

YURI O. POPOV

Department of Physics
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EDUCATION

Ph.D., Physics, **University of Chicago**, 2003.

Dissertation: “[*Singularities, Universality, and Scaling in Evaporative Deposition Patterns.*](#)”

Advisor: Prof. Thomas A. Witten.

B.S., Physics, **Moscow State University**, 1997.

Summa cum laude, cumulative GPA 5.0/5.0.

TEACHING EXPERIENCE

Physics Lecturer, University of Michigan, Ann Arbor, Department of Physics, 2008–present.

- Developed physics courses; created syllabi, course content, lecture notes, discussion problems, homework assignments, examinations, computer labs, and organizational handouts.
- Introduced numerical techniques, programming, and computer labs in introductory physics courses for physics majors and for engineering students.
- Redeveloped the introductory sequence for physics honors.
- Reformed the introductory physics sequence for engineering students.
- Implemented interactive engagement methods in large (200+) introductory physics classes.
- Achieved significant improvements in students’ learning gains and classroom atmosphere.
- Created lecture videos and problem-solving videos.
- Flipped the classroom in large intro physics courses.
- Introduced several new teaching tools: math pre-test, prelectures and checkpoints, computer lab manuals.
- Successfully implemented randomized assigned seating on large (500-student) intro-physics exams
- Taught a variety of physics subjects: Classical Mechanics, Electricity and Magnetism, Thermodynamics and Statistical Physics, as well as various computational and mathematical topics.
- Taught at a variety of mathematical levels: algebra-based, calculus-based, and numerics-based.
- Taught at a variety of difficulty levels: from introductory lower-level to advanced upper-level courses.
- Taught to a variety of student audiences: pre-meds, engineers, physics majors, honors students.
- Taught to a variety of age groups: from freshmen to seniors.
- Taught a variety of class sizes: from 7 to 700 students.
- Taught in a variety of classroom settings: large 250-student lectures, 40-student discussion sections, 70-student computer labs, small 15-student studio-type classes.
- Taught full time up to 12 classroom hours a week for 18 years.
- Earned stellar teaching evaluations throughout the pedagogical career (with scores up to 4.9 out of 5.0).
- Advised physics majors and minors for several semesters.
- Took an active role in developing curriculum for the department and conducting several reforms.
- Held complete responsibility for up to 1000 undergraduate students and their grades each year.
- Managed more than 13,000 undergraduate students over 36 semesters.
- Resolved both class-wide and individual-student issues on daily basis.
- Supervised dozens undergraduate learning assistants (on average 7-10 per semester for 30+ semesters).
- Supervised a reform team of 9 graduate students and postdocs.

TEACHING EXPERIENCE (continued)

Physics Tutor, University of Chicago, College Core Tutor Program, 1999–2001.

- Assisted undergraduate and graduate students with Physics- and Math-related problems individually and in small groups (8 hours a week for two calendar years).

Grader, University of Chicago, Department of Physics, graduate course “*Quantum Mechanics 2*”, 2000.

- Graded homework and exams; assisted the professor in developing solutions to problem sets.

Teaching Assistant, University of Chicago, Department of Physics, undergraduate sequence “*Physics for Science Majors 1, 2, and 3*”, 1997–1998.

- Conducted lab sessions (8 hours a week for a full calendar year).
- Graded lab notebooks, homework and exams; held extensive office hours.

RESEARCH EXPERIENCE

Post-doctoral Researcher, **Case Western Reserve University**, Department of Physics, 2007–2008.

Principal investigator: Prof. Philip L. Taylor.

Research subject: *Equilibrium structure of ionomer membranes in fuel cells.*

- Studied dipole screening and dipole correlations in partially charged polymer systems.
- Developed a theoretical framework for understanding the influence of electrostatic interactions on the structure of ionomer membranes.
- Applied field-theoretic techniques to dipolar interactions.

Post-doctoral Researcher, **University of California, Santa Barbara**, Materials Research Laboratory, 2005–2007.

Principal investigator: Prof. Glenn H. Fredrickson.

Research subject: *Formation of complexes and correlation properties in polyelectrolyte systems.*

- Formulated field-theoretic models for polyelectrolyte solutions and analytically solved them by employing fluctuation expansions in arbitrary dimensions.
- Investigated phase separation and polyelectrolyte complexation under various conditions.
- From first principles, predicted a novel correlation length associated with electrostatic interactions in oppositely charged polymer systems.
- Obtained comprehensive scaling results for several polymer problems of varying complexity.

