

# EUIWOONG LEE

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**RESEARCH INTEREST** Theoretical computer science, especially approximation algorithms, hardness of approximation, sum-of-squares (SoS) hierarchy.

**EMPLOYMENT** **Postdoctoral Associate**  
New York University, 2018.1 -

**Research Fellow**  
Simons Institute for the Theory of Computing at Berkeley, 2017.8 - 2017.12

**EDUCATION** **Ph.D., Computer Science**  
Carnegie Mellon University, 2017  
Thesis title: Optimal Approximabilities beyond CSPs  
Advisor: Venkatesan Guruswami

**M.S., Computer Science**  
California Institute of Technology, 2012  
Thesis title: Clustering Affine Spaces: Hardness and Algorithms  
Thesis advisor: Leonard J. Schulman

**B.S., Computer Science and Mathematics**  
California Institute of Technology, 2009

**HONORS** Edmund M. Clarke Doctoral Dissertation Award from CMU CS, 2018  
ICALP Best Student Paper Award, 2017  
Simons Award for Graduate Students in Theoretical Computer Science, 2015  
Samsung Scholarship for graduate study (PhD), 2012 - 2017  
Samsung Scholarship for graduate study (MS), 2009 - 2012  
Upperclass Merit Award at Caltech, 2008  
ACM - ICPC World Final, 31th place (out of 100 teams), 2008  
ACM - ICPC Southern California Regional, First place (out of 63 teams), 2007

**JOURNAL PUBLICATIONS** Beating the 2-Approximation Factor for Global Bicut  
with Kristóf Bérczi, Karthekeyan Chandrasekaran, Tamás Király, and Chao Xu.  
*Mathematical Programming, Series A.*

Partitioning a Graph into Small Pieces with Applications to Path Transversal  
*Mathematical Programming, Series A.*

Inapproximability of  $H$ -Transversal/Packing  
with Venkatesan Guruswami.  
*SIAM Journal on Discrete Mathematics (SIDMA).*

Nearly Optimal NP-hardness of Unique Coverage  
with Venkatesan Guruswami.  
*SIAM Journal on Computing (SICOMP).*

APX-Hardness of Maximizing Nash Social Welfare with Indivisible Items  
*Information Processing Letters (IPL)*.

LP/SDP Hierarchy Lower Bounds for Decoding Random LDPC Codes  
with Badih Ghazi.  
*IEEE Transactions on Information Theory*.

Improved and Simplified Inapproximability for k-means  
with Melanie Schmidt and John Wright.  
*Information Processing Letters (IPL)*.

Towards a Characterization of Approximation Resistance for Symmetric CSPs  
with Venkatesan Guruswami.  
*Theory of Computing (TOC)*.

Strong Inapproximability Results on Balanced Rainbow-Colorable Hypergraphs  
with Venkatesan Guruswami  
*Combinatorica*.

Simple Proof of Hardness of Feedback Vertex Set  
with Venkatesan Guruswami.  
*Theory of Computing (TOC) 2016*.

Complexity of Approximating CSP with Balance/Hard Constraints.  
with Venkatesan Guruswami.  
*Theory of Computing Systems (TOCS) 2016*.

**CONFERENCE PUBLICATIONS** Losing Treewidth by Separating Subsets  
with Anupam Gupta and Jason Li and Pasin Manurangsi and Micha Wodarczyk.  
*ACM-SIAM Symposium on Discrete Algorithms (SODA) 2019*.

A PTAS for  $\ell_p$ -Low Rank Approximation  
with Frank Ban and Vijay Bhattiprolu and Karl Bringmann and Pavel Kolev and David Woodruff.  
*ACM-SIAM Symposium on Discrete Algorithms (SODA) 2019*.

Approximability of  $p \rightarrow q$  matrix norms: Generalized Krivine rounding and hypercontractive hardness  
with Vijay Bhattiprolu and Mrinalkanti Ghosh and Venkatesan Guruswami and Madhur Tulsiani.  
*ACM-SIAM Symposium on Discrete Algorithms (SODA) 2019*.

