

Fedor Sandomirskiy

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Research interests: (research statement: [link](#))

economic design, fair division, information design and strategic use of information, algorithmic game theory, dynamic games, probability theory

Research experience:

- **Post-doctoral fellow, starting in Spring 2021**, Caltech
<https://www.hss.caltech.edu/>
- **Post-doctoral fellow, 2018—present**, Game theory group at Technion
<https://gametheory.net.technion.ac.il>
- **Senior research fellow, 2015—present (remote)**, International Laboratory of Game Theory and Decision Making, National Research University Higher School of Economics (NRU HSE)
<http://scem.spb.hse.ru/en/ilgt/about/>
- **Head of the laboratory, 2017—2018**, International Laboratory of Game Theory and Decision Making, National Research University Higher School of Economics (NRU HSE)
<http://scem.spb.hse.ru/en/ilgt/about/>
- **Researcher, 2012—2015**, Chebyshev Laboratory (Department of Mathematics, St.Petersburg State University) <https://chebyshev.spbu.ru/en/>
- **Research assistant, 2008—2011**, Department of Mathematical Physics (Faculty of Physics, St.Petersburg State University)

Selected publications:

working papers:

- Feasible joint posterior beliefs (with Itai Arieli, Yakov Babichenko, and Omer Tamuz)
EC2020 best paper award
accepted by *Journal of Political Economy (JPE)*
arXiv 2020: [arXiv:2002.11362](https://arxiv.org/abs/2002.11362)
[slides](#), [talk](#), [poster](#), [1min talk](#)
- A simple online fair division problem (with Anna Bogomolnaia and Herve Moulin)
accepted by *Management Science*
arXiv 2019: [arXiv:1903.10361](https://arxiv.org/abs/1903.10361),
[slides](#)
- Protecting the protected group: circumventing harmful fairness (with Omer Ben-Porat and Moshe Tennenholtz)
accepted by *AAAI-21* (The Thirty-Fifth AAAI Conference on Artificial Intelligence)
arXiv 2019: [arXiv:1905.10546](https://arxiv.org/abs/1905.10546)

- On social networks that support learning (with Itai Arieli and Rann Smorodinsky)
arXiv 2020: [2011.05255](https://arxiv.org/abs/2011.05255)
[slides](#), [talk](#)
- Representative Committees of Peers (with Reshef Meir and Moshe Tennenholtz)
R&R in *Journal of Artificial Intelligence Research (JAIR)*
arXiv 2020: [arXiv:2006.07837](https://arxiv.org/abs/2006.07837)
- Algorithms for competitive division of chores (with Simina Brânzei)
R&R in *Mathematics of Operations Research*
arXiv 2019: [arXiv:1907.01766](https://arxiv.org/abs/1907.01766)
[slides](#)
- Fair division with minimal sharing (with Erel Segal-Halevi)
R&R in *Operations Research*
arXiv 2019: [arXiv:1908.01669](https://arxiv.org/abs/1908.01669)
[slides](#)

published:

- Competitive division of a mixed manna (with A. Bogomolnaia, H. Moulin, E. Yanovskaya)
Econometrica, 2017, vol.85:6, p.1847-1871
preprint: [arXiv:1702.00616](https://arxiv.org/abs/1702.00616)
[slides](#)
- A polynomial-time algorithm for computing a Pareto optimal and almost proportional allocation (with Haris Aziz and Herve Moulin)
Operations Research Letters, 2020, vol.48:5, p.573-578
preprint: [arXiv:1909.00740](https://arxiv.org/abs/1909.00740)
- Dividing bads under additive utilities (with A. Bogomolnaia, H. Moulin, E. Yanovskaya)
Social Choice and Welfare, 2019, vol.52:3, p.395-417.
preprint: [arXiv:1608.01540](https://arxiv.org/abs/1608.01540)
- On repeated zero-sum games with incomplete information and asymptotically bounded values
Dynamic Games and Applications, 2018, vol.8:1, p. 180-198
preprint: [arXiv:1509.01727](https://arxiv.org/abs/1509.01727)
- Repeated games of incomplete information with large sets of states
International Journal of Game Theory, 2014, vol.43:4, p.767-789
preprint: [arXiv:1205.6791](https://arxiv.org/abs/1205.6791)
- An exact renormalization formula for the Maryland model (with Alexander Fedotov)
Communications in Mathematical Physics, 2015, vol.334:2, p.1083-1099
preprint: [arXiv:1311.6930](https://arxiv.org/abs/1311.6930)
- Variation of measure-valued martingales and repeated games with incomplete information
Doklady Mathematics (English translations of Proceedings of the Russian Academy of Sciences), 2012, vol.86 p.796-798

