dissertations-theses/on-new-notions-algorithmic-dimension-immunity/docview/2727721863/se-2>.
- [246] L. B. Westrick. *Computability in Ordinal Ranks and Symbolic Dynamics*. PhD thesis, University of California, Berkeley, 2014. URL: <https://www.proquest.com/dissertations-theses/computability-ordinal-ranks-symbolic-dynamics/docview/1625969254/se-2>.
- [247] R. Williams. Defying hardness with a hybrid approach. Technical Report CMU-CS-04-159, School of Computer Science, Carnegie Mellon University, August 2004. URL: <http://reports-archive.adm.cs.cmu.edu/anon/2004/abstracts/04-159.html>.
- [248] M. Zimand. Two sources are better than one for increasing the Kolmogorov complexity of infinite sequences. *Theory of Computing Systems*, 46(4):707–722, 2010. arXiv:0705.4658, doi:10.1007/S00224-009-9214-6.
- [249] M. Zimand. Possibilities and impossibilities in Kolmogorov complexity extraction. Technical Report 1104.0872, arXiv, 2011. arXiv:1104.0872.