

References

- [1] Zeyuan Allen-Zhu et al. “Much Faster Algorithms for Matrix Scaling”. In: (Apr. 7, 2017). arXiv: 1704.02315v1 [cs.DS].
- [2] Zeyuan Allen-Zhu et al. “Operator Scaling via Geodesically Convex Optimization, Invariant Theory and Polynomial Identity Testing”. In: (Apr. 3, 2018). arXiv: 1804.01076v1 [cs.DS].
- [3] Shimshon Amitsur. “Rational identities and applications to algebra and geometry”. In: *Journal of Algebra* 3 (1966), pp. 304–359. URL: <https://www.sciencedirect.com/science/article/pii/0021869366900044>.
- [4] Jonathan Bennett et al. “The Brascamp-Lieb inequalities: finiteness, structure, and extremals”. In: *Geometric and Functional Analysis* 17.5 (2008), pp. 1343–1415. URL: <https://arxiv.org/abs/math/0505065>.
- [5] Markus Bläser, Gorav Jindal, and Anurag Pandey. “Greedy strikes again: A deterministic PTAS for commutative rank of matrix spaces”. In: *Electronic Colloquium on Computational Complexity (ECCC)* 23 (), p. 145. URL: <http://drops.dagstuhl.de/opus/volltexte/2017/7519/>.
- [6] Herm Brascamp and Elliot Lieb. “Best Constants in Young’s Inequality, Its Converse and Its Generalization to More Than Three Functions”. In: *Advances in Mathematics* 20 (1976), pp. 151–172. URL: <https://www.sciencedirect.com/science/article/pii/0001870876901845>.
- [7] Peter A. Brooksbank and Eugene M. Luks. “Testing isomorphism of modules”. In: *Journal of Algebra* 320.11 (2008). Computational Algebra, pp. 4020–4029. ISSN: 0021-8693. DOI: <https://doi.org/10.1016/j.jalgebra.2008.07.014>. URL: <http://www.sciencedirect.com/science/article/pii/S0021869308003748>.
- [8] Peter Bürgisser et al. “Alternating minimization, scaling algorithms, and the null-cone problem from invariant theory”. In: (Nov. 21, 2017). arXiv: 1711.08039v1 [cs.CC].
- [9] Peter Bürgisser et al. “Membership in moment polytopes is in NP and coNP”. In: *SIAM Journal on Computing* 46.3 (2017), pp. 972–991. URL: <http://epubs.siam.org/doi/abs/10.1137/15M1048859>.
- [10] Alexander L. Chistov, Gábor Ivanyos, and Marek Karpinski. “Polynomial Time Algorithms for Modules over Finite Dimensional Algebras”. In: *Proceedings of the 1997 International Symposium on Symbolic and Algebraic Computation, ISSAC '97, Maui, Hawaii, USA, July 21-23, 1997*. 1997, pp. 68–74.
- [11] Matthias Christandl, Péter Vrana, and Jeroen Zuiddam. “Universal points in the asymptotic spectrum of tensors”. In: (Sept. 22, 2017). arXiv: 1709.07851v2 [math.CO].