Education:

- **Economics & Game-theory:**

- **Ph.D.** (Candidate of Sciences) **in Mathematical Methods of Economics**, 2013, Central Economics and Mathematics Institute, RAS, Moscow
Thesis: “Extreme asymptotic regimes for the value of information in repeated games”
Advisers: Victor Domansky, Ernst Presman
Graduated with honors

- **Mathematics:**

- **Master Degree in Mathematical Physics**, 2011, Faculty of physics, St.Petersburg State University
Thesis: “Monodromization and the Maryland equation”
Adviser: Alexander Fedotov
Graduated with honors, GPA: 9/10

- **Computer science:**

- **Advanced training in Computer Science Center**, St.Petersburg, 2015-2017
specialization: theoretical computer science
Programming skills: C++, Matlab/Octave, Python

- **Additional training:**

- COST IC1205 Summer School on Computational Social Choice (San Sebastian, 2016)
- The 28th Jerusalem School in Economic Theory: mechanism design (2017)
- The Workshop on soft skills for teaching and research by William Thomson (2018)
- The 3rd Jerusalem School in Computer Science and Engineering on Blockchains and Cryptocurrencies (2018)
- Schools on computational aspects of fair division (organizer, see below)

Short-term research visits:

- Stanford MS&E, hosted by Itai Ashlagi, December 2019
- Caltech (California Institute of Technology), hosted by Omer Tamuz, December 2019
- University of Rochester, hosted by William Thomson, September 2018
- University of Glasgow, hosted by Herve Moulin and Anna Bogomolnaia, Jan. 2016 and Feb. 2017
- Hebrew University of Jerusalem, hosted by Avi Shmida, November 2017

Selected presentations:

I've given more than 50 talks. The list of the most important:

- “On social networks that support learning”, micro-theory seminar of Cornell University, December 2020, [slides](#)
- “Methods of Optimal Transportation in Bayesian Persuasion & Auctions”, seminar of the Laboratory of Stochastic Analysis and its Applications of HSE, November 2020, [slides](#)
- “Feasible joint posterior beliefs”, [slides](#), [talk](#), [poster](#), [1min talk](#)

- The joint seminar of the Center for the Study of Rationality (Hebrew University) and Tel-Aviv University, December 2020
- The Twenty-First ACM Conference on Economics and Computation (EC'20), July 2020, **best paper award**
- Department of Management Science and Engineering, Stanford, December 2019, USA
- Division of the Humanities and Social Sciences, Caltech, December 2019, USA
- Department of Economics, Bar-Ilan University, November 2019, Israel
- “Can society learn without opinion leaders”, [slides](#), [talk](#)
 - Conference on Mechanism and Institution Design 2020 (CMID20), June 2020
 - Joint virtual seminar of Technion and Bar-Ilan university, June 2020
- “One open problem in Bayesian communication”, open-problem session at Dynamics and Information Workshop, Tel-Aviv University, January 2020, Israel
- “Fair division with minimal sharing”, Workshop and Tutorial on Fair Division Theory “De Aequa Divisione” at LUISS, 2019, Rome, Italy, [slides](#)
- “A simple online fair division problem”, [slides](#)
 - Econ-CS seminar of the Center for the Study of Rationality, Hebrew University of Jerusalem, 2019, Israel
 - Game theory seminar, Tel-Aviv University, 2019, Israel
- “Algorithms for competitive division of chores”, CS seminar, Tel-Aviv University, 2019, Israel, [slides](#)
- “Nash social welfare for fair division of bads: normative and algorithmic issues”, [slides](#)
 - Game theory seminar, Technion, Haifa, 2018, Israel
 - Econ-CS seminar of the Center for the Study of Rationality, Hebrew University of Jerusalem, 2017, Israel
- “Fairness / efficiency trade-off in online (and offline) object-allocation problems”, seminar in econ. department, September 2018, University of Rochester, USA
- “Competitive division of a mixed manna”, 22nd Coalition Theory Network Workshop, 2017, Glasgow, UK
- “Competitive fair division of goods, bads, and satiable items”, Matching under preferences (MATCH UP), 2017, Boston, USA
- “On repeated zero-sum games with incomplete information and asymptotically bounded values”, GAMES 2016, the 5th World Congress of the Game Theory Society, 2016, Maastricht, Netherlands
- “Competitive fair division of bads, hairy ball theorem and concentration effects”, Sixth International Workshop on Computational Social Choice (COMSOC 2016), 2016, Toulouse, France
- “Infinite games where information is revealed in finite time”, Mathematical Aspects of Game Theory and Applications, 2014, Roscoff, France
- “On repeated games with incomplete information having bounded values”, The 5th Israeli Game Theory conference, 2013, Tel-Aviv, Israel
- “Extremal asymptotic regimes for the value of information”, Games and Strategy in Paris (in honor of Sylvain Sorin’s birthday), 2012, Paris, France

