

Troy Lee

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Education

- **University of Amsterdam**, 2002–2006
PhD received January 11, 2006
Advisor: Harry Buhrman
- **University of Amsterdam**, 2000–2001
Master of Science in Logic
- **California Institute of Technology**, 1996–2000
Bachelor of Science in Mathematics with Honors.

Positions

- **Nanyang Technological University**, Associate Professor, 2013–present
- **Centre for Quantum Technologies**, Principal Investigator, 2014–present
- **Centre for Quantum Technologies**, Senior Research Fellow, 2010–2013
- **Rutgers University**, Postdoc 2007–2008, 2009–2010
- **Columbia University**, Postdoc 2008–2009
- **LRI, Université Paris-Sud**, Postdoc 2006–2007

Awards

- Singapore National Research Fellowship, 2013
- Binational Israel-US Science Foundation Travel Fellowship, 2009
- National Science Foundation Mathematical Sciences Postdoctoral Research Fellowship, 2007–2008, 2009–2010
- Netherlands Organisation for Scientific Research Rubicon Postdoctoral Fellowship, 2006–2007
- Papers invited to the special issue of Conference on Computational Complexity in 2004, 2005, 2008, 2012 and special issue of Mathematical Foundations of Computer Science, 2004.
- Netherlands-America Fellowship, 2000–2001
- Research Fellowship, Center for the Neural Basis of Cognition, 1999

- Caltech Summer Undergraduate Research Fellowship, 1998
- Robert C. Byrd Scholarship, 1996-1999

Publications

- J. Kaniewski, T. Lee, R. de Wolf. Query complexity in expectation. arXiv:
- T. Lee, Z. Wei. The square root rank of the correlation polytope is exponential. arXiv:
- R. Jain, T. Lee, N. Vishnoi: A quadratically tight partition bound for classical communication complexity and query complexity. CoRR abs/1401.4512 (2014).
- A. Ganor, I. Komargodski, T. Lee, R. Raz. On the noise stability of small de Morgan formulas. ECCV TR12-174.
- A. Hamed, T. Lee. Rank and fooling set size. Submitted. arXiv:1310.7321.
- G. Braun, R. Jain, T. Lee, S. Pokutta. Information-theoretic approximations of the nonnegative rank. Submitted. ECCV TR13-158.
- N. Alon, T. Lee, A. Shraibman. The cover number of a matrix and its algorithmic applications. APPROX 2014.
- T. Lee, A. Shraibman. Matrix Completion From any Given Set of Observations. Spotlight presentation, NIPS 2013: 1781-1787
- N. Alon, T. Lee, A. Shraibman, S. Vempala. The approximate rank of a matrix and its algorithmic applications. In Proceedings of the 45th Annual ACM Symposium on Theory of Computing: 675–684, 2013
- T. Lee, F. Magniez, M. Santha. Improved quantum query algorithms for triangle finding and associativity testing. In proceedings of Symposium on Discrete Algorithms, 2013. arXiv:1210.1014.
- G. Ivanyos, H. Klauck, T. Lee, M. Santha, R. de Wolf. New bounds on the classical and quantum communication complexity of some graph properties. In proceedings of Foundations of Software Technology and Theoretical Computer Science, 2012. arXiv:1204.4596.
- J. Briet, H. Buhrman, T. Lee, T. Vidick. Multipartite entanglement in XOR games. Quantum Information and Computation, vol. 13: 3&4, 2013. arXiv:0911.4007.
- T. Lee, D. Theis. Support based bounds for positive semidefinite rank. Submitted. arXiv:1203.3961
- T. Lee, F. Magniez, M. Santha. A learning graph based quantum query algorithm for finding constant sized subgraphs. Chicago Journal of Theoretical Computer Science, vol. 2012:10, 2012. arXiv:1109.5135
- A. Belovs, T. Lee. Quantum algorithm for k-distinctness with prior knowledge on the input. Technical report: arXiv:1108.3022

