

# Anton Bernshteyn

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## RESEARCH INTERESTS

My main areas of research are **combinatorics** and **descriptive set theory**. Some particular topics I am interested in include: graph coloring, probabilistic methods, extremal combinatorics, and Borel/measurable combinatorics with applications to ergodic theory.

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## EDUCATION

PHD in Mathematics, **University of Illinois at Urbana–Champaign**, Urbana, IL, U.S.A., 2018  
MSC in Mathematics, **University of Illinois at Urbana–Champaign**, Urbana, IL, U.S.A., 2016  
BSC in Mathematics, **Novosibirsk State University**, Novosibirsk, Russia, 2014

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## ACADEMIC APPOINTMENTS

Postdoctoral Associate, **Carnegie Mellon University**, Pittsburgh, PA, U.S.A., 2018–present

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## AWARDS & FELLOWSHIPS

Philippe Tondeur Dissertation Prize, 2018  
Waldemar J., Barbara G., and Juliette Alexandra Trjitzinsky Fellowship, 2017–2018  
Illinois Distinguished Fellowship, 2014–2017

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## PUBLICATIONS & PREPRINTS

### *Journal articles*

**2019+** With A. KOSTOCHKA and X. ZHU. *Fractional DP-colorings of sparse graphs*. **Journal of Graph Theory**, to appear.

*Measurable versions of the Lovász Local Lemma and measurable graph colorings*. **Advances in Mathematics**, to appear.

With M. TAIT. *Improved lower bound for difference bases*. **Journal of Number Theory**, to appear.

*Ergodic theorems for the shift action and pointwise versions of the Abért–Weiss theorem*. **Israel Journal of Mathematics**, to appear.

*Multiplication of weak equivalence classes may be discontinuous*. **Transactions of the American Mathematical Society**, to appear.

*Building large free subshifts using the Local Lemma*. **Groups, Geometry, and Dynamics**, to appear.

With A. KOSTOCHKA. *DP-colorings of hypergraphs*. **European Journal of Combinatorics**, to appear.

With O. KHORMALI, R.R. MARTIN, J. ROLLIN, D. RORABAUGH, S. SHAN, and A.J. UZZELL. *Regular colorings in regular graphs*. **Discussiones Mathematicae Graph Theory**, to appear.

**2019** *The Johansson–Molloy theorem for DP-coloring*. **Random Structures and Algorithms**, 54 (4), 2019, 653–664.

With M. DELCOURT, H. TOWNSNER, and A. TSERUNYAN. *A short nonalgorithmic proof of the containers theorem for hypergraphs*. **Proceedings of the American Mathematical Society**, 147 (4), 2019, 1739–1749.

**2018** With A. KOSTOCHKA. *Об отличиях DP-раскраски от предписанной раскраски* (Russian) [On differences between DP-coloring and list coloring]. **Matematicheskie Trudy**, 21 (2), 2018, 61–71; [English version](#).

With A. KOSTOCHKA. *Sharp Dirac’s theorem for DP-critical graphs*. **Journal of Graph Theory**, 88 (3), 2018, 521–546.

**2017** With A. KOSTOCHKA and X. ZHU. *DP-colorings of graphs with high chromatic number*. **European Journal of Combinatorics**, 65, 2017, 122–129.

*The Local Cut Lemma*. **European Journal of Combinatorics**, 63 (2017), 95–114.

With A. KOSTOCHKA and S. PRON. *О DP-раскраске графов и мультиграфов* (Russian) [On DP-coloring of graphs and multigraphs]. **Siberian Mathematical Journal**, 58 (1), 2017, 36–47; [English version](#).

**2016** *The asymptotic behavior of the correspondence chromatic number*. **Discrete Mathematics**, 339 (11), 2016, 2680–2692.

*New bounds for the acyclic chromatic index*. **Discrete Mathematics**, 339 (10), 2016, 2543–2552.

With A. KOSTOCHKA. *On the number of edges in a graph with no  $(k + 1)$ -connected subgraphs*. **Discrete Mathematics**, 339 (2), 2016, 682–688.

**2014** *3-регулярные подграфы и  $(3, 1)$ -раскраски 4-регулярных псевдографов* (Russian) [3-Regular subgraphs and  $(3, 1)$ -colorings of 4-regular pseudographs]. **Discrete Analysis and Operations Research**, 21 (5), 2014, 3–16.

**2013** With N. SHILOV. *Мультиагентная задача о роботах в пространстве: сложностной, информационный и криптографический аспекты* (Russian) [Robots in Space Multi-agent Problem: complexity, information and cryptographic aspects]. **Modeling and Analysis of Information Systems**, 20 (2), 2013, 34–53.