- [12] Arjeh M. Cohen, Gábor Ivanyos, and David B. Wales. “Finding the radical of an algebra of linear transformations”. In: *J. Pure Appl. Algebra* 117/118 (1997). Algorithms for algebra (Eindhoven, 1996), pp. 177–193. ISSN: 0022-4049. DOI: 10.1016/S0022-4049(97)00010-8. URL: [https://doi.org/10.1016/S0022-4049\(97\)00010-8](https://doi.org/10.1016/S0022-4049(97)00010-8).
- [13] Michael B. Cohen et al. “Matrix Scaling and Balancing via Box Constrained Newton’s Method and Interior Point Methods”. In: (Apr. 7, 2017). arXiv: 1704.02310v2 [cs.DS].
- [14] P. M. Cohn and C. Reutenauer. “On the Construction of the Free Field”. In: *International journal of Algebra and Computation* 9.3 (1999), pp. 307–323. URL: <http://www.worldscientific.com/doi/abs/10.1142/S0218196799000205>.
- [15] D. Cox, J. Little, and D. O’Shea. *Ideals, Varieties, and Algorithms*. Third edition. Undergraduate Texts in Mathematics. Springer, New York, 2007. URL: <https://daco.people.amherst.edu/iva.html>.
- [16] Imre Csiszár and Gábor Tuszány. “Information geometry and alternating minimization procedures”. In: *Stat. Decis. Suppl.* 1 (1984), pp. 205–237.
- [17] Artur Czumaj, ed. *Proceedings of the Twenty-Ninth Annual ACM-SIAM Symposium on Discrete Algorithms, SODA 2018, New Orleans, LA, USA, January 7-10, 2018*. SIAM, 2018. ISBN: 978-1-61197-503-1. DOI: 10.1137/1.9781611975031. URL: <https://doi.org/10.1137/1.9781611975031>.
- [18] Harm Derksen. “Polynomial bounds for rings of invariants”. In: *Proceedings of the American Mathematical Society* 129.4 (2001), pp. 955–964. URL: <https://www.ams.org/proc/2001-129-04/S0002-9939.../S0002-9939-00-05698-7.pdf>.
- [19] Harm Derksen and Gregor Kemper. *Computational Invariant Theory*. 1st ed. Vol. 130. Springer-Verlag Berlin Heidelberg, 2002. DOI: 10.1007/978-3-662-04958-7.
- [20] Harm Derksen and Visu Makam. “Algorithms for orbit closure separation for invariants and semi-invariants of matrices”. In: (Jan. 6, 2018). arXiv: 1801.02043v1 [math.RA].
- [21] Harm Derksen and Visu Makam. “Polynomial degree bounds for matrix semi-invariants”. In: (Dec. 10, 2015). arXiv: 1512.03393v1 [math.RT].
- [22] Harm Derksen and Jerzy Weyman. “The combinatorics of quiver representations”. In: (2007). URL: <https://arxiv.org/abs/math/0608288>.
- [23] Zeev Dvir et al. “Rank bounds for design matrices with block entries and geometric applications”. In: (2016). URL: <https://arxiv.org/abs/1610.08923>.
- [24] Michael Forbes and Amir Shpilka. “Explicit noether normalization for simultaneous conjugation via polynomial identity testing”. In: *RANDOM* 8096 (2013). URL: https://link.springer.com/chapter/10.1007/978-3-642-40328-6_37.

- [25] Jürgen Forster. “A linear lower bound on the unbounded error probabilistic communication complexity”. In: *Journal of Computer and System Sciences* 65.4 (2002), pp. 612–625. URL: <https://www.sciencedirect.com/science/article/pii/S0022000002000193>.
- [26] Marc Fortin and Christophe Reutenauer. “Commutative/Noncommutative Rank of Linear Matrices and Subspaces of Matrices of Low Rank”. In: (2004). URL: www.lacim.uqam.ca/~christo/Publi%C3%A9s/2007/Rank%20of%20linear%20matrices.pdf.
- [27] Ankit Garg et al. “Algorithmic and optimization aspects of Brascamp-Lieb inequalities, via Operator Scaling”. In: (July 22, 2016). arXiv: 1607.06711v3 [cs.CC].
- [28] Ankit Garg et al. “Operator scaling: theory and applications”. In: (Nov. 11, 2015). arXiv: 1511.03730v3 [cs.CC].
- [29] Boaz Gelbord and Roy Meshulam. “Spaces of singular matrices and matroid parity”. In: *European Journal of Combinatorics* 23.4 (2002), pp. 389–397. URL: <https://www.sciencedirect.com/science/article/pii/S0195669802905731>.
- [30] I. Gelfand et al. “Quasideterminants”. In: (Aug. 21, 2002). arXiv: math/0208146v4 [math.QA].
- [31] Leonid Gurvits. “Classical complexity and quantum entanglement”. In: *Journal of Computer and System Sciences* 69.3 (2004), pp. 448–484. URL: <https://www.sciencedirect.com/science/article/pii/S0022000004000893>.
- [32] Leonid Gurvits. “Hyperbolic polynomials approach to van der waerden/schrijver-valiant like conjectures: sharper bounds, simpler proofs and algorithmic applications”. In: *STOC* (2006), pp. 417–426. URL: <https://dl.acm.org/citation.cfm?id=1132578>.
- [33] Leonid Gurvits and Alex Samorodnitsky. “A deterministic algorithm approximating the mixed discriminant and mixed volume, and a combinatorial corollary”. In: *Discrete Computational Geometry* 27 (2002), pp. 531–550. URL: <https://link.springer.com/article/10.1007/s00454-001-0083-2>.
- [34] Pavel Hrubes and Avi Wigderson. “Non-commutative arithmetic circuits with division”. In: *ITCS* (2014). URL: <https://theoryofcomputing.org/articles/v011a014/>.
- [35] Christian Ikenmeyer, Ketan D. Mulmuley, and Michael Walter. “On vanishing of Kronecker coefficients”. In: *Computational Complexity* (2017). URL: <https://arxiv.org/abs/1507.02955>.
- [36] Gábor Ivanyos, Marek Karpinski, and Nitin Saxena. “Deterministic Polynomial Time Algorithms for Matrix Completion Problems”. In: *SIAM J. Comput.* 39.8 (2010), pp. 3736–3751. DOI: 10.1137/090781231. URL: <https://doi.org/10.1137/090781231>.