- T. Lee, J. Roland. A strong direct product theorem for quantum query complexity. *Computational Complexity* 22(2): 429–462 (2013). Special issue of CCC 2012. arXiv:1104.4468
- T. Lee, B. Reichardt, R. Spalek, M. Szegedy. Quantum query complexity of state conversion. In proceedings of the 52nd Annual Symposium on Foundations of Computer Science (FOCS), 2011. arXiv:1011.3020.
- J. Briet, H. Buhrman, T. Lee, T. Vidick. All Schatten spaces endowed with the Schur product are Q-algebras. *Journal of Functional Analysis*, 262 (1), pp. 1–9, 2012.
- T. Lee, S. Zhang. Composition theorems in communication complexity. In proceedings of the 37th ICALP, 475–489, 2010.
- T. Lee. A note on the sign degree of formulas. Technical report: arXiv:0909.4607.
- T. Lee, A. Shraibman. Lower bounds on communication complexity. Survey article in *Foundations and Trends in Theoretical Computer Science*, Vol. 3: No 4, 263–398.
- T. Lee, G. Schechtman, A. Shraibman. Lower bounds on multiparty quantum communication complexity. In proceedings of the 24th Annual Conference on Computational Complexity, 254–262, 2009.
- T. Lee, A. Shraibman. An approximation algorithm for approximation rank. In proceedings of the 24th Annual Conference on Computational Complexity, 351–357, 2009. arXiv:0809.2093.
- T. Lee, R. Mittal. Product theorems via semidefinite programming. In *Proceedings of the 35th annual International Colloquium on Automata, Languages, and Programming*: vol. 5125, 674–685, 2008.
- A. Childs, T. Lee. Optimal quantum adversary lower bounds for ordered search. In *Proceedings of the 35th annual International Colloquium on Automata, Languages, and Programming*: vol. 5125, 869–880, 2008.
- T. Lee, A. Shraibman. Disjointness is hard in the multiparty number-on-the-forehead model. *Computational Complexity*, 18:2, 309–336, 2009. Special issue from the 23rd Annual Conference on Computational Complexity, 2008.
- T. Lee, A. Shraibman, R. Špalek. A direct product theorem for discrepancy. In *Proceedings of the 23rd Annual Conference on Computational Complexity*: 71–80, 2008.
- P. Høyer, T. Lee, R. Špalek. Negative weights make adversaries stronger. In *Proceedings of the 39th Annual ACM Symposium on Theory of Computing*: 526–535, 2007.
- T. Lee, A new rank technique for formula size lower bounds. In *Proceedings of the 24th Annual Symposium on Theoretical Aspects of Computer Science*. *Lecture Notes in Computer Science*, vol. 4393:145–156, 2007.
- P. Høyer, T. Lee, R. Špalek, Tight adversary bounds for composite functions. Technical report quant-ph/0509067.

- T. Lee. *Kolmogorov Complexity and Formula Size Lower Bounds*. Ph.D. Thesis, University of Amsterdam, 2006.
- L. Fortnow, T. Lee, N. Vereshchagin. Kolmogorov complexity with error. In *Proceedings of the 23rd Symposium on Theoretical Aspects of Computer Science*. Lecture notes in computer science volume 3884, pages 137–148, 2006.
- S. Laplante, T. Lee, M. Szegedy. The quantum adversary method and classical formula size lower bounds. *Computational Complexity*, 15(2):163–196, 2006. Special issue of papers from the 20th Conference on Computational Complexity, 2005.
- T. Lee, A. Romashchenko. On polynomial time bounded symmetry of information. *Theoretical Computer Science*, 345:2-3, pages 386–405, 2005. Special issue of selected papers from the 29th Symposium on the Mathematical Foundations of Computer Science, 2004.
- H. Buhrman, T. Lee, D. van Melkebeek. Language compression and pseudorandom generators. *Computational Complexity*, 14, pages 247–274, 2005. Special issue of selected papers from the 19th Annual IEEE Conference on Computational Complexity, 2004.
- T. Lee. *Arithmetical definability over finite structures*. *Mathematical Logic Quarterly* 49(4):385–392, 2003.
- V. Tereshko, T. Lee. *How information-mapping patterns determine foraging behaviour of a honey bee colony*. *Open Systems and Information Dynamics* 9:1–13, 2002.

Teaching

- Linear Algebra I, Spring 2014, Nanyang Technological University
- Communication Complexity, Spring 2010, Rutgers University.
- Math Behind the Machine, Summer 2010. An 11 lecture course on theoretical computer science for high school students.

Service

- Co-organizing Dagstuhl workshop “Limitations of convex programming: lower bounds on extended formulations and factorization ranks” in February, 2015.
- Local organizer Theory of Quantum Computation, Communication, and Cryptography 2014.
- Co-organized Dagstuhl workshop “Communication complexity, linear optimization, and non-negative rank” in February, 2013.
- Program Committees: Theory of Quantum Computation, Communication, and Cryptography 2015, Quantum Information Processing 2013, Conference on Computational Complexity 2013, Conference on Theory of Quantum Computation, Communication, and Cryptography 2013
- Journal refereeing: *Algorithmica*, *Computational Complexity*, *Mathematical Logic Quarterly*, *Theory of Computing*

- Conference refereeing: Foundations of Computer Science, Symposium on Theory of Computing, Conference on Computational Complexity, Foundations of Software Technology and Theoretical Computer Science, International Colloquium on Automata, Languages and Programming