### **Preprints**

**2018** With M. DELCOURT and A. TSERUNYAN. *Independent sets in algebraic hypergraphs*.

**2017** *On Baire measurable colorings of group actions*.

### **Expository writing**

*An  $\ell_2$ -based proof of Gaboriau’s theorem*.

*Linear Algebra* (lecture notes).

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## INVITED TALKS

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### **Invited conference talks**

**2019** *Logic Fest in the Windy City*, **University of Illinois at Chicago**, Chicago, IL.

*Joint Mathematics Meetings (JMM)*, AMS Special Session on Recent Advances in Regularity Lemmas, Baltimore, MD.

**2018** *Atlanta Lecture Series in Combinatorics and Graph Theory*, **Emory University**, Atlanta, GA.

*South Eastern Logic Symposium*, **University of Florida**, Gainesville, FL.

**2017** *Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM)*, Graph Colouring Minisymposium, **Ryerson University**, Toronto, ON, Canada.

*Spring Central Sectional Meeting of the AMS*, Special Session on Extremal Problems in Graphs, Hypergraphs and Other Combinatorial Structures, **Indiana University**, Bloomington, IN.

**2016** *Workshop on New Trends in Graph Coloring*, **Banff International Research Station**, Banff, AB, Canada; [video of the talk](#).

*Atlanta Lecture Series in Combinatorics and Graph Theory*, **Georgia State University**, Atlanta, GA.

### ***Invited seminar talks***

**2019** Descriptive Set Theory Seminar, **University of Illinois at Urbana–Champaign**, Urbana, IL, April 10.

Graph Theory and Combinatorics Seminar, **University of Illinois at Urbana–Champaign**, Urbana, IL, April 9.

Logic Seminar, **University of Illinois at Urbana–Champaign**, Urbana, IL, April 9.

Tutte Colloquium, **University of Waterloo**, Waterloo, ON, Canada, March 8.

Model Theory Seminar, **University of Waterloo**, Waterloo, ON, Canada, March 7.

Graphs and Matroids Seminar, **University of Waterloo**, Waterloo, ON, Canada, March 6.

**2018** Groups and Dynamics Seminar, **Texas A&M University**, College Station, TX, November 14.

Combinatorics Seminar, **University of Birmingham**, Birmingham, United Kingdom, May 30.

Mathematics Colloquium, **Western Illinois University**, Macomb, IL, April 26.

Discrete Applied Math Seminar, **Illinois Institute of Technology**, Chicago, IL, February 7.

**2017** Logic Seminar, **University of Illinois at Chicago**, Chicago, IL, April 11.

Combinatorics Seminar, **University of Birmingham**, Birmingham, United Kingdom, February 16.

DIMAP Seminar, **University of Warwick**, Coventry, United Kingdom, February 14.

**2016** Caltech–UCLA Logic Seminar, **University of California, Los Angeles**, CA, November 18.

Logic Seminar, **California Institute of Technology**, Pasadena, CA, November 17.

Mathematical Logic Seminar, **Carnegie Mellon University**, Pittsburgh, PA, October 11.

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## TEACHING

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### ***Carnegie Mellon University***

**2019** Spring: [Set Theory](#) (21-329).

**2018** Fall: [Linear Algebra](#) (21-341).

### ***University of Illinois at Urbana–Champaign***

**2018** Spring: **Set Theory and Forcing** (graduate, MATH 574), TA.

**2017** Fall: [A Mathematical World](#) (MATH 181), primary instructor (with curriculum responsibilities).

Spring: **Real Analysis** (graduate, MATH 540), TA.

**2016** Fall: **Combinatorial Mathematics** (graduate, MATH 580), TA, and **Structure of Graphs** (graduate, MATH 582), TA.

Spring: **Mathematical Logic** (MATH 414), TA, and **Linear Programming** (MATH 482), TA.

**2015** Fall: **Graph Theory** (MATH 412), TA, and **Mathematical Logic** (graduate, MATH 570), TA.

Spring: **Applied Linear Algebra** (MATH 415), TA.

- On *List of Teachers Ranked as Excellent by Their Students*.

**2014** Fall: **Applied Linear Algebra** (MATH 415), TA.

- On *List of Teachers Ranked as Excellent by Their Students*.

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## REVIEWS & REFEREEING

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Archive for Mathematical Logic (Springer)

Discrete Applied Mathematics (Elsevier)

Discrete Mathematics (Elsevier)

Discussiones Mathematicae Graph Theory (University of Zielona Góra)

Electronic Journal of Combinatorics

European Journal of Combinatorics (Elsevier)

Journal of Combinatorial Theory, Series A (Elsevier)

Journal of Combinatorial Theory, Series B (Elsevier)

Journal of Graph Theory (Wiley)

Mathematical Reviews (AMS)

Order (Springer)

Random Structures & Algorithms (Wiley)

SIAM Journal on Discrete Mathematics (SIDMA)