

Assistant Professor

Department of Physics and Astronomy, Hofstra University, Hempstead, NY 11549, USA

Personal

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Education, Degrees

- Fall 1994 – Spring 2000: **P.L. Kapitza Institute for Physical Problems**, Moscow, Russia
Ph. D. in Physics, July 2000,
Thesis: “*Superfluid and normal properties of two-dimensional Fermi systems with repulsion*”
Scientific advisor: Prof. M.Yu. Kagan
- Fall 1989 – Spring 1994: **Moscow Institute of Physics and Technology**, Dolgoprudny, Russia
M. Sc. in Physics, June 1994

Employment History

- Spring 2006 – present: **Hofstra University**, Hempstead, NY
Assistant Professor, Department of Physics and Astronomy
- Spring 2005 – Fall 2006: **Brock University**, St. Catharines, Ontario, Canada
Postdoctoral Research Associate, Department of Physics
- Fall 2001 – Fall 2005: **Université de Sherbrooke**, Sherbrooke, Québec, Canada
Postdoctoral Researcher and Research Associate, Département de physique and Regroupement québécois sur les matériaux de pointe (Department of Physics and Quebec Advanced Material Group)
- Fall 2000 – Summer 2003: **Institute of Radio Engineering and Electronics**, Russian Academy of Sciences, Moscow, Russia
Staff Researcher
- Fall 1994 – Spring 2000: **P.L. Kapitza Institute for Physical Problems**, Russian Academy of Sciences, Moscow, Russia
Postgraduate Researcher

- Fall 1992 – Spring 1994: **Moscow Institute of Physics and Technology** (Department of General and Applied Physics), Dolgoprudny, Russia, and **P.L. Kapitza Institute for Physical Problems** (Theoretical Department), Russian Academy of Sciences, Moscow, Russia
Graduate Research Assistant

Honors and awards

- 2007 – 2009: **KITP Scholar**. This award funds a total of three research visits to Kavli Institute for Theoretical Physics, University of California, Santa Barbara, to be used over a period of up to three years. About seven scholars from undergraduate universities are selected each year.
- 2006, 2008: **HCLAS Faculty Research and Development Grant and Presidential Research Award**, Hofstra University.
- 1994 – 2001: Recipient of individual research and conference grants from **INTAS**, grants from **Russian Foundation for Basic Research**, from **Russian Ministry of Science and Technology**, and from the **Committee at the Russian Academy of Sciences aimed to promote the research made by young scientists in Russia**.
- 1994 and 1995: Individual research grants from **Open Society Institute** and **Soros Foundation** in Moscow.

Professional memberships

- 2002 – present: **American Physical Society**.
- 2009 – present: **Anacapa Society**.

Teaching Experience

Courses taught at Hofstra University, 41 section total, Spring 2006 – Fall 2011:

- PHYS 11A (General Physics Lecture Course, 4 semester hours) – a first semester of a two-semester calculus-based sequence covering the fundamental laws and principles of mechanics, heat, sound, light, electricity and magnetism. PHYS 11A focuses on mechanics and heat. Taught 8 sections in total, Fall 2006 – Fall 2009.
- PHYS 12A (General Physics Lecture Course, 4 semester hours) – a second semester of a two-semester calculus-based sequence covering the fundamental laws and principles of mechanics, heat, sound, light, electricity and magnetism. PHYS 12A has an emphasis on sound, light, electricity and magnetism. Taught 14 sections in total, Spring 2006 – Fall 2011.
- PHYS 1A (Elementary Physics Lecture Course, 3 semester hours) – a first semester of a two-semester algebra-based sequence covering fundamental laws and principles of mechanics, sound, light, electricity and magnetism. PHYS 1A focuses on mechanics and heat. Taught 1 section in the Fall 2011.

