

ANAND BANERJEE

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EDUCATION

- 2002 – 2008 Ph.D. in Physics, University of Maryland, College Park, Maryland, USA
 Dissertation: Study of complex systems in condensed matter physics and economics
- 1997 – 2002 Masters in Physics, Pondicherry University, Pondicherry, India

RESEARCH EXPERIENCE

Research Scientist 2016 – Present

Virginia Tech, Blacksburg, Virginia

- Systems biology and computational modeling of cell cycle checkpoints
 - Developing models for DNA repair and spindle assembly checkpoints
 - Performing Gillespie stochastic simulation to study the robustness of checkpoints to noise

Postdoctoral Fellow 2010 – 2015

National Institutes of Health (NIH), Bethesda, Maryland

- Systems biology of clathrin-mediated endocytosis
 - Developed a mathematical model for clathrin-coated pit assembly
 - Performed kinetic Monte Carlo simulations and calculated lifetimes of clathrin-coated pits
 - Validated the model by comparing simulation results with experimental data
- Endocytosis of nanoparticles: application to targeted drug delivery
 - Developed a stochastic model to calculate cellular uptake probability of nanoparticles
 - Calculated the dependence of cellular uptake probability on nanoparticle sizes
 - Determined optimal parameters for targeted-drug delivery

Faculty Research Associate 2009 – 2010

Institute for Physical Science and Technology, University of Maryland, College Park, Maryland

- Analysis of turbulence in solar wind
 - Collected/processed large data sets on solar wind from NASA spacecrafts Ulysses and ACE
 - Performed time-series analysis to study turbulence in solar wind
 - Determined dependence of scaling properties of solar wind turbulence on solar cycle

Graduate Research Assistant

2002 – 2008

Department of Physics, University of Maryland, College Park, Maryland

- Study of magnetoresistance in solid state materials
 - Developed a theoretical model to study magnetoresistance of organic conductors and graphene
 - Performed quantum-mechanics-based calculations of magnetoresistance
 - Proposed an experimental method to determine energy band gaps in organic conductors
- Statistical study of income distribution
 - Developed a mathematical model for income distribution within a nation
 - Performed statistical analysis of income data and determined temporal evolution of income distribution and inequality
- Statistical study of universal patterns in inequality
 - Determined historical trends and probability distributions of global energy consumption and carbon dioxide emission
 - Tested applicability of statistical physics principles to describe inequality

AWARD

2012 Fellows Award for Research Excellence at the National Institute of Health

SKILLS

Modeling Monte Carlo simulations, Brownian dynamics simulations, & Time-series analysis
Programing C++, Matlab, Mathematica, & Computing using Biowulf cluster at NIH

PUBLICATIONS

1. **A. Banerjee**, A. Berezhkovskii, R. Nossal. Kinetics of cellular uptake of nanoparticles and viruses via clathrin-mediated endocytosis. *Physical Biology* 13, 016005 (2016)
2. **A. Banerjee**, A. Berezhkovskii, R. Nossal. Distributions of lifetime and maximum size of abortive clathrin-coated pits. *Physical Review E* 86, 031907 (2012)
3. **A. Banerjee**, A. Berezhkovskii, R. Nossal. Stochastic model of clathrin-coated pit assembly. *Biophysical Journal* 102, 2725 (2012)
4. **A. Banerjee**, V. M. Yakovenko. Universal patterns of Inequality. *New Journal of Physics* 12, 075032 (2010)
5. S. Banerjee, B. Taylor, **A. Banerjee**. On the stability of electrostatic orbits. *American Journal of Physics* 77, 396 (2009)
6. **A. Banerjee**, V. M. Yakovenko. Angular magnetoresistance oscillations in quasi-one-dimensional organic conductors in the presence of a crystal superstructure. *Physical Review B* 78, 125404 (2008)

7. **A. Banerjee**, V. M. Yakovenko, T. Di Matteo. A study of personal income distribution in Australia. *Physica A* 370, 54 (2006)

PRESENTATIONS

1. “Modeling clathrin-coated pit assembly in the endocytosis of nanoparticles” Georgetown University. May 2015. (*Invited Talk*)
2. “Modeling cellular uptake of nanoparticles via clathrin-mediated endocytosis”, Biophysical Society meeting, Baltimore. Feb 2015. (*Poster*)
3. “Modeling nanoparticle internalization via receptor-mediated endocytosis”, Biophysical Society meeting, San Francisco. Feb 2014. (*Poster*)
4. “On the size dependence of cellular uptake of nanoparticles via clathrin-mediated endocytosis”, Biophysical Society meeting, Philadelphia. Feb 2013. (*Poster*)
5. “Stochastic model of clathrin-coated pit assembly” Gordon Research Conference, Ventura, California. Jan 2013. (*Talk*)
6. “Stochastic nature of clathrin-coated pit assembly” American Physical Society, Baltimore. Mar 2013. (*Talk*)
7. “Stochastic modeling of clathrin-coated pit assembly” Laboratory of Computational Biology, National Institutes of Health. Feb 2012. (*Invited Talk*)
8. “Stochastic nature of clathrin-coated pit assembly” Biophysical Society meeting, San Diego. Feb 2012. (*Poster*)
9. “Kinetic aspects of clathrin-coated pit formation” American Society of Cell Biology meeting, Denver. May 2011. (*Talk*)
10. “Energy of formation of clathrin-coated pits”, Biophysical Society meeting, Baltimore. Mar 2011. (*Poster*)
11. “Energy of formation of clathrin-coated pits”, American Society of Cell Biology meeting, Philadelphia. Dec 2010. (*Poster*)
12. “IMF turbulence and cumulative distribution functions”, American Geophysical Union Fall meeting, San Francisco. Dec 2010. (*Poster*)
13. “Energy of formation of clathrin-coated pits”, National Institutes of Health, Bethesda, Maryland. Nov 2010. (*Talk*)
14. “Analysis of self-similar scaling in magnetic energy density”, American Geophysical Union Fall meeting, San Francisco. Dec 2009. (*Poster*)
15. “Angular magnetoresistance oscillations in graphene bilayers”, Center for Nanophysics and advanced material, University of Maryland. Aug 2008. (*Talk*)
16. “Angular magnetoresistance oscillations in quasi-one dimensional organic conductors in the presence of a crystal superstructure”, Center for Superconductivity Research, University of Maryland. Nov 2006. (*Talk*)
17. “A study of personal income distribution in Australia”, March meeting of American Physical Society, Baltimore. Mar 2006. (*Talk*)
18. “Temporal evolution of income in USA during 1983-2001”, 75th Annual Meeting of the Southern Economic Association, Washington DC. Nov 2005. (*Talk*)

TEACHING EXPERIENCE

- 2015 Instructor for a course at FAES graduate school at NIH
 Course title: Concepts in Science for MCAT preparation
- 2015 Instructor for a course at FAES graduate school at NIH
 Course title: A Survey of Biomedical Physics
- 2014 Guest lecturer at Georgetown University for a course in Biophysics
- 2014 Journal club organizer for NIH summer interns and post-baccalaureate students
 Course title: Modeling processes in cell signaling
- 2013 Mentor of a summer student
 Project title: Measuring cytosolic and membrane bound clathrin concentration
- 2013 Instructor for course for NIH post-baccalaureate students
 Course title: Become effective scientists

REFERENCES

Dr. Ralph Nossal
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National Institutes of Health
Bethesda, MD 20892
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Prof. Victor Yakovenko
Department of Physics
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College Park, MD 20740
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Dr. Sergey Bezrukov
Senior Investigator
National Institutes of Health
Bethesda, MD 20892
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