Post-doctoral Researcher, **University of Michigan, Ann Arbor**, Department of Physics, 2003–2005.

Principal investigator: Prof. Alexei V. Tkachenko.

Research subject: *Effects of structural singularities and sequence disorder on DNA micromechanical properties.*

- Developed an analytical model for the elastic response of a worm-like polymer chain with reversible kink-like defects.
- Predicted a renormalization of the DNA persistence length in the limit of small stretching forces and the formation of multi-kink structures in the limit of large stretching forces.
- Analyzed the effects of inherent sequence disorder on DNA looping and cyclization by accounting for both random intrinsic curvature and inhomogeneous bending rigidity.
- Discovered a remarkably wide (up to several orders of magnitude) distribution of cyclization probabilities for even completely random nucleotide sequences.

RESEARCH EXPERIENCE (continued)

Graduate Research Assistant, **University of Chicago**, James Franck Institute, 1998–2003.

Advisor: Prof. Thomas A. Witten.

Research subject: *Colloidal suspensions and solute transfer in evaporating sessile drops.*

- Developed a theory of solute transfer near the edge of a drying drop with a sharply bent contact line.
- Analytically predicted two qualitatively different regimes near the singularity of the vertex.
- Generalized an existing theory to account for the spatial extent of deposit patterns.
- Solved an independent problem on hydrodynamic interactions in colloidal suspensions.

Undergraduate Thesis Research, **Moscow State University**, Department of Physics, 1995–1997.

Advisors: Prof. Alexander N. Semenov and Prof. Igor Y. Erukhimovich.

Research subject: *Nematic ordering in anisotropic polymer networks.*

- Extended a mean-field theory of nematic ordering to non-Gaussian networks with “frozen” anisotropy and analytically predicted a soft deformation mode.

PUBLICATIONS

N.A. Tarchinski, H. Rypkema, T. Finzell, Y.O. Popov, T.A. McKay “[Extended Exam Time Has a Minimal Impact on Disparities in Student Outcomes in Introductory Physics.](#)” *Frontiers in Education*, **7**, 831801 (2022).

J. Lee, Y.O. Popov, G.H. Fredrickson “[Complex Coacervation: A Field-Theoretic Simulation Study of Polyelectrolyte Complexation.](#)” *The Journal of Chemical Physics*, **128**, 224908 (2008). ([arXiv:0803.3994](#))

Y.O. Popov, J. Lee, G.H. Fredrickson “[Field-Theoretic Simulations of Polyelectrolyte Complexation.](#)” *Journal of Polymer Science B: Polymer Physics*, **45**, 3223-3230 (2007). ([arXiv:0705.0718](#))

Y.O. Popov, A.V. Tkachenko “[Effects of Sequence Disorder on DNA Looping and Cyclization.](#)” *Physical Review E*, **76**, 021901 (2007). ([arXiv:cond-mat/0510302](#))

Y.O. Popov, A.V. Tkachenko “[Effects of Kinks on DNA Elasticity.](#)” *Physical Review E*, **71**, 051905 (2005). ([arXiv:cond-mat/0410591](#))

R. Zheng, Y.O. Popov, T.A. Witten “[Deposit Growth in the Wetting of an Angular Region with Uniform Evaporation.](#)” *Physical Review E*, **72**, 046303 (2005). ([arXiv:cond-mat/0410493](#))

Y.O. Popov “[Evaporative Deposition Patterns: Spatial Dimensions of the Deposit.](#)” *Physical Review E*, **71**, 036313 (2005). ([arXiv:cond-mat/0408106](#)) – this *single-author* theory article has been **cited more than 1000 times** according to [Google Scholar](#)

Y.O. Popov, T.A. Witten “[Characteristic Angles in the Wetting of an Angular Region: Deposit Growth.](#)” *Physical Review E*, **68**, 036306 (2003). ([arXiv:cond-mat/0301336](#))

Y.O. Popov “[Effects of Flow on Measurements of Interactions in Colloidal Suspensions.](#)” *Journal of Colloid and Interface Science*, **252**, 320-325 (2002). ([arXiv:cond-mat/0103426](#))

Y.O. Popov, T.A. Witten “[Characteristic Angles in the Wetting of an Angular Region: Surface Shape.](#)” *The European Physical Journal E*, **6**, 211-220 (2001). ([arXiv:cond-mat/0006387](#))

Y.O. Popov, A.N. Semenov “[Nematic Ordering in Anisotropic Elastomers: Effect of Frozen Anisotropy.](#)” *The European Physical Journal B*, **6**, 245-256 (1998).