- PHYS 2A (Elementary Physics Lecture Course, 3 semester hours) – a second semester of a two-semester algebra-based sequence covering fundamental laws and principles of mechanics, sound, light, electricity and magnetism. PHYS 2A has an emphasis on sound, light, electricity and magnetism. Taught 6 sections in total, Summer 2009 – Summer 2010.
- PHYS 11B (Elementary Physics Lab, 3 semester hours) – Laboratory exercises to accompany PHYS 11A, covering fundamental laws and principles of mechanics. Taught 8 sections in total, Fall 2006 – Fall 2011.
- PHYS 104 (Electromagnetism, 3 semester hours) – an advanced course that covers fundamentals of electromagnetic theory. It includes vector analysis, Maxwells equations, electrostatics, magnetostatics, electromagnetic waves. PHYS 12A is a prerequisite. Taught 2 sections in total, Fall 2008 and Spring 2010.
- PHYS 14F (First-Year Seminar) – This course gives first-year students the opportunity to work with a member of the faculty. The course is open to first-year students only. Topics vary by semester. The course taught covered advanced topics of mechanics and heat. Taught 2 sections in total, Fall 2010 and Fall 2011.
- Fall 2008 – Spring 2009: Supervising Dan Richford, a research undergraduate student, Hofstra University Honors College option. Research project on Mechanisms of Low-temperature Resistivity of Metals. The project included advanced studies of the theoretical background mostly done in the Fall 2008, and an experimental research in the Spring of 2009. The experimental apparatus was designed and built in the undergraduate physics lab. It included the cryostat, the experimental cell, the thermocouple thermometer, and the operational amplifier for the voltage measurements). The thesis has received highest honors in Spring 2009.
- Supervising students at Hofstra University Honors College. (Brianna Burke, Thomas Sorvino, PHYS 11A, Fall 2007; Patrick Gooch, Waqqas Khan, PHYS 11A, Fall 2008; Waqqas Khan, Valerie Podczasy, Spring 2009).
- 2005: Teaching Assistant, PHYS 1P21 General Physics (Mechanics and Waves) at the Department of Physics, Brock University, St. Catharines, Ontario, Canada.
- 1994 – 2000: Teaching Assistant, Physics and Mathematics at Phys-Tech College, the center for extra-curricular study for high school students in Moscow.
- 2000 – 2001: Teaching mentor for graduate students in the research group at P.L. Kapitza Institute, Moscow.

Scientific Interests

My field of research is theoretical condensed matter physics. More specifically:

- **Solid state physics:** unconventional and exotic superconductivity including HTSC and organic materials, quantum phase transition, fluctuations and transport in low-dimensional superconductors;
- **Low temperature physics:** quantum liquids, ultracold gases in traps, superfluidity;
- **Mesoscopic physics:** Kondo physics of quantum dots, Josephson and tunnel junctions, Andreev tunneling.

Research Visits

- Department of Physics, University of Maryland, June 2011;
- Division of Genetics, Harvard Medical School, January 2011;
- Kavli Institute for Theoretical Physics, University of California, Santa Barbara (KITP Scholar and Program on Strongly Correlated Phases in Condensed Matter and Degenerate Atomic Systems), June 2009, 2007, 2009;
- Department of Physics, Brock University, St. Catharines, Ontario, Canada (Prof. K.V. Samokhin), June 2006;
- Kavli Institute for Theoretical Physics, University of California, Santa Barbara (Quantum Phase Transition Program), February – March 2005;
- Low Temperature Group, Royal Holloway University of London, UK (Prof. J. Saunders), October – December 1997;
- Quantum Fluids Group, Kamerlingh Onnes Laboratory, University of Leiden, the Netherlands (Prof. G. Frossati, Prof. R. Jochemsen), November – December 1996;

Talks given

- Kavli Institute for Theoretical Physics, University of California, Santa Barbara, CA, June 2007.
- Condensed Matter Seminar, Department of Physics, Purdue University, IN, March 2005.
- Theory Seminar, Department of Physics, University of Illinois at Urbana-Champaign, IL, March 2005.
- Condensed Matter Physics Seminar, Department of Physics, University of Toronto, Toronto, ON, Canada, January 2004.
- Theoretical Division Seminar, Los Alamos National Laboratory, Los Alamos, NM, October 2003.

