Sergey V. Venev

Curriculum Vitae

Contact

Program in Bioinformatics and Integrative Biology
University of Massachusetts Medical School
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Education

2008–2011 Ph.D. in Polymer Physics. Adviser: Prof. Igor I. Potemkin
Chair of Polymer and Crystal Physics, Lomonosov Moscow State University
Moscow, Russia

2002–2008 M.S. (honors) in Physics. Adviser: Prof. Igor I. Potemkin
Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia

Employment

2017–present Bioinformatics Specialist. Adviser: Prof. Job Dekker
Program in Systems Biology,
Howard Hughes Medical Institute, Worcester, MA

2011–2017 Postdoctoral Researcher, Computational Biology. Adviser: Prof. Konstantin B. Zeldovich
Program in Bioinformatics and Integrative Biology,
University of Massachusetts Medical School, Worcester, MA

2009–2011 Visiting scholar, Polymer Physics.
Department of Polymer Science, Universität Ulm, Ulm, Germany

Research Experience

- Statistical analysis of experimentally generated deep mutational scanning data for signal peptide of influenza A virus hemagglutinin. Structural RNA analysis to elucidate fitness effects of synonymous mutations.
- Statistical analysis of experimentally generated deep mutational scanning data for distant orthologous proteins. Analysis of the fitness landscapes and structural interpretation of the data.
- Bioinformatics analysis of Next Generation Sequencing data and software integration in a collaborative project focused on evolution of Influenza A virus under selective pressure and during reassortment.
- Biophysical modeling of Influenza virus genome packaging and Monte-Carlo simulation of evolving viral populations.
- Development of a novel GPU-accelerated lattice protein folding algorithm to model thermal adaptation in prokaryotes. NCBI database and text mining to extract environmental features of archeal and bacterial species followed by the statistical analysis of their genomes.
- Mean-field theory of copolymers and polyelectrolytes: effects of electrostatic interactions and primary structure of macromolecules on their self-organization in solutions.

Computational Skills

Python scripting (IPython, Cython, NumPy, pandas, matplotlib, SciPy, BioPython)
C/C++, OpenMP, GPGPU programming: CUDA, Thrust, cuBLAS
Mathematical software: Mathematica, Maple, MATLAB

Workflow managers: Nextflow, Snakemake
Bioinformatics software: BLAST, Muscle, T-Coffee, BWA, Bowtie, PyMol, UCSF Chimera, ViennaRNA

Teaching experience

2015–present Co-advised Yvonne Chan, graduate student, University of Massachusetts Medical School

2010 Co-advised Dian Yang, visiting undergraduate scholar, Moscow State University

2009 Co-advised Evgeniy Subirkin, undergraduate student, Moscow State University

2009 Teaching Assistant, undergraduate physics laboratory, 7 students, Moscow State University

Awards

2011	Russian Foundation for Basic Research travel grant RFBR11-03-09209
2009	Best oral presentation award at The 16^{th} conference "Lomonosov–2009"
2007–2008	M.V. Lomonosov student scholarship, Moscow State University
2006	5^{th} RAO UES of Russia award, "New Generation" on best qualification work
2001	Regional Olympiad in physics, entered the second stage, top 10% of participants

Peer–reviewed publications

[1] A. S. Canale, **S. V. Venev**, T. W. Whitfield, D. R. Caffrey, W. A. Marasco, C. A. Schiffer, T. F. Kowalik, J. D. Jensen, R. W. Finberg, K. B. Zeldovich, J. P. Wang, and D. N. A. Bolon, "Synonymous mutations at the beginning of the influenza a virus hemagglutinin gene impact experimental fitness," *Journal of Molecular Biology*, vol. 430, no. 8, pp. 1098–1115, 2018.

[2] **S. V. Venev** and K. B. Zeldovich, "Thermophilic adaptation in prokaryotes is constrained by metabolic costs of proteostasis," *Molecular Biology and Evolution*, vol. 35, no. 1, pp. 211–224, 2017.

[3] Y. Chan, **S. V. Venev**, K. B. Zeldovich, and C. R. Matthews, "Correlation of fitness landscapes from three orthologous tim barrels originates from sequence and structure constraints," *Nature Communications*, vol. 8, p. 14614, 2017.

[4] **S. V. Venev** and K. B. Zeldovich, "Massively parallel sampling of lattice proteins reveals foundations of thermal adaptation," *The Journal of Chemical Physics*, vol. 143, no. 5, p. 055101, 2015.