- [37] Gábor Ivanyos and Youming Qiao. “Algorithms based on $*$ -algebras, and their applications to isomorphism of polynomials with one secret, group isomorphism, and polynomial identity testing”. In: *Proceedings of the Twenty-Ninth Annual ACM-SIAM Symposium on Discrete Algorithms, SODA 2018, New Orleans, LA, USA, January 7-10, 2018*. Ed. by Artur Czumaj. SIAM, 2018, pp. 2357–2376. ISBN: 978-1-61197-503-1. DOI: 10.1137/1.9781611975031.152. URL: <https://doi.org/10.1137/1.9781611975031.152>.
- [38] Gabor Ivanyos, Youming Qiao, and K. V. Subrahmanyam. “Constructive noncommutative rank computation in deterministic polynomial time over fields of arbitrary characteristics”. In: *ITCS (2017)*. URL: www.cmi.ac.in/~kv/IQS2.pdf.
- [39] Gabor Ivanyos, Youming Qiao, and K. V. Subrahmanyam. “Non-commutative Edmonds’ problem and matrix semi-invariants”. In: *Computational Complexity (2016)*. URL: <https://link.springer.com/article/10.1007/s00037-016-0143-x>.
- [40] Gábor Ivanyos et al. “Generalized Wong sequences and their applications to Edmonds’ problems”. In: *31st International Symposium on Theoretical Aspects of Computer Science (STACS 2014)*. Ed. by Ernst W. Mayr and Natacha Portier. Vol. 25. Leibniz International Proceedings in Informatics (LIPIcs). Dagstuhl, Germany: Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, 2014, pp. 397–408. ISBN: 978-3-939897-65-1. DOI: 10.4230/LIPIcs.STACS.2014.397. URL: <http://drops.dagstuhl.de/opus/volltexte/2014/4474>.
- [41] Gbor Ivanyos et al. “Generalized Wong sequences and their applications to Edmonds’ problems”. In: *Journal of Computer and System Sciences* 81.7 (2015), pp. 1373–1386. ISSN: 0022-0000. DOI: <https://doi.org/10.1016/j.jcss.2015.04.006>. URL: <http://www.sciencedirect.com/science/article/pii/S0022000015000446>.
- [42] Valentine Kabanets and Russell Impagliazzo. “Derandomizing polynomial identity tests means proving circuit lower bounds”. In: *Computational Complexity* 13 (2004), pp. 1–46. URL: <https://www.cs.sfu.ca/~kabanets/Research/poly.html>.
- [43] Wolfgang W. Kuchlin, ed. *ISSAC ’97: Proceedings of the 1997 International Symposium on Symbolic and Algebraic Computation*. Kihei, Maui, Hawaii, USA: ACM, 1997. ISBN: 0-89791-875-4.
- [44] Tsz Chiu Kwok et al. “The Paulsen Problem, Continuous Operator Scaling, and Smoothed Analysis”. In: (Oct. 6, 2017). arXiv: 1710.02587v2 [cs.DS].
- [45] Carlton Lemke and J. T. Howson. “Equilibrium points of bimatrix games”. In: *SIAM Journal on Applied Mathematics* 12.2 (1964), pp. 413–423. URL: <http://epubs.siam.org/doi/abs/10.1137/0112033>.