- Condensed Matter Seminar, Department of Physics at University of Massachusetts, Amherst, MA, April 2002.
- Condensed Matter Seminar, Department of Physics and Astronomy at Northwestern University, Evanston, IL, January 2002.
- Various talks in P.L. Kapitza Institute, Moscow, Russia, 1994-2001.
- Departement de Physique Theorique, Universite de Geneve, Switzerland, March 2001.
- Theoretical Physics Group, Department of Applied Physics, Delft University of Technology, The Netherlands, October 2000.
- Condensed Matter Physics Group, Department of Physics, Loughborough University, UK, April 2000.
- Low Temperature Group, Royal Holloway University of London, UK, November 1997.
- Quantum Fluids Group, Kamerlingh Onnes Laboratory, University of Leiden, The Netherlands, November 1996.

International Conferences Attendance

- APS March meetings: Pittsburgh, PA 2009, Denver, CO, 2007; Baltimore, MD, 2006; Los Angeles, CA, 2005; Montreal, QC, 2004; Austin, TX, 2003; Indianapolis, IN, 2002.
- CIAR Quantum Materials and Superconductivity Meetings, Toronto, ON, May 2002; Vancouver, BC, May 2003; l'Estere, QC, October 2003; Toronto, ON, May 2004.
- Nanoquebec: Quebec Workshop on Nanoscience and Nanotechnology, Montreal, QC, November 2001 and November 2002.
- International Symposium on Quantum Fluids and Solids QFS'2001, Konstanz, Germany, July 2001.
- International Symposium on Ultralow Temperature Physics ULT'99, St. Petersburg, Russia, August 1999.
- XXII International Conference on Low Temperature Physics LTXXII, Helsinki, Finland, August 1999.
- Condensed Matter and Materials Physics Conference CMMP'97, Exeter, UK, December 1997.
- XXI International Conference on Low Temperature Physics LTXXI, Prague, Czech Republic, August 1996.

International Workshops and Schools

- Strongly Correlated Phases in Condensed Matter and Degenerate Atomic Systems, KITP, UCSB, CA, June 2007.

- Gordon Research Conference on Correlated Electron Systems, South Hadley, MA, June 2006 and 2004.
- Workshop on Evolution of Quantum Effects from the Nano to the Macroscale, Cargese, Corsica, France May 2004.
- Seminar and Workshop on Quantum Phase Transitions, MPIPKS Dresden, Germany, July 2003.
- CIAR School on Superconductivity and Quantum Materials, Hamilton, ON, May 2002; Vancouver, BC, May 2003; Toronto, ON, May 2004.
- NATO Advanced Study Institute on Field Theory of Strongly Correlated Fermions and Bosons in Low-Dimensional Disordered Systems, Windsor, UK, August 2001.
- Training Course in the Physics of Correlated Systems and High-Tc Superconductors, Vietri sul Mare, Salerno, Italy, October 2000 and October 1999.
- NATO Advanced Research Workshop on Open Problems in Strongly Correlated Electron Systems Bled 2000, Bled, Slovenia, April 2000.
- NATO Advanced Study Institute/EC Summer School on New Theoretical Approaches to Strongly Correlated Systems, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, April 2000.
- International Workshop on Spin, Charge and Orbital Ordering in Complex Magnetic Oxides, Dubna, Russia, July 1999.
- Jerusalem Winter School for Theoretical Physics on Concepts and Trends in Condensed Matter Physics, Jerusalem, Israel, January 1999.
- Landau Summer School '94, Chernogolovka, Russia, July 1994.
- Spring College on Condensed Matter, International Center for Theoretical Physics, Trieste, Italy, May 1994.

List of publications in peer-reviewed journals and books.