INVITED TALKS

Y.O. Popov “Interactive Engagement: the What, the Why, and the How.” Universidade Federal de Pernambuco, Recife (Brazil), May 2014.

Y.O. Popov “Polymer Physics at Mesoscopic Scale: from Bulk to Single Molecules.” University of Texas, San Antonio, October 2008.

Y.O. Popov “Polymer Physics at Mesoscopic Scale: a Field-Theoretic Study of Fluctuation Effects in Charged Systems.” University of California, Los Angeles, July 2008.

Y.O. Popov “Polymer Physics at Mesoscopic Scale: a Field-Theoretic Study of Fluctuation Effects in Charged Systems.” Northwestern University, July 2008.

Y.O. Popov “Polymer Physics at Mesoscopic Scale: from Bulk to Single Molecules.” University of North Carolina, Chapel Hill, February 2008.

Y.O. Popov “Biopolymers: A Physicist’s Perspective.” Temple University, April 2007.

Y.O. Popov “Biopolymers: A Physicist’s Perspective.” University of Rhode Island, April 2007.

CONFERENCE PRESENTATIONS

Y.O. Popov, P.L. Taylor “Field-Theoretic Study of Fluctuation Effects in Charged Systems.” *American Physical Society March Meeting*, New Orleans, LA, March 2008.

Y.O. Popov, A.V. Tkachenko “Effects of DNA structure on its micromechanical properties.” *Mechanics of Life: from Biomolecules to Molecular Machines*, Ann Arbor, MI, June 2007.

Y.O. Popov, G.H. Fredrickson “Field Theory of Polyelectrolyte Complexation.” *American Physical Society March Meeting*, Denver, CO, March 2007.

Y.O. Popov, J. Lee, G.H. Fredrickson “Polyelectrolyte Complexation: Analytical and Field-Theoretic Simulation Studies.” *Complex Fluids Design Consortium Annual Meeting*, Santa Barbara, CA, January 2007.

Y.O. Popov, A.V. Tkachenko “Effects of Sequence Disorder on DNA Looping and Cyclization.” *Gordon Research Conference*, Ventura, CA, February 2006.

Y.O. Popov, A.V. Tkachenko “Effects of Sequence Disorder on DNA Looping and Cyclization.” *American Physical Society March Meeting*, Los Angeles, CA, March 2005.

Y.O. Popov, A.V. Tkachenko “Effects of Kinks on DNA Elasticity.” *Statistical Physics of Macromolecules: from Electronic Structure to Fluid Dynamics*, Santa Fe, NM, May 2004.

Y.O. Popov, A.V. Tkachenko “Effects of Kinks on DNA Elasticity.” *American Physical Society March Meeting*, Montreal, QC, March 2004.

Y.O. Popov, T.A. Witten “Spatial Extensions of the Evaporative Deposition Patterns.” *American Physical Society March Meeting*, Montreal, QC, March 2004.

Y.O. Popov, T.A. Witten “Singularities, Universality and Scaling in a Pointed Evaporating Drop.” *American Physical Society March Meeting*, Austin, TX, March 2003.

CONFERENCE PRESENTATIONS (continued)

Y.O. Popov, T.A. Witten “Singularities, Scaling and Universal Exponents in a Pointed Evaporating Drop.” *Nanohybrid Structures Workshop*, Chicago, IL, November 2002.

Y.O. Popov, T.A. Witten “Characteristic Angles in Evaporative Deposition in a Pointed Droplet on a Plane.” *American Physical Society March Meeting*, Indianapolis, IN, March 2002.

Y.O. Popov, T.A. Witten “Contact Line Deposits in an Evaporating Drop over a Plane Angular Sector.” *Gordon Research Conference*, New London, CT, June 2001.