Faster Exact and Approximate Algorithms for k-Cut  
with Anupam Gupta and Jason Li.  
*IEEE Symposium on Foundations of Computer Science (FOCS) 2018*.

Optimal Online Contention Resolution Schemes via Ex-Ante Prophet Inequalities  
with Sahil Singla.  
*European Symposium on Algorithms (ESA) 2018*.

- Tri-Fly: Distributed Estimation of Global and Local Triangle Counts in Graph Streams with Kijung Shin and Mohammad Hammoud and Jinoh Oh and Christos Faloutsos.  
*Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD) 2018.*
- An FPT Algorithm Beating 2-Approximation for k-Cut with Anupam Gupta and Jason Li.  
*ACM-SIAM Symposium on Discrete Algorithms (SODA) 2018.*
- Understanding the Correlation Gap for Matchings with Guru Guruganesh.  
*Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS) 2017.*
- Weak Decoupling, Polynomial Folds, and Approximate Optimization over the Sphere with Vijay V. S. P. Bhattiprolu, Mrinalkanti Ghosh, Venkatesan Guruswami, and Madhur Tulsiani.  
*Annual Symposium on Foundations of Computer Science (FOCS) 2017.*
- Improved Hardness for Cut, Interdiction, and Firefighter Problems  
*International Colloquium on Automata, Languages, and Programming (ICALP) 2017.*
- Why You Should Charge Your Friends for Borrowing Your Stuff with Kijung Shin, Dhivya Eswaran, Ariel Procaccia.  
*International Joint Conference on Artificial Intelligence (IJCAI) 2017.*
- Sum-of-Squares Certificates for Maxima of Random Tensors on the Sphere with Vijay V. S. P. Bhattiprolu and Venkatesan Guruswami.  
*International Workshop on Randomization and Computation (RANDOM) 2017.*
- Global and Fixed-terminal Cuts in Digraphs with Kristóf Bérczi, Karthekeyan Chandrasekaran, Tamás Király, and Chao Xu.  
*International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX) 2017.*
- Minimum Birkhoff-von Neumann Decomposition with Janardhan Kulkarni and Mohit Singh.  
*Conference on Integer Programming and Combinatorial Optimization (IPCO) 2017.*
- Maximum Matching in the Online Batch-Arrival Model with Sahil Singla.  
*Conference on Integer Programming and Combinatorial Optimization (IPCO) 2017.*
- Partitioning a Graph into Small Pieces with Applications to Path Transversal  
*ACM-SIAM Symposium on Discrete Algorithms (SODA) 2017.*
- Nearly Optimal NP-hardness of Unique Coverage with Venkatesan Guruswami.  
*ACM-SIAM Symposium on Discrete Algorithms (SODA) 2016.*

Approximate Hypergraph Coloring under Low-discrepancy and Related Promises  
with Vijay V. S. P. Bhattiprolu and Venkatesan Guruswami.  
*International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX) 2015.*

Towards a Characterization of Approximation Resistance for Symmetric CSPs  
with Venkatesan Guruswami.  
*International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX) 2015.*

Inapproximability of  $H$ -Transversal/Packing  
with Venkatesan Guruswami.  
*International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX) 2015.*

Hardness of Graph Pricing Through Generalized Max-Dicut  
*ACM Symposium on Theory of Computing (STOC) 2015.*

LP/SDP Hierarchy Lower Bounds for Decoding Random LDPC Codes  
with Badih Ghazi.  
*ACM-SIAM Symposium on Discrete Algorithms (SODA) 2015.*

Strong Inapproximability Results on Balanced Rainbow-Colorable Hypergraphs  
with Venkatesan Guruswami.  
*ACM-SIAM Symposium on Discrete Algorithms (SODA) 2015.*

