

## Konstantinos Tsekouras

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**Postdoctoral Scholar, Indiana University – Purdue University Indianapolis**

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### RESEARCH EXPERIENCE

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*Indiana University – Purdue University Indianapolis*

**Postdoctoral research associate** – to professor Steve Presse **present**  
Employ statistical mechanics, statistical inference and computational methods to infer biophysical models of enzyme catalysis and protein-DNA binding from FCS-FRET, AFM and single-molecule experiments.

*University of California at Merced, Merced CA USA*

**Postdoctoral research associate** – to professor Ajay Gopinathan **2011-2012**  
Employed statistical mechanics plus numerical methods and stochastic simulations to develop an approach for the determination of nanoparticle properties leading to increased cancer cell targeting specificity.

*Institut Curie, Paris, France*

**Postdoctoral research associate** –to professor JF Joanny **2009-2011**  
Used statistical mechanics in a master equation formulation plus Gillespie algorithm-based simulations to develop a computational and analytical model for a bundle of actively polymerizing and depolymerizing actin filaments exerting force against a barrier.

*Rice University, Houston TX USA*

**Research Assistant** – to professor Anatoly B. Kolomeisky **2007-2009**  
Used statistical mechanics, mean-field theory and combinatorics to develop mathematical models of non-equilibrium biological processes such as intracellular bioparticle transport and verifying theoretical results via Monte-Carlo simulations written in C++ in a parallel-processing environment.

**Research Assistant** – to professor Han Pu.

Worked on a research MS Thesis investigating the evolution of dipolar spin-1 and spin-2 BECs by developing a dynamical theory based on spherical harmonic expansions and Fourier transforms and verifying predictions via computational simulations written in C++. **2005-2007**

**Research Assistant** – to professor Peter Nordlander.

Analytically investigated the response of rod-like nanoparticles to electromagnetic fields in the near-field regime utilizing plasmon hybridization theory and many-body/condensed matter methods such as Green's functions. **2004-2005**

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TEACHING EXPERIENCE

*California Polytechnic State University, San Luis Obispo CA USA* **2012**

**Lecturer**

Courses: Mechanics (both calculus and non-calculus based),  
Thermodynamics, Waves & Optics, Astronomy (undergraduate)

*University of California at Merced, Merced CA USA* **2011**

**Lecturer**

E&M course (undergraduate)

Rice University Physics Department, Houston TX USA **2008**

**Recitation Instructor**

Mechanics course (undergraduate)

Rice University Physics Department, Houston TX US **2003-2006**

**Teaching Assistant**

Courses: Weather & Climate, Waves & Optics (both undergraduate)

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EDUCATION

**PhD in Physics (Theoretical Physics)** **2009**

Rice University, Houston, TX USA

Thesis: "Mean-Field Theory and Exact Solutions of Linked Exclusion  
Process Systems"

**MS in Physics (Atomic-Molecular-Optical Physics)** **2007**

Rice University, Houston, TX USA

Thesis: "Dynamical Evolution of Spin-1 and Spin-2 Dipolar Bose-Einstein  
Condensates"

**BS in Physics** **2003**

National & Capodistrian University of Athens, Athens, Greece

Thesis: "Computational Models for Astrophysical Shocks"

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## HONORS & AWARDS

Cal Poly CTLT Special Consultant for Physics Education	2013
Welch Foundation Award	2009
Publication J. Phys. A: Math. Theor. 41 (2008) 095002	2008
Picked for inclusion in IOP Select	
Gerondelis Foundation Scholarship Award	2008
Rice Quantum Institute Research Symposium Chevron Award	2008

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## PUBLICATIONS & PAPERS

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“Dynamical Evolution of Spin-1 and Spin-2 Dipolar Bose-Einstein Condensates”, Master of Science Thesis, 2007

“Inhomogeneous Coupling in 2-Channel Asymmetric Simple Exclusion Processes”, J. Phys. A: Math. Theor. 41 (2008) 095002

“Parallel Coupling of Symmetric and Asymmetric Simple Exclusion Processes”, J. Phys. A: Math. Theor. 41 (2008) 465001