Organizational activities:

I was a member of organizing and program committees of

- International Conference, “Economic Design and Algorithms in St.Petersburg”, and satellite summer school, “Game Theory: Applications, Networks, Emotions”, July 5-9, 2019
- International Conference, “Algorithmic aspects of Social Choice and Auctions”, August 9-10, 2018
- International Summer School, “Fair Division: Between Economics, Mathematics and Computer Science”, August 7-8, 2017
- International Conference, “Advances in Fair Division”, August 9-11, 2017
- International Autumn School, “Computational Social Choice and Fair Division”, October 20-22, 2016
- International conference, “Game Theory and Mechanism Design”, in memory of Victor Domansky, May 22-27, 2016.

All these events were conducted in the Laboratory of Game Theory, see <http://scem.spb.hse.ru/en/ilgt/conferences/>

I was involved in the organization of the Russian Game Theory Olympiad (2018, 2019, 2020), several local workshops, a weekly research seminar on Economics (2015—2018), and series of popular lectures in Game Theory and Mechanism Design for undergrads and gifted secondary-school students.

Teaching and supervision (teaching statement: [link](#))

Apart from popular lectures, I have held regular teaching activities:

- a course “Games with incomplete information and information design” (co-taught with Rann Smorodinsky), Technion, 2020
- a course “Introduction to mechanism design” (developed together with A.Nesterov), Higher School of Economics, 2017
- a tutorial “Appeal and challenges of competitive approach to fair resource allocation” (with Vasilis Gkatzelis) at the “De Aequa Divisione” workshop on fair division (LUISS, Rome, May 2019).
- a tutorial “Modern approaches to Fair Division” at the workshop “Imperfect Markets: Collusion, Networks, and Crowdfunding” (New Economic School, Moscow, 2017)
- tutorials Probability, Analysis 1, Linear algebra, St.Petersburg State University, 2013-2014

Theses completed under my supervision:

- Yulia Ibragimova “Competitive market mechanisms for fair division of indivisible goods”, Bachelor’s thesis. Accepted to poster session at COMSOC 2016
- Yulia Ibragimova “Online Procurement Auctions up to 500 Thousand Rubles: Participants Behavior Patterns at Micro and Macro levels”, Master’s thesis
- Alisa Maricheva “Fair division of indivisible goods with or without money transfers”, Master’s thesis

Reviewing for:

- ACM Conference on Economics and Computation (EC 2019, EC 2020), Program Committee member
- Theoretical Economics
- Economic Theory
- Games and Economic Behavior
- Mathematics of Operations Research
- American Economic Journal: Microeconomics
- STOC 2019 (ACM Symposium on Theory of Computing)
- Eurasian Mathematical Journal
- Recent Advances in Game Theory and Applications
- Mathematical Game Theory and Applications (in Russian)
- German-Israeli Foundation for Scientific Research and Development
- The Israel Science Foundation

Grants:

Principal Investigator:

- RFBR 19-01-00762, “Cardinal mechanisms for resource allocation”
- RFBR 16-01-00269, “Asymptotic problems of game theory”
- RFBR 13-01-00462, “Game-theoretic analysis of multistage social and economic interactions with asymmetrically informed agents and variability of beliefs during Bayesian learning”

Co-investigator:

- RFBR 14-01-00760, “Spectral and asymptotic problems of quantum mechanics and mathematical physics”
- RFBR 13-01-00784, “Controlled random processes”

Awards:

- B.L. Ovsievich memorial prize (2013) for research on repeated games with incomplete information
- V. Deych fund prize (2009) for outstanding Bachelor’s thesis in mathematical physics
- 2008-2011: Several prizes (from first to third), Annual Math Olympiad for Russian students