Complexity of Approximating CSP with Balance/Hard Constraints.  
with Venkatesan Guruswami.  
*Innovations in Theoretical Computer Science (ITCS) 2014.*

Improved Bounds on the Price of Stability in Network Cost Sharing Games  
with Katrina Ligett.  
*ACM Conference on Electronic Commerce (EC) 2013.*

Clustering Affine Spaces: Hardness and Algorithms  
with Leonard J. Schulman.  
*ACM-SIAM Symposium on Discrete Algorithms (SODA) 2013.*

Progress on Pricing with Peering  
with David Buchfuhrer, Lachlan L.H. Andrew, Ao Tang, and Steven H. Low.  
*Conference on Information Sciences and Systems (CISS) 2008.*

Pricing in the Presence of Peering  
with David Buchfuhrer, Lachlan L.H. Andrew, Ao Tang, and Steven H. Low.  
*Allerton Conference on Communication, Control and Computing 2007.*

## TALKS

Losing Treewidth by Separating Subsets  
ICALP 2018 Workshop on Parameterized Approximation Algorithms

An FPT Algorithm Beating 2-Approximation for  $k$ -Cut  
ISMP 2018

FPT-Approximation Algorithms for  $k$ -Cut and  $k$ -Treewidth Deletion  
NYU Theory Seminar

Approximability of Norm Optimization  
Simons Collaboration on Algorithms and Geometry Meeting 2018

Polynomial Optimization over the Sphere  
FOCS 17  
Simons Reading Group on Convex Hierarchies

Hardness of Cut Problems  
Simons Workshop on Discrete Optimization via Continuous Relaxation  
ICALP 17

Sum-of-Squares Certificates for Maxima of Random Tensors on the Sphere  
RANDOM 17

FPT Approximation Algorithms for Graph Problems  
KAIST Discrete Math Seminar

Minimum Birkhoff-von Neumann Decomposition  
IPCO 17

Partitioning a Graph into Small Pieces with Applications to Path Transversal  
UC Berkeley Theory Lunch  
Pohang University of Science and Technology (Postech)  
Seoul National University  
SODA 2017  
CMU Theory Lunch

Nearly Optimal NP-hardness of Unique Coverage  
SODA 2016  
CMU Theory Lunch

Inapproximability of  $H$ -Transversal/Packing  
APPROX 2015  
CMU Theory Lunch

Towards a Characterization of Approximation Resistance for Symmetric CSPs  
Dagstuhl Seminar on CSP 2015  
APPROX 2015

Hardness of Graph Pricing  
CMU CSD Open House 2015  
KAIST Theory Day 2015  
STOC 2015

Strong Inapproximability Results on Balanced Rainbow-Colorable Hypergraphs  
SODA 2015

Complexity of Approximating CSP with Balance/Hard Constraints.  
ITCS 2014  
China Theory Week 2014

Improved Bounds on the Price of Stability in Network Cost Sharing Games  
EC 2013

Clustering Affine Subspaces: Hardness and Algorithms  
SODA 2013  
CMU Theory Lunch 2013

Pricing in the Presence of Peering  
Caltech Theory Seminar 2007

**SERVICE**

Program Committee: APPROX 18, WADS 19

Ph.D. Admissions Committee for CMU Computer Science Department, 2016, 2017

Organizer of CMU Theory Lunch, Jan.2015 - Mar. 2015

External reviewer for STOC, FOCS, SODA, ICALP, APPROX, RANDOM, IPEC, TARK, JACM, SICOMP, SIDMA, Algorithmica, TOC, TOCT, TEAC.

**TEACHING**

TA for CS138 (Computer Algorithms) at Caltech, Mar.2009 - Jun.2009

TA for 15-859N (Spectral Graph Theory) at CMU, Aug.2013 - Dec.2013

TA for 15-457A/859E (Advanced Algorithms) at CMU, Jan.2015 - May.2015