- [46] Elliot Lieb. “Gaussian kernels have only Gaussian maximizers”. In: *Inventiones Mathematicae* 102 (1990), pp. 179–208. URL: <https://link.springer.com/article/10.1007/BF01233426>.
- [47] Nati Linial, Alex Samorodnitsky, and Avi Wigderson. “A Deterministic Strongly Polynomial Algorithm for Matrix Scaling and Approximate Permanents”. In: *Combinatorica* 20 (4 2000), pp. 545–568. URL: <https://link.springer.com/article/10.1007/s004930070007>.
- [48] Laszlo Lovasz. “Singular spaces of matrices and their application in combinatorics”. In: *Bulletin of the Brazilian Mathematical Society* 20 (1989), pp. 87–99. URL: <https://link.springer.com/article/10.1007/BF02585470>.
- [49] Ernst W. Mayr and Natacha Portier, eds. *31st International Symposium on Theoretical Aspects of Computer Science (STACS 2014), STACS 2014, March 5-8, 2014, Lyon, France*. Vol. 25. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2014. ISBN: 978-3-939897-65-1.
- [50] Ketan D. Mulmuley. “Geometric Complexity Theory V: Efficient algorithms for Noether Normalization”. In: *J. Amer. Math. Soc.* 30.1 (2017), pp. 225–309. URL: <http://www.ams.org/journals/jams/2017-30-01/S0894-0347-2016-00864-0/>.
- [51] Ketan Mulmuley and Milind Sohoni. “Geometric complexity theory I: An approach to the P. vs. NP and related problems”. In: *SIAM Journal on Computing* 31.2 (2006), pp. 496–526. URL: <http://epubs.siam.org/doi/abs/10.1137/S009753970038715X>.
- [52] David Mumford. *Geometric invariant theory*. Springer-Verlag, Berlin-New York, 1965. URL: <http://www.springer.com/us/book/9783540569633>.
- [53] Ryan O’Donnell, ed. *32nd Computational Complexity Conference, CCC 2017, July 6-9, 2017, Riga, Latvia*. Vol. 79. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, Aug. 10, 2017. ISBN: 978-3-95977-040-8.
- [54] Amir Shpilka and Amir Yehudayoff. “Arithmetic Circuits: A Survey of Recent Results and Open Questions”. In: *NOW, Foundations and Trends in Theoretical Computer Science* 5 (2010). URL: <http://www.nowpublishers.com/article/Details/TCS-039>.
- [55] Richard Sinkhorn. “A Relationship Between Arbitrary Positive Matrices and Doubly Stochastic Matrices”. In: *The Annals of Mathematical Statistics* 35 (1964), pp. 876–879. URL: <https://www.jstor.org/stable/2238545>.
- [56] Damian Straszak and Nisheeth K. Vishnoi. “Computing Maximum Entropy Distributions Everywhere”. In: (Nov. 6, 2017). arXiv: 1711.02036v1 [cs.DS].
- [57] Bernd Sturmfels. *Algorithms in Invariant Theory*. 2nd ed. Springer Wein New York, 2008. URL: <http://www.springer.com/us/book/9783211774168>.

- [58] Stefán Valdimarsson. “The Brascamp-Lieb polyhedron”. In: *Canadian Journal of Mathematics* 62 (2010), pp. 870–888. URL: <https://cms.math.ca/10.4153/CJM-2010-045-2>.
- [59] Leslie Valiant. “The complexity of computing the permanent”. In: *Theoretical Computer Science* 8 (1979), pp. 189–201. URL: <https://www.sciencedirect.com/science/article/pii/0304397579900446>.
- [60] Christopher T. Woodward. “Moment maps and geometric invariant theory”. In: (Dec. 6, 2009). arXiv: 0912.1132v6 [math.SG].