

## Dr. Nikolai (Nick) Gravin

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CONTACT INFORMATION      School of Information Management & Engineering,      *ITCS, SUFE*  
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Yangpu District, Shanghai 200433 China      *WWW: logic.pdmi.ras.ru/~gravin*

ACADEMIC POSITIONS      **Associate Professor**      2017 – Present  
ITCS, Shanghai University of Finance and Economics  
**Postdoctoral Researcher**      2016 – 2017  
MIT: Computer Science and Artificial Intelligence Laboratory  
• Host: Constantinos Daskalakis  
**Postdoctoral Researcher**      2013 – 2015  
Microsoft Research New England  
• Supervising manager: Jennifer Chayes

EDUCATION

(2nd) Ph.D., **Nanyang Technological University**, Singapore, December 2013

- Thesis: *Incentive Compatible Design of Reverse Auctions*
- Adviser: Dmitrii Pasechnik
- G.P.A.: 4.00/4

(1st) Ph.D., **V. A. Steklov Institute of Mathematics**, St. Petersburg, Russia, April 2011

- Thesis: *Some aspects of proper graph colorings*
- Adviser: Dmitrii Karpov

Specialist (M.S. & B.S.), **Saint-Petersburg State University**, Russia, June 2008

- Thesis: *Non-degenerate colorings in Brook's theorem*
- Adviser: Dmitrii Karpov
- graduated cum laude

AWARDS & GRANTS

MOE Tier 2 Grant SGD 740,000 (USD 600,000), co-investigator, Singapore 2011-2014

PhD Microsoft Research Asia Fellowship, 2011.

SINGA PhD scholarship, Singapore 2009-2013

Euler Foundation Scholarship for Young Mathematicians, Russia 2008.

Semi-finals of ACM International, Collegiate Programming Contest, 2006.

Gold Medal at International Mathematical Olympiad, 2003.

EXPERIENCE

**Research intern, Microsoft Research New England**, June-August 2012.

- Supervisor: Jennifer Chayes

**Visiting PhD student, Aarhus University**, July-September 2011.

- Host: Peter Bro Miltersen

**Research intern, Microsoft Research Asia**, June-August 2010.

- Supervisor: Pinyan Lu

PROFESSIONAL  
SERVICES

**Programm committee:** ACM EC 2014, ACM EC 2015, ACM EC 2016, SAGT 2015

**Subreferee:** ACM EC 2013, ALT 2014, CATS 2012, CIAC 2013, CSR (2010, 2011), FOCS 2014, ICALP 13, MFCS 2013, SAGT 2014, SODA (2013, 2015), SOFSEM 2014, SPAA 2011, STOC (2011, 2013, 2014, 2015), WINE (2009, 2010, 2011, 2012, 2013).

**Journal Reviews:** Games and Economic Behavior, Mathematics of Operation Research, ACM Transactions on Algorithms, IEEE Transactions on Signal Processing, Advances in Computational Mathematics.

**Other services:** mathematical reviews for AMS, session organizer at international symposium on mathematical programming 2015.

JOURNAL  
PUBLICATIONS

- [1] N. Gravin, F. Petrov, D. Shiryayev, S. Robins. *Poisson imitation of lattices and convex curves*, **Mathematika**, v. 60, i. 01, pp. 139- 152, 2014
- [2] N. Chen, N. Gravin, P. Lu. *Truthful Generalized Assignments via Stable Matching*, **Mathematics of Operation Research**, p. 722-736, v. 39, n. 3, 2014
- [3] N. Gravin, M. Kolountzakis, S. Robins, D. Shiryayev. *Structure results for multiple tilings in 3D*, **Discrete and Computational Geometry**, v. 50, i. 4, pp. 1033-1050, 2013
- [4] N. Gravin, J. Lasserre, D. Pasechnik, S. Robins. *The inverse moment problem for convex polytopes*, **Discrete and Computational Geometry**, 48(3), pp. 596-621, 2012
- [5] N. Gravin, S. Robins, D. Shiryayev. *Translational tilings by a polytope, with multiplicity*, **Combinatorica**, (32) 6, pp. 629-649, 2012
- [6] I. Caragiannis, A. Fanelli, N. Gravin, A. Skopalik, *Computing approximate pure Nash equilibria in congestion games*, **SIGecom Exchanges**, pp. 26-29, 2012
- [7] N. Chen, N. Gravin. *Note on Shortest k-Paths Problem*, **Journal of Graph Theory**, v. 67(1), pp. 34-37, 2011
- [8] N. Gravin, D. Karpov. *On proper colorings of hypergraphs*, **Zap. Nauchn. Sem. POMI**, v. 391, pp. 79-89. (English translation) Journal of Mathematical Sciences, v. 184, i. 5, pp. 595-600, 2011
- [9] N. Gravin. *Construction of a spanning tree with many leaves*, **Zap. Nauchn. Sem. POMI**, v. 381, pp. 31-46. (English translation) Journal of Mathematical Sciences v. 179, n. 5, pp. 592-600, 2011
- [10] N. Gravin. *Non-degenerate colorings in the Brook's theorem*, **Diskr. Mat.**, 21:4 (2009), pp. 105-128, (English translation) Discrete Mathematics and Applications, v. 19, i.5, pp. 533-553, 2009
- [11] N. Gravin, D. Shiryayev. *Abnormal subgroups of classical groups corresponding to closed sets of roots*, **Zap. Nauchn. Sem. POMI**, v. 365, pp. 151-171, (English translation) Journal of Mathematical Sciences, 161:4, pp. 542-552, 2009

