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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 scholar, 2021—present** Caltech
  https://www.hss.caltech.edu/
- **Post-doctoral scholar, 2018—2021,** 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
  slides, talk, poster, 1min talk
  popular summary published in SIGecom Exchanges
- A simple online fair division problem (with Anna Bogomolnaia and Herve Moulin)
  accepted by *Management Science*
  arXiv 2019: arXiv: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

- On social networks that support learning (with Itai Arieli and Rann Smorodinsky)
  arXiv 2020: 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

- Algorithms for competitive division of chores (with Simina Brânzei)
  R&R in *Mathematics of Operations Research*
  arXiv 2019: arXiv:1907.01766
  slides

- Fair division with minimal sharing (with Erel Segal-Halevi)
  R&R in *Operations Research*
  arXiv 2019: arXiv: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
  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

- 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

- 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

- 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

- 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

- 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 "New Directions in Social Choice in St. Petersburg", July 12-13, 2021
- International Conference, "Economic Design and Algorithms in St.Petersburg", and a 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.

I am a member of the award committee for Victoria Kreps memorial prize for young Russian game theorists and theoretical economists.

Teaching and supervision (teaching statement: link)

- 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:

- EC 2019, EC 2020, EC 2021 (ACM Conference on Economics and Computation), **PC member**
- WINE 2021 - The 17th Conference on Web and Internet Economics, **PC 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