1. M.Yu. Kagan, D.V. Efremov, M.S. Mar'enko, V.V. Val'kov, *Superconductivity in repulsive Fermi-systems at low density*, cond-mat arXiv:1111.3230, accepted for publication in Journal of Superconductivity and Novel Magnetism in 2011;
2. M.Yu. Kagan, D.V. Efremov, M.S. Marienko, V.V. Valkov, *Triplet p-wave superconductivity in low-density extended Hubbard model with repulsion*, JETP Letters **93**, 807 (2011);
3. K.V. Samokhin and M.S. Mar'enko, *Nonuniform mixed-parity superfluid state in dipolar Fermi gases*, Phys. Rev. Lett. **97**, 197003 (2006);
4. K.V. Samokhin and M.S. Mar'enko, *Quantum fluctuations in Larkin-Ovchinnikov-Fulde-Ferrell superconductors*, Phys. Rev. B **73**, 144502 (2006);
5. M.S. Mar'enko, C. Bourbonnais, and A.-M.S. Tremblay, *Effect of superconducting fluctuations on ultrasound in unconventional superconductor*, Phys. Rev. B **72**, 024508 (2005);
6. M.S. Mar'enko, C. Bourbonnais, and A.-M.S. Tremblay, *Superconducting fluctuation corrections to ultrasound attenuation in layered superconductors*, Phys. Rev. B **69**, 224503 (2004);
7. M.A. Baranov, M.S. Mar'enko, Val.S. Rychkov, and G.V. Shlyapnikov, *Superfluid pairing in a polarized Fermi gas*, Phys. Rev. A **66**, 013606 (2002);
8. M.S. Mar'enko, D.V. Efremov, A.V. Ozharovskii, M.A. Baranov, and M.Yu. Kagan, *Superfluid triplet phases in two-dimensional Fermi system with repulsion*, J. Low Temp. Phys. **126**(1), 551 (2002);
9. M.S. Mar'enko, M.Yu. Kagan, D.V. Efremov and M.A. Baranov, *Superfluidity in 2D Fermi systems with repulsion*, in "Open Problems in Strongly Correlated Electron Systems", edited by Janez Bonca, Peter Prelovsek, Anton Ramsak, Sarben Sarkar, NATO Science Series, Kluwer Academic Publishers and IOS Press, Amsterdam (March 2001), ISBN 0-7923-6896-7;
10. M.A. Baranov, D.V. Efremov, M.S. Mar'enko and M.Yu. Kagan, *Superfluid transition temperature in a Fermi gas with repulsion. Higher orders of perturbation theory*, Sov. Phys. JETP **90**, 861 (2000) [Zh. Eksp. Teor. Fiz. **117**, 990 (2000)] (cond-mat/0007334);
11. D.V. Efremov, M.S. Mar'enko, M.A. Baranov and M.Yu. Kagan, *Critical temperature and phase diagram for 2D superfluid Fermi gas with repulsion*, Physica B **284-288**, 216 (2000);
12. D.V. Efremov, M.S. Mar'enko, M.A. Baranov and M.Yu. Kagan, *Superfluid critical temperature in 3D Fermi gas with repulsion*, Physica B **284-288**, 397 (2000);
13. M.Yu. Kagan, A.V. Chubukov, M.A. Baranov, D.V. Efremov and M.S. Mar'enko, *Superconductivity in correlated electron systems with repulsion*, J. Phys. Chem Solids **59**, 1828 (1998);
14. M.Yu. Kagan, M.A. Baranov, D.V. Efremov and M.S. Mar'enko, *Phase diagram for the superfluid Fermi gas in a strong magnetic field*, Czechoslovak Journal of Physics **46**, 209 (1996);
15. M.A. Baranov, M.Yu. Kagan and M.S. Mar'enko, *Singularity in the quasiparticle interaction function in 2D Fermi gas*, Czechoslovak Journal of Physics **46**, 2519 (1996);

16. M.Yu. Kagan, M.A. Baranov, D.V. Efremov, M.S. Mar'enko, P. Brussaard, Ch.G. van Weert and H.W. Capel, *Phase diagram for a superfluid Fermi gas in a strong magnetic field*, JETP Lett. **62**, 610 (1995) [Pis'ma Zh. Eksp. Teor. Fiz. **62**, 589 (1995)];
17. M.Yu. Kagan, M.A. Baranov, D.V. Efremov, M.S. Mar'enko and H.W. Capel, *Strong coupling corrections in a superfluid Fermi-gas with repulsion*, JETP Lett. **59**, 290 (1994) [Pis'ma Zh. Eksp. Teor. Fiz. **59**, 268 (1994)];
18. M.A. Baranov, M.Yu. Kagan and M.S. Mar'enko, *Singularity in the quasiparticle interaction function in 2D Fermi gas*, JETP Lett. **58**, 709 (1993) [Pis'ma Zh. Eksp. Teor. Fiz. **58**, 734 (1993)];