AWARDS

Honored Instructor (seven times), in recognition of the recipient’s “invaluable contribution to student learning” and making “a significant impact on students’ educational experience.”

University of Michigan, 2018, 2019, 2020, 2021, 2023, 2024, and 2025.

Excellence in Education Award, in recognition of “the effort and dedication shown towards undergraduate education, work beyond the call of duty, the positive energy brought to Introductory Physics, and remarkable, innovative efforts to improve pedagogy.”

University of Michigan, College of Literature, Science, and the Arts, 2013.

Travel Grant for the conference “Statistical Physics of Macromolecules: from Electronic Structure to Fluid Dynamics.”

Los Alamos National Laboratory, 2004.

Graduate Full-Tuition Merit Scholarship.

University of Chicago, Department of Physics, 1997–2003.

Russian Federation Government Fellowship, “awarded to university students who demonstrate exceptional abilities to study and conduct scientific research.”

State Committee for Higher Education, Government of the Russian Federation, 1995.

Soros Fellowship, “in recognition and appreciation of outstanding achievements in the study of science at the university level.”

International Soros Science Education Program, 1994.

Finalist of the Russian National Physics Olympiad, 1990.

First Prizes at several regional Physics Olympiads and Mathematics Olympiads, 1989–1991.

ACADEMIC SERVICE

Help Room coordinator, University of Michigan, Ann Arbor, Department of Physics, 2015–present.

Physics Major/Concentration advisor/counselor, University of Michigan, Ann Arbor, Department of Physics, 2014–2015 and 2025–present.

Undergraduate Curriculum Committee member, University of Michigan, Ann Arbor, Department of Physics, 2014–2017, 2018–2019, and 2023–2025.

Introductory Physics Committee member, University of Michigan, Ann Arbor, Department of Physics, 2012–2020.

ACADEMIC SERVICE (continued)

Reform coordinator of the Introductory Physics Sequence for National Sciences and Engineering, University of Michigan, Ann Arbor, Department of Physics, 2015–2017.

Competency Examination Committee member, University of Michigan, Ann Arbor, Department of Physics, 2014–2015.

Graduate Qualifying Examinations Committee member, University of Michigan, Ann Arbor, Department of Physics, 2011–2013.

Manuscript reviewer for *Physical Review E*, *Europhysics Letters*, *Macromolecules*, and *Journal of Materials Science*, 2001–present.

Member of the American Physical Society, 2001–present.

Group meetings organizer, University of Chicago, Department of Physics, 2001–2003.

Undergraduate Admissions Committee member, Moscow State University, 1997.

ADDITIONAL EXPERIENCE AND SKILLS

Consulting experience in a joint project by the Materials Research Center and Graduate School of Business, University of Chicago, 2001.

- Served on a five-member team of advanced science and business students for a software feasibility study under a \$50,000 contract with a major corporation.
- Identified and quantified a value proposition; developed market entry strategy.

Fluent in Russian.

Computer skills: MS Windows, Unix, TeX/LaTeX, VPython, Pascal, Fortran, WR Mathematica, MicroCal Origin, MS Word, MS PowerPoint, MS Excel, MS FrontPage, and other software products.

Expert in passenger transportation and cartography (with an emphasis on urban and rail transit).

REFERENCES

Prof. **Bradford G. Orr**, University of Michigan, Ann Arbor, Department of Physics.
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Prof. **Glenn H. Fredrickson**, University of California, Santa Barbara, Departments of Chemical Engineering and Materials.
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Prof. **Thomas A. Witten**, University of Chicago, Department of Physics and James Frank Institute.
+1-773-702-0947, t-witten_at_uchicago_dot_edu

Prof. **Alexei V. Tkachenko**, Brookhaven National Laboratory, Center for Functional Nanomaterials.
+1-631-344-3645, oleksiyt_at_bnl_dot_gov

Prof. **David G. Grier**, New York University, Department of Physics.
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REFERENCES (continued)

Prof. **Philip A. Pincus**, University of California, Santa Barbara, Departments of Physics and Materials.
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Prof. **Philip L. Taylor**, Case Western Reserve University, Department of Physics.
+1-216-368-4044, [taylor_at_case_dot_edu](mailto:taylor@case.edu)

Prof. **Alexander N. Semenov**, University Louis Pasteur Strasbourg, Institute Charles Sadron.
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