CONFERENCE  
PROCEEDINGS

- [1] N. Gravin, Y. Peres, B. Sivan. *Tight Lower Bounds for Multiplicative Weights Algorithmic Families*, forthcoming **ICALP 2017**.
- [2] N. Gravin, N. Immorlica, B. Lucier, E. Pountourakis. *Procrastination with Variable Present Bias*, ACM conference on Economics and Computation, p.361, **ACMEC 2016**.
- [3] N. Gravin, Y. Peres, B. Sivan. *Towards Optimal Algorithms for Prediction with Expert Advice*, ACM-SIAM Symposium on Discrete Algorithms, pp. 528-547, **SODA 2016**

- [4] N. Chen, N. Gravin, P. Lu. *Competitive analysis via benchmark decomposition*, ACM conference on Economics and Computation, pp. 363-376, **ACM EC 2015**.
- [5] M. Feldman, N Gravin, B. Lucier. *Combinatorial Auctions via Posted Prices*, ACM-SIAM Symposium on Discrete Algorithms, pp. 123-135, **SODA 2015**.
- [6] I. Caragiannis, A. Fanelli, N. Gravin. *Short Sequences of Improvement Moves Lead to Approximate Equilibria in Constraint Satisfaction Games*, International Symposium on Algorithmic Game Theory, pp. 49–60, **SAGT 2014**.  
Journal version accepted to **Algorithmica**
- [7] N. Chen, N. Gravin, P. Lu. *Optimal competitive auctions*, ACM Symposium on the Theory of Computing, pp. 253–262, **STOC 2014**
- [8] N. Gravin, P. Lu. *Competitive Auctions for Markets with Positive Externalities*, International Colloquium on Automata, Languages and Programming, pp. 569-580, **ICALP 2013**
- [9] M. Feldman, N Gravin, B. Lucier. *Combinatorial Walrasian Equilibrium*, ACM Symposium on the Theory of Computing, pp. 61-70, **STOC 2013**.  
Journal version in **SIAM J. Comput.**, 45(1), pp. 29–48.
- [10] M. Feldman, Hu Fu, N Gravin, B. Lucier. *Simultaneous Auctions are (almost) Efficient*, ACM Symposium on the Theory of Computing, pp. 201–210, **STOC 2013**.  
**Invited to the special issue of Games and Economic Behavior (GEB)**
- [11] I. Caragiannis, A. Fanelli, N. Gravin, A. Skopalik. *Approximate Pure Nash Equilibria in Weighted Congestion Games: Existence, Efficient Computation, and Structure*, ACM conference on Electronic Commerce, pp. 284-301, **ACM EC 2012**.  
**Invited to the special issue of ACM Transactions on Economics and Computation (TEAC)**
- [12] X. Bei, N. Chen, N. Gravin, P. Lu.  
*Budget Feasible Mechanism Design: From Prior-Free to Bayesian*, ACM Symposium on the Theory of Computing, pp. 449-458, **STOC 2012**
- [13] I. Caragiannis, A. Fanelli, N. Gravin, A. Skopalik. *Efficient computation of approximate pure Nash equilibria in congestion games*, the IEEE Symposium on Foundations of Computer Science, pp. 532-541, **FOCS 2011**
- [14] J. Augustine, N. Chen, E. Elkind, A. Fanelli, N. Gravin, D. Shiryayev. *Dynamics of Profit-Sharing Games*, International Joint Conference on Artificial Intelligence, pp. 37-42, **IJCAI 2011**
- [15] N. Chen, N. Gravin, P. Lu. *On the Approximability of Budget Feasible Mechanisms*, ACM-SIAM Symposium on Discrete Algorithms, pp. 685-699, **SODA 2011**
- [16] J. Augustine, N. Gravin. *On The Continuous CNN Problem*, International Symposium on Algorithms and Computation, pp. 254-265, **ISAAC 2010**
- [17] N. Gravin. *Time optimal d-list colouring of a graph*, International Computer Science Symposium in Russia, pp. 156-168, **CSR 2010**
- [18] N. Chen, E. Elkind, N. Gravin, F. Petrov. *Frugal Mechanism Design via Spectral Techniques*, the IEEE Symposium on Foundations of Computer Science, pp. 755-764, **FOCS 2010**
- [19] N. Chen, E. Elkind and N. Gravin.  
*Refining the Cost of Cheap Labor in Set System Auctions*, International Workshop on Internet and Network Economics, pp. 447-454, **WINE 2009**

