

Alexander Y. Mitrophanov, Ph.D.

Research Scientist
Biotechnology High-Performance Computing
Software Applications Institute (BHSAI)
2405 Whittier Dr, Suite 200
Frederick, MD 21702

Email: alex@bioanalysis.org
Phone: (301) 619-1934
Fax: (301) 619-1983
Web page: <http://opal.biology.gatech.edu/~amit>

RESEARCH EXPERIENCE

Aug 2009 – present: Research Scientist, Biotechnology HPC Software Applications Institute
Oct 2006 – Aug 2009: Postdoctoral Associate, Howard Hughes Medical Institute,
Washington University School of Medicine, Department of Molecular Microbiology
Laboratory of Professor Eduardo A. Groisman
Sep 2004 – Sep 2006: Postdoctoral Fellow, Georgia Institute of Technology, School of Biology
Laboratory of Professor Mark Borodovsky
Oct 2002 – Aug 2004: Mathematician, Saratov State University
Sep 2001 – Aug 2004: Research Scientist, Saratov State University (Saratov, Russia)

EDUCATION

Oct 2002: Ph.D. in Mathematics from Saratov State University
Thesis: "Robustness Estimates for Stochastic Models
of Interacting Particle Systems"
Jun 2001: M.S. in Biology from Saratov State University
Specialization: Biochemistry
Jun 1998: M.S. in Applied Mathematics from Saratov State University
Specialization: Systems Analysis and Operations Research

HONORS, AWARDS, AND SCHOLARSHIPS

May 2007 – Aug 2009 postdoctoral research sponsored by the Howard Hughes Medical Institute
Jun 2001: Saratov State University (Biology) –
graduated *summa cum laude*
Jun 1998: Saratov State University (Applied Mathematics) –
graduated *summa cum laude*
Sep 1995 – Jun 1998: A. M. Bogomolov Scholarship awarded by Saratov State University
Aug 1993 – Jun 1994: Participant in the Freedom Support Act Future Leaders Exchange Program
(North Monterey County High School, Castroville, CA) sponsored by the
US Government

SERVICE

Ad hoc reviewer for *Molecular Systems Biology*, *PLoS Computational Biology*, *Molecular Microbiology*,
Bioinformatics, *BMC Bioinformatics*, *Briefings in Bioinformatics*, *Journal of Bioinformatics and Computational
Biology*, *Mathematical Biosciences*, *Stochastic Models*, *Methodology and Computing in Applied Probability*,
Mathematical Inequalities and Applications, SummerSim'07, Zentralblatt MATH

Jan 2005 – Sep 2006: Co-organizer of the Georgia Institute of Technology Bioinformatics and
Computational Biology (BiComB) Seminar Series

TEACHING EXPERIENCE

- 2006: BMED 4813 “Biological Networks and Genomics”, Georgia Institute of Technology
2004: “Queuing Networks Theory”, Saratov State University
2003: “Foundations of Queuing Theory”, Saratov State University

PROFESSIONAL ASSOCIATIONS

American Society for Microbiology
International Society for Computational Biology

SELECTED PEER-REVIEWED JOURNAL PUBLICATIONS

1. **Mitrophanov^{*}, A. Y.**, Jewett^{*}, M. W., Hadley, T. J., Groisman, E. A. (2008) Evolution and dynamics of regulatory architectures controlling polymyxin B resistance in enteric bacteria. *PLoS Genetics* 4: e1000233. ^{*}Equal authorship.
2. **Mitrophanov, A. Y.** and Groisman, E. A. (2008) Signal integration in bacterial two-component regulatory systems. *Genes and Development* 22: 2601–2611.
3. **Mitrophanov, A. Y.** and Groisman, E. A. (2008) Positive feedback in cellular control systems. *Bioessays* 30: 542–555.
4. Kato^{*}, A., **Mitrophanov^{*}, A. Y.**, Groisman, E. A. (2007) A connector of two-component regulatory systems promotes signal amplification and persistence of expression. *Proceedings of the National Academy of Sciences USA* 104: 12063–12068. ^{*}Equal authorship.
5. **Mitrophanov, A. Y.** and Borodovsky, M. (2007) Convergence rate estimation for the TKF91 model of biological sequence length evolution. *Mathematical Biosciences* 209: 470–485.
6. **Mitrophanov, A. Y.**, Churchward, G. and Borodovsky, M. (2007) Control of *Streptococcus pyogenes* virulence: modeling of the CovR/S signal transduction system. *Journal of Theoretical Biology* 246: 113–128.
7. **Mitrophanov, A. Yu.** and Borodovsky, M. (2006) Statistical significance in biological sequence analysis. *Briefings in Bioinformatics* 7: 2–24.
8. **Mitrophanov, A. Yu.** (2006) Estimates of sensitivity to perturbations for finite homogeneous continuous-time Markov chains. *Theory of Probability and Its Applications* 50: 319–326.
9. **Mitrophanov, A. Yu.**, Lomsadze, A. and Borodovsky, M. (2005) Sensitivity of hidden Markov models. *Journal of Applied Probability* 42: 632–642.
10. **Mitrophanov, A. Yu.** (2005) Sensitivity and convergence of uniformly ergodic Markov chains. *Journal of Applied Probability* 42: 1003–1014.
11. **Mitrophanov, A. Yu.** (2005) Ergodicity coefficient and perturbation bounds for continuous-time Markov chains. *Mathematical Inequalities and Applications* 8: 159–168.
12. **Mitrophanov, A. Yu.** (2004) The spectral gap and perturbation bounds for reversible continuous-time Markov chains. *Journal of Applied Probability* 41: 1219–1222.

