Vijay Bhattiprolu

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Institute for Advanced Study   **http://vspvijay.com**

Education:

→ **Postdoctoral Researcher** at **Princeton University** during Aug 2019-July 2020 and at the **School of Mathematics** at the **Institute for Advanced Study** during Aug 2020–July 2022. Affiliated with the **Simons Collaboration on Algorithms and Geometry**.

→ **Ph.D.** In Algorithms, Combinatorics, Optimization, **Carnegie Mellon University**, Aug 2014 – June 2019. **Advisor:** Venkatesan Guruswami,

→ **B.Sc.** In Math & Computer Science, **University of Illinois at Urbana-Champaign**, Aug 2011 - May 2014. Graduated with Honors and Highest distinction.

Research Interests:

Approximation Algorithms / Inapproximability, Convex/Continuous Optimization, Convcx Geometry, Functional Analysis, Operator Norms, Sum of Squares Hierarchy, Spectral Theory.

Publications:

1. **Separating NP-Hardness of the Grothendieck Problem from the Little-Grothendieck Problem.**
   With Euiwoong Lee and Madhur Tulsiani.
   ITCS 2022. http://vspvijay.com/bpsdgroth.pdf

2. **A Framework for Quadratic Form Maximization over Convex Sets via Non-Convex Relaxations.**
   With Assaf Naor and Euiwoong Lee.
   STOC 2021. http://vspvijay.com/quadmax.pdf

3. **Inapproximability of Matrix p->q Norms.**
   With Mrinalkanti Ghosh, Venkatesan Guruswami, Euiwoong Lee and Madhur Tulsiani.
   SICOMP 2021. https://arxiv.org/abs/1802.07425
   Part of this work was announced in SODA 2019 in a merged abstract with the below paper.

4. **Approximating Operator Norms via Generalized Krivine Rounding.**
   With Mrinalkanti Ghosh, Venkatesan Guruswami, Euiwoong Lee and Madhur Tulsiani.
   SODA 2019. https://arxiv.org/abs/1804.03644

5. **A PTAS for lp-Low Rank Approximation.**
   With Frank Ban, Karl Bringmann, Pavel Kolev, Euiwoong Lee, and David Woodruff.
   SODA 2019. https://arxiv.org/abs/1807.06101

6. **Weak Decoupling, Polynomial Folds and Approximate Optimization over the Sphere.**
   With Mrinalkanti Ghosh, Venkatesan Guruswami, Euiwoong Lee and Madhur Tulsiani.
   FOCS 2017. https://arxiv.org/abs/1611.05998

7. **Sum of Squares Certificates for Maxima of Random Tensors over the Sphere.**
   With Venkatesan Guruswami and Euiwoong Lee.
   RANDOM 2017. https://arxiv.org/abs/1605.00903

8. **Extending Parikh's Theorem to Weighted and Probabilistic Context-Free Grammars.**
   With Spencer Gordon and Mahesh Viswanathan.
   QEST 2017. http://vspvijay.com/ptscfg.pdf

9. **Separating a Voronoi Diagram via Local Search.**
   With Sariel Har-Peled.
   SoCG 2016. https://arxiv.org/abs/1401.0174

10. **Approximate Hypergraph Coloring under Low-discrepancy and Related Promises.**
    With Venkatesan Guruswami and Euiwoong Lee.
    APPROX 2015. https://arxiv.org/abs/1506.06444

Visits/Internships:

→ Visited Pravesh Kothari at Princeton/IAS during July/August 2018.
→ Spring 2018 Visitor at Center for Mathematical Sciences and Applications at Harvard University.
→ Visiting researcher at U. C. Berkeley hosted by Prasad Raghavendra. October 2017 – January 2018.
→ Toyota Technological Institute - Summer 2017. Mentored by Madhur Tulsiani.
→ Toyota Technological Institute - Summer 2016. Mentored by Madhur Tulsiani.

Invited Talks:

→ SIAM AG'21 Conference on Applied Algebraic Geometry. Approximability of Quadratic Maximization over Convex Sets.
→ IAS November/December 2020. Factorization, Rounding and Duality.
→ IAS April 2020. Approximability of Quadratic Maximization over Convex Sets.
→ Rutgers/Dimacs April 2020. Approximability of Quadratic Maximization over Convex Sets.
→ Simons A&G January 2020. Approximability of Quadratic Maximization over Convex Sets.
→ Berkeley Theory Lunch January 2018. On the Approximability of p-to-q norms.
→ Simons Workshop Fall 2017: Hierarchies, Extended Formulations and Matrix Analytic Techniques. On approximate optimization over the sphere.
→ CMU Theory Lunch Spring 2017. On Approximate optimization over the sphere.
→ CMU Theory Lunch Fall 2015. On Approximate Hypergraph Coloring under Promise.

Awards and Honors:

→ Spring 2014: Recipient of C. W. Gear outstanding undergraduate award.
→ Spring 2013: Recipient of James N. Snyder award for outstanding scholastic achievement.
→ Fall 2011 – Spring 2014: Graduated with James Scholars Honors and Highest Distinction.