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| WORKING PAPERS      | <p>[1] C. Daskalakis, N. Dikkala, N. Gravin. <i>Testing from One Sample: Is the casino really using a riffle shuffle?</i>, under submission.</p> <p>[2] Y. Azar, M. Feldman, N. Gravin, A. Roytman. <i>Liquid Price of Anarchy</i>, under submission.</p> <p>[3] N. Gravin, D. Pasechnik, B. Shapiro, M. Shapiro. <i>On moments of a polytope</i>, under submission.</p>   |
| TECHNICAL REPORTS   | N. Gravin, D. Nguyen, D. Pasechnik, S. Robins. <i>The Inverse Moment problem for convex polytopes: implementation aspects</i> , 2014.  |
| TUTORIALS           | “Budget Feasible Mechanisms”, Conference on Web and Internet Economics (WINE), Harvard University, Cambridge, MA, December 2013 (Co-taught with Yaron Singer)  |
| INVITED TALKS       | <p>Seattle, Microsoft Theory Day “Play with your benchmarks”, October 2014</p> <p>Barbados, Bellairs Workshop on Algorithmic Game Theory, “Competitive analysis: how to play with your benchmarks”, April 2014</p> <p>Dagstuhl seminar on Electronic Markets and Auctions, “Competitive auctions for selling an item in unlimited supply”, November 2013</p> <p>New York Computer Science and Economics Day, “Optimal competitive auctions”, November 2013</p> <p>MSR New England, Game Theory and Computation Seminar, “Optimal competitive auctions”, October, 2013</p> <p>Singapore, Theory seminar “Combinatorial Walrasian Equilibrium”, November 2012</p> <p>Copenhagen, CFEM workshop on New Trends in Mechanism Design, “On the power of random sampling in mechanism design”, September 2011</p> <p>Aarhus, CTIC Theory seminar “Frugal Mechanism Design via Spectral Techniques”, August 2011</p> <p>Hong-Kong, Joint Workshop on Applied Mathematics and Informatics, “An Improved Algorithm for Orthogonal CNN Problem”, March 2010.</p> |
| ACTIVITIES          | <p>Organizer of <i>reading group</i> at <i>Nanyang Technological University</i>, spring 2011, fall 2012.</p> <ul style="list-style-type: none"> <li>• Research papers on algorithmic game theory and related topics.</li> </ul> <p><i>Seminar organizer</i> at <i>Saint-Petersburg State University</i>, spring 2008</p> <ul style="list-style-type: none"> <li>• Advanced topics (graduate level) in graph theory for undergraduate students.</li> </ul>  |
| TEACHING EXPERIENCE | <p><b>Saint-Petersburg State University</b></p> <p><i>Teaching Assistant</i>, fall semester 2007</p> <ul style="list-style-type: none"> <li>• 3rd semester of Linear Algebra.</li> <li>• Responsibilities: problem solving, designing tests, grading.</li> </ul> <p><i>Teaching assistant</i>, fall semesters 2008, 2009, 2010</p> <ul style="list-style-type: none"> <li>• Graph Theory and Combinatorics.</li> <li>• Responsibilities: problem solving, designing tests, grading, extra lectures to the main course.</li> </ul>  |

## Nanyang Technological University

*Trainer*, spring semesters 2010, 2011

- Topics on combinatorics and linear algebra for 2-5 year undergraduate students.
- Responsibilities: selection to and training for International Mathematical Competition.

*Instructor*, spring semester 2011

- Course: “art of problem solving” for 1-3 year students.
- Responsibilities: design of problem sets, problem solving, maintaining blog where students did cross-verification of their solutions.

### REFERENCES AVAILABLE TO CONTACT

**Jennifer Chayes** (e-mail: [jchayes@microsoft.com](mailto:jchayes@microsoft.com))

- Managing Director Microsoft Research New England
- ◇ Microsoft Research, One Memorial Drive Cambridge, MA 02142

**Yuval Peres** (e-mail: [peres@microsoft.com](mailto:peres@microsoft.com) )

- Principal Researcher at Microsoft Research Redmond,  
Adjunct Professor at UC Berkeley.
- ◇ Microsoft Research, One Microsoft Way WA, 98052

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**Michal Feldman** (e-mail: [michal.feldman@cs.tau.ac.il](mailto:michal.feldman@cs.tau.ac.il))

- Associate Professor at Tel-Aviv University
- ◇ Blavatnic School of Computer Science Schreiber Building,  
Tel Aviv University P.O.B. 39040, Ramat Aviv, Tel Aviv

**Pinyan Lu** (e-mail: [pinyanl@microsoft.com](mailto:pinyanl@microsoft.com))

- Lead Researcher at Microsoft Research Asia,  
Chair Professor at Shanghai Jiao Tong University
- ◇ Microsoft Shanghai Technology Park  
No 999, Zixing Road, Minhang District Shanghai, 200241, China.

**Sinai Robins** (e-mail: [rsinai@ntu.edu.sg](mailto:rsinai@ntu.edu.sg))

- Associate Professor at Nanyang Technological University
- ◇ School of Physical and Mathematical Sciences,  
21 Nanyang Link, 637371 Singapore.