13. **Mitrophanov, A. Yu.** (2004) Reversible Markov chains and spanning trees. *Mathematical Scientist* 29: 107–114.
14. **Mitrophanov, A. Yu.** (2004) Note on Zeifman's bounds on the rate of convergence for birth–death processes. *Journal of Applied Probability* 41: 593–596.
15. **Mitrophanov, A. Yu.** (2003) Stability and exponential convergence of continuous-time Markov chains. *Journal of Applied Probability* 40: 970–979.
16. Evseeva, N. V., Tkachenko, O. V., Lobachev, Yu. V., **Mitrophanov, A. Yu.**, Djatchouk, T. I., and Shchyogolev, S. Yu. (2002) Studies on the embryogenic processes in the *in vitro* culture of wheat somatic tissues by using a proliferative antigen of initial cells. *Wheat Information Service* 94: 1–4.
17. **Mitrophanov, A. Yu.** (2001) Stochastic Markov models for the process of binary complex formation and dissociation. *Mathematical Modeling* 13 (9): 101–109.

SELECTED ORAL PRESENTATIONS

- | | |
|-----------|--|
| Aug 2009: | “Quantitative properties of post-translationally regulated genetic circuits”
3 rd Q-bio Conference on Cellular Information Transmission.
Santa Fe, NM |
| Jul 2009: | “Dynamics of post-translational genetic regulation in enteric bacteria”
BioMathematical Methodology Seminar Series. Stanford University.
Stanford, CA |
| Apr 2009: | “Quantitative properties of gene regulation circuits: prediction and analysis”
Special Seminar. Biotechnology HPC Software Applications Institute.
Frederick, MD |
| Dec 2008: | “Quantitative properties of gene regulation networks: prediction and analysis”
Special Seminar. Department of Environmental Health, University of Cincinnati College
of Medicine. Cincinnati, OH |
| Sep 2008: | “Structure and dynamic properties of bacterial regulatory circuits”
Washington University Molecular Microbiology Retreat. Grafton, IL |
| Jul 2008: | “Regulatory architectures and differential control of antibiotic resistance genes in
enteric bacteria”
Gordon Research Conference on Microbial Stress Response. South Hadley, MA |
| Nov 2007: | “Regulatory architecture and expression dynamics of bacterial virulence genes”
Washington University Infectious Diseases/Basic Microbiological Mechanisms Seminar
Series. St. Louis, MO |
| Aug 2006: | “Signal transduction in prokaryotes: lessons from mathematical modeling”
Special Seminar. Department of Molecular Microbiology, Washington University School
of Medicine. St. Louis, MO |

- Jul 2006: "An optimization algorithm for multiple string matching and its application to exonic splicing enhancers"
Special Seminar. Department of Biomedical Informatics, Columbia University.
New York, NY
- Oct 2005: "Sensitivity of hidden Markov models"
Stochastics Seminar. Department of Mathematics, Georgia Institute of Technology.
Atlanta, GA
- Sep 2004: "Inequality-based perturbation theory for Markov chains: recent advances"
Stochastics Seminar. Department of Mathematics, Georgia Institute of Technology.
Atlanta, GA
- Jul 2001: "Inequalities for perturbed Markov chains"
2nd All-Russian Symposium on Applied and Industrial Mathematics.
Samara, Russia

SELECTED POSTER PRESENTATIONS

- Sep 2008: **Mitrophanov, A. Y.**, Jewett, M. W., Hadley, T. J., Groisman, E. A.
"Structure and dynamic properties of genetic circuits controlling antibiotic resistance in enteric bacteria"
Howard Hughes Medical Institute Scientific Meeting on Mechanisms of Intra- and Intercellular Signaling. Chevy Chase, MD
- Aug 2008: **Mitrophanov, A. Y.**, Jewett, M. W., Hadley, T. J., Groisman, E. A.
"Regulatory architectures and dynamics of bacterial gene expression"
2nd Q-Bio Conference on Cellular Information Processing. Santa Fe, NM
- Nov 2007: **Mitrophanov, A. Y.**, Borodovsky, M.
"Transcription factor binding site prediction via an optimization algorithm for multiple string matching"
6th Georgia Tech–ORNL International Conference on Bioinformatics.
Atlanta, GA
- Oct 2007: Kato^{*}, A., **Mitrophanov^{*}, A. Y.**, Groisman, E. A.
^{*}Equal authorship.
"Dynamical properties of connector-mediated pathways in two-component signal transduction"
8th International Conference on Systems Biology. Long Beach, CA
- Jul 2007: **Mitrophanov^{*}, A. Y.**, Kato^{*}, A., Groisman, E. A.
^{*}Equal authorship.
"A connector of two-component regulatory systems promotes signal amplification and persistence of expression"
Gordon Research Conference on Microbial Adhesion and Signal Transduction.
Newport, RI
- Jul 2006: **Mitrophanov, A. Y.**, Churchward, G., Borodovsky, M.
"Control of *Streptococcus pyogenes* virulence: modeling of the CovR/S signal transduction system"
Gordon Research Conference on Microbial Stress Response. South Hadley, MA
- Nov 2005: **Mitrophanov, A. Y.**, Lomsadze, A., Borodovsky, M.
"Sensitivity of hidden Markov models"
5th Georgia Tech–ORNL International Conference on Bioinformatics. Atlanta, GA