Paul Valiant

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Associate Professor: Computer Science Department, Purdue University, since August 2021

Former Positions
- Postdoc: Massachusetts Institute of Technology, 2008-2009
- Postdoc: UC Berkeley, 2009-2012 (NSF Mathematical Sciences Postdoctoral Fellowship)
- Assistant Professor: Brown University, 2012-2020
- Von Neumann Fellow: Institute for Advanced Study, Princeton, NJ, 2020-2021

Education
Massachusetts Institute of Technology, 2004 – 2008
- PhD in Computer Science: June 2008
  Thesis Title: "Testing Symmetric Properties of Distributions"
  Advisor: Silvio Micali
- MS in Computer Science: February 2007
- Thesis Title: "Incrementally Verifiable Computation"
Stanford University, 2000 – 2004.
- MS Computer Science: June 2004
- BS Mathematics, and BS Physics: June 2004.

Awards
- Test of Time Award from Theory of Cryptography Conference 2019 *"for demonstrating the power of recursive composition of proofs of knowledge and enabling the development of efficiently verifiable proofs of correctness for complex computations"* in his 2008 TCC paper.
- Brown University Dean's Award for Excellence in Teaching, 2018.
- Winner of the Brown University 2016 Barrett Hazeltine Citation for Teaching. Nominated by students in CSCI 1570: Design and Analysis of Algorithms. University-wide award. One of two winners.
- Sloan Research Fellowship, 2014-2018.
- "An Automatic Inequality Prover and Instance Optimal Identity Testing" (co-authored with G. Valiant) chosen as an *ACM Computing Reviews notable item published in computing in 2014*, one of five papers in the Theory of Computation area.
- Sheridan Center Junior Faculty Teaching Fellow 2014.
- NSF Mathematical Sciences Postdoctoral Research Fellowship, 2009-2011.
- Best Student Paper Award, Theory of Cryptography Conference 2008.
- Machtey Award (Best Student Paper), Foundations of Computer Science Conference 2005 (co-winner).
- National Defense Science and Engineering Graduate Fellowship, from 2004-2007.
- Stanford Mathematics Department Research Award for Undergraduate Honors Thesis on "General Relativity", 2004.

- Three-time member of US International Mathematical Olympiad team.
- Gold Medalist, International Mathematical Olympiad, Bucharest 1999.

Service to Research Community

- Program committee member for the 2013 and 2020 *Foundations of Computer Science Conference*, the 2015, 2017, and 2022 *Innovations in Theoretical Computer Science* conference, the 2016 *Symposium on Discrete Algorithms*; served on 2020 *National Science Foundation* panel.
- Reviewed manuscripts for: *Journal of the Association for Computing Machinery, Symposium on Discrete Algorithms, Random Structures and Algorithms, International Workshop on Randomization and Computation, Theory of Computing, SIAM Journal on Computing, Symposium on Theory of Computing, International Workshop on Approximation Algorithms for Combinatorial Optimization Problems, Foundations of Computer Science, Information Processing Letters, Conference on Computational Complexity, Journal of Computer and System Sciences, Innovations in Theoretical Computer Science.*

Publications

1. J. Lee, P. Valiant. Optimal Sub-Gaussian Mean Estimation in Very High Dimensions. *Innovations in Theoretical Computer Science* (ITCS), 2022.
2. J. Lee, P. Valiant. Optimal sub-Gaussian mean estimation in $\mathbb{R}$. *Foundations of Computer Science* (FOCS), 2021.
3. G. Valiant and P. Valiant. Instance Optimal Distribution Testing and Learning. Chapter 23 in *Beyond the Worst-Case Analysis of Algorithms*, edited by Tim Roughgarden, Cambridge University Press, 2021.
4. J. Lee and P. Valiant. Uncertainty about Uncertainty: Optimal Adaptive Algorithms for Estimating Mixtures of Unknown Coins, *Symposium on Discrete Algorithms* (SODA), 2021.
5. J. Y. Chen, G. Valiant, P. Valiant. Worst-case analysis for randomly collected data. *Neural Information Processing Systems* (NeurIPS) 2020, **invited for "Oral Presentation"**.
6. G. Blanc, N. Gupta, G. Valiant, P. Valiant. Implicit regularization for deep neural networks driven by an Ornstein-Uhlenbeck like process. *Conference on Learning Theory* (COLT), 2020
7. P. Valiant. New Relations for Energy Flow in Terms of Vorticity, arxiv.org/abs/1911.12289, 2019.
8. G. Valiant and P. Valiant. Estimating the Unseen: Improved Estimators for Entropy and Other Properties. *Journal of the ACM, 64(6):* 37:1-37:41 (2017).
9. G. Valiant and P. Valiant. An Automatic Inequality Prover and Instance Optimal Identity Testing. *SIAM Journal on Computing, 46(1):* 429-455 (2017).
10. S. Childress, A. Gilbert, and P. Valiant. Eroding dipoles and vorticity growth for Euler flows in R^3 I. Axisymmetric flow without swirl. *Journal of Fluid Mechanics, 805*, pp. 1-30, 2016.
11. J. Lee and P. Valiant. Optimizing Star-Convex Functions. *IEEE Symposium on Foundations of Computer Science* (FOCS), 2016
12. G. Valiant and P. Valiant. Instance Optimal Learning, *ACM Symposium on Theory of Computing* (STOC) 2016.