“Bundle of Parallel Actin Filaments Polymerizing against a Wall”, New Journal of Physics, Vol 13, pp103032 (2011)

“Design of High-Specificity Nanocarriers by Exploiting Non-Equilibrium Effects in Cancer Cell Targeting”, PlosOne, 8, e65623 (2013)

“The Heat Released By Single Catalytic Events Locally Enhances The Diffusion Of The Enzyme”, *submitted*

“Fluctuations in Nanocarrier Internalization by Cancerous Cells”, *In preparation*

“Walking Dynamics and Kinesin Traffic Jams”, *In preparation*

“A Novel Ising Chain Model for Biochemical Regulatory Network Modeling”, *In preparation*

“Dynamics of Extended Particles in Parallel Asymmetric Exclusion”, *In preparation*

## RESEARCH INTERESTS

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**-Statistical Physics:** nonequilibrium statistical mechanics, complex systems, stochastic processes, classic and quantum Monte-Carlo simulations

**-Mathematical Physics:** complexity, emergence and criticality in physical & biological systems, mathematical and computer modeling, statistical inference

**-Theoretical Biophysics:** biological transport, self-assembled biological structures, cytoskeleton, proteomics, high-throughput methods, catalysis, population dynamics

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## CONFERENCES & PRESENTATIONS

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“Evolution of a spin-1 Rb-87 BEC under the Simple-Mode Approximation” Poster presentation, DAMOP May 2006 Knoxville TN

“Inhomogeneous Coupling in Two-Channel Asymmetric Simple Exclusion Processes” Talk, APS March meeting 2008, New Orleans LA

“Coupled Totally Asymmetric Simple Exclusion Processes” Talk, SigmaPhi July 2008, Kolymbari Crete, Greece

“Exclusion Processes and the Modeling of Biological Transport” Talk, Max Planck Institute for the Physics of Complex Systems, January 2009, Dresden Germany

“Investigation of Multiparticle Motor Protein Dynamics using Coupled Exclusion Processes” Poster Presentation, Biophysical Society Annual meeting February 2009, Boston MA

“Multiparticle Motor Protein Transport Dynamics Investigated via Coupled Exclusion Processes” Talk, APS March meeting 2009, Pittsburgh PA

“Exclusion Processes and the Modeling of Biological Transport” Talk, University of Michigan, Ann Arbor MI, March 2009

“Exclusion Processes and the Modeling of Biological Transport” Talk, Okinawa Institute of Science and Technology, Okinawa Japan, May 2009

“Parallel Actin Filaments against a Wall” Poster presentation, Cargese Winter School 2010, Cargese, France February 2010

“Parallel Asymmetric Exclusion Processes with Extended Particles”, APS March Meeting, Portland OR, March 2010

“Actin Filament Polymerization Against a Barrier”, Talk, Max-Planck Institute for Self-Organization, Gottingen Germany February 2011

“Actin Force Exertion Against a Barrier”, Talk, APS March Meeting Dallas TX March 2011

“Optimal Nanocarrier Design for Cancer Cell Targeting”, Poster Presentation, BPS Annual Meeting, San Diego CA USA February 2012

“Optimal Nanocarrier Design for Cancer Cell Targeting”, Talk, California-Nevada APS Regional Meeting, San Luis Obispo CA USA February 2013

“Nanocarrier Design Principles and Enzyme Perturbation during Turnover Events”, Talk, IUPUI Statistical Biology Seminar, November 2013

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#### LANGUAGE SKILLS

Greek – native speaker

English – speak fluently and read/write with high proficiency

French and German – speak, read, and write with basic competence

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#### OTHER TRAINING

Dynamics of the Cytoskeleton Cargese Winter School, Cargese France February 2010

Complex Systems Summer School, Paris France August 2010

Modeling Intracellular Movements, NiMBIOS Investigative Workshop, Knoxville TN USA October 2011

Princeton Biophysics and Computation in Neurons and Networks Summer Course, Princeton NJ June-July 2013

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#### PROFESSIONAL MEMBERSHIPS

American Physical Society

Biophysical Society

American Association for the Advancement of Science