[5] K. B. Zeldovich, P. Liu, N. Renzette, M. Foll, S. T. Pham, **S. V. Venev**, G. R. Gallagher, D. N. Bolon, E. A. Kurt-Jones, J. D. Jensen, D. R. Caffrey, C. A. Schiffer, T. F. Kowalik, J. P. Wang, and R. W. Finberg, "Positive selection drives preferred segment combinations during influenza virus reassortment," *Molecular Biology and Evolution*, vol. 32, no. 6, pp. 1519–1532, 2015.

[6] **S. V. Venev** and I. I. Potemkin, "Swelling of chemical and physical planar brushes of gradient copolymers in a selective solvent," *Soft Matter*, vol. 10, no. 34, pp. 6442–6450, 2014.

[7] **S. V. Venev** and K. B. Zeldovich, "Segment self-repulsion is the major driving force of influenza genome packaging," *Physical Review Letters*, vol. 110, no. 9, p. 098104, 2013.

[8] D. Yang, **S. V. Venev**, V. V. Palyulin, and I. I. Potemkin, "Nematic ordering of rigid rod polyelectrolytes induced by electrostatic interactions: Effect of discrete charge distribution along the chain," *The Journal of Chemical Physics*, vol. 134, no. 7, p. 074901, 2011.

[9] **S. V. Venev**, P. Reineker, and I. I. Potemkin, "Direct and inverse micelles of diblock copolymers with a polyelectrolyte block: effect of equilibrium distribution of counterions," *Macromolecules*, vol. 43, no. 24, pp. 10735–10742, 2010.

Conference presentations

[1] **S. V. Venev** and K. B. Zeldovich, "Metabolic costs of proteostasis constrain proteome-wide thermal adaptations in prokaryotes.," in *Molecular Mechanisms in Evolution, Gordon Research Conference*, (Easton, MA), July 2015.

[2] **S. V. Venev** and K. B. Zeldovich, "Segment self-repulsion is the major driving force of influenza genome packaging.," in *15th Annual Greater Boston Area Statistical Mechanics Meeting*, (Waltham, MA), October 2013.

[3] **S. V. Venev** and K. B. Zeldovich, "Segment self-repulsion is the major driving force of influenza genome packaging.," in *23rd Conference on Phage/Virus Assembly*, (Lake Arrowhead, CA), September 2013.

[4] **S. V. Venev** and K. B. Zeldovich, "Evolutionary connectivity of model protein sequence space under folding constraints.," in *The 9th Annual North Eastern Structure Symposium*, (Farmington, CT), October 2012.

[5] **S. V. Venev** and I. Potemkin, "Densely grafted brushes of gradient copolymers in a selective solvent: an effective flory-huggins parameter approach," in *The 7th International Symposium "Molecular Order and Mobility in Polymer Systems"*, (Saint–Petersburg, Russia), June 2011.

[6] **S. V. Venev**, "Nematic ordering in a solution of rigid rod polyelectrolytes induced by electrostatic interactions: Effect of discrete charge distribution along the chain," in *The 18th International Student, Postgraduate and Young Scientist Conference "Lomonosov–2011"*, (Moscow, Russia), April 2011.

[7] **S. V. Venev** and I. Potemkin, "Densely grafted brushes of gradient copolymers: an effective flory-huggins parameter approach," in *APS March Meeting*, (Dallas, TX), March 2011.

[8] **S. V. Venev**, E. O. Perelstein, and I. I. Potemkin, "Self-organization in solutions of amphiphilic copolymers," in *Bilateral German–Russian Workshop "Self-organized structures of amphiphilic macromolecules"*, (Schloß Thurnau, Germany), October 2010.

[9] **S. V. Venev**, P. V. V., and I. I. Potemkin, "Self-organization in solutions of amphiphilic copolymers," in *International Workshop "Theory and Computer Simulation of Polymers: New Developments"*, (Moscow, Russia), June 2010.

[10] **S. V. Venev** and I. I. Potemkin, "Self-organization in solutions of amphiphilic copolymers," in *12th European Polymer Congress "EPF'09"*, (Graz, Austria), July 2009.

[11] **S. V. Venev**, "Phase diagram of diblock-copolymers with charged block in a selective solvent," in *The 16th International Student, Postgraduate and Young Scientist Conference "Lomonosov–2009"*, (Moscow, Russia), April 2009.

[12] **S. V. Venev** and I. I. Potemkin, "Micellization theory of diblock-copolymers with charged block in a selective solvent," in *The 3rd International Symposium "Trends in Nanoscience 2009"*, (Kloster Irsee, Germany), March 2009.

References

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