13. J. Zou, G. Valiant, P. Valiant, K. Karczewski, S. O. Chan, K. Samocha, M. Lek, Exome Aggregation Consortium, S. Sunyaev, M. Daly, D. MacArthur. Quantifying the unobserved protein-coding variants in human populations provides a roadmap for large-scale sequencing projects. *Nature Communications, 13293, (*2016).

14. G. Valiant and P. Valiant. An Automatic Inequality Prover and Instance Optimal Identity Testing. *IEEE Symposium on Foundations of Computer Science* (FOCS), 2014. (Journal version invited to special issue of *SICOMP*., Chosen as an **ACM Computing Reviews notable item published in computing in 2014**, one of five papers in the Theory of Computation area)

15. P. Valiant. Evolvability of Real Functions. *ACM Transactions on Computation Theory* (special issue for ITCS 2012), 6 (3) #12.

16. S.-O. Chan, I. Diakonikolas, G. Valiant, and P. Valiant. Optimal Algorithms for Testing Closeness of Discrete Distributions. *ACM-SIAM Symposium on Discrete Algorithms* (SODA), 2014.

17. G. Valiant and P. Valiant. Estimating the Unseen: Improved Estimators for Entropy, Distinct Elements, and Other Properties. *Neural Information Processing Systems* (NIPS), 2013.

18. C. Daskalakis, I. Diakonikolas, R. Servedio, G. Valiant, and P. Valiant. Testing K-Modal Distributions: Optimal Algorithms via Reductions. *ACM-SIAM Symposium on Discrete Algorithms* (SODA), 2013.

19. G. Gottlob, S.T. Lee, G. Valiant, and P. Valiant. Size and Treewidth Bounds for Conjunctive Queries. *Journal of the ACM* 59(3), 2012

20. P. Valiant. Testing Symmetric Properties of Distributions. *SIAM J. on Computing*, 40 (6), 2011.

21. P. Valiant. Distribution Free Evolvability of Polynomial Functions over all Convex Loss Functions. *3rd Conference on Innovations in Theoretical Computer Science* (ITCS), January, 2012.

22. A. McGregor and P. Valiant. The Shifting Sands Algorithm. *ACM-SIAM Symposium on Discrete Algorithms* (SODA), 2012.

23. G. Valiant and P. Valiant. The Power of Linear Estimators. *IEEE Symposium on Foundations of Computer Science* (FOCS), 2011.

24. G. Valiant and P. Valiant. Estimating the Unseen: an n/log(n)-Sample Estimator for Entropy and Support Size, Shown Optimal via New CLTs. *ACM Symposium on Theory of Computing* (STOC) 2011, pp. 685-694.

25. A. Bhattacharyya, E. Fischer, R. Rubinfeld, and P. Valiant. Testing Monotonicity of Distributions over General Partial Orders. *2nd Conference on Innovations in Computer Science* (ICS), January, 2011, pp. 239-252.

26. J. Chen, S. Micali, and P. Valiant. Robustly Leveraging Collusion in Combinatorial Auctions. *1st Conference on Innovations in Computer Science* (ICS), January, 2010, pp. 81-93.

27. C. Daskalakis, G. Schoenebeck, G. Valiant, and P. Valiant. On the Complexity of Nash Equilibria of Action-Graph Games. *ACM-SIAM Symposium on Discrete Algorithms* (SODA) 2009, pp. 710-719.

28. P. Valiant. Testing Symmetric Properties of Distributions, *ACM Symposium on Theory of Computing* (STOC) 2008, pp. 383-392.

29. P. Valiant: Incrementally Verifiable Computation or Proofs of Knowledge Imply Time/Space Efficiency. *Theory of Cryptography Conference* (TCC) 2008, pp. 1-18. **Winner of the Best Student Paper Award, and 2019 Test of Time Award**.

30. X. Chen, S.-H. Teng, P. Valiant. The Approximation Complexity of Win-Lose Games. *ACM-SIAM Symposium on Discrete Algorithms* (SODA) 2007, pp. 159-168.

31.   M. Vutukuru, P. Valiant, S. Kopparty, H. Balakrishnan. How to Construct a Correct and Scalable iBGP Configuration. *IEEE International Conference on Computer Communications* (INFOCOM) 2006.

32.   T. Abbot, D. Kane, P. Valiant. On the Complexity of Two-Player Win-Lose Games *IEEE Symposium on Foundations of Computer Science* (FOCS) 2005, pp. 113-122. **Co-winner of the Best Student Paper award**.

33.   P. Valiant. The Tensor Product of Two Codes Is Not Necessarily Robustly Testable. *9th International Workshop on Randomization and Computation* (RANDOM) 2005, pp. 472-481.

34.   M. de Graaf and P. Valiant, Polynomial Representations of Symmetric Partial Boolean Functions. *SIAM Journal on Discrete Math* 19(2) 2005, pp. 481-488.

35.   P. Valiant, Linear Bounds on the North-East Model and Higher Dimensional Analogs. *Advances in Applied Mathematics* 33(1), 2004, pp. 40-50.

36.   P. Valiant, The Log-Rank Conjecture and Low Degree Polynomials. *Information Processing Letters* 89(2), 2004, pp. 99-103.