

Jeffrey H. Chuang

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education MASSACHUSETTS INSTITUTE OF TECHNOLOGY Cambridge, MA
Ph.D. in Physics (2001). Thesis title: Energy and Topology of Heteropolymers.

HARVARD UNIVERSITY Cambridge, MA
B.A. *summa cum laude* in Chemistry & Physics (1996).

awards National Science Foundation Postdoctoral Fellowship in Interdisciplinary Informatics (2003-2005).
National Institutes of Health Biochemistry Postdoctoral Fellowship (2001-2002).
National Science Foundation Graduate Fellowship (1997-1999).
MIT Karl Taylor Compton Graduate Fellowship (1996-1997).
Phi Beta Kappa, Harvard University (1996).

professional Member of the International Society for Computational Biology.
associations Member of the American Physical Society.
Member of the American Association for the Advancement of Science.
Member of Sigma Xi Scientific Research Society.
Reviewer for the Journal of Chemical Physics.

research UNIVERSITY OF CALIFORNIA, DEPT. OF BIOCHEMISTRY & BIOPHYSICS San Francisco, CA
experience *Postdoctoral Fellow* - Computational studies on a number of problems in comparative genomics and gene regulation. Advisor: Hao Li (2001- Present).

- Showed that selection affects the location of genes within mammalian genomes, and that genes are optimized for their mutational environment within the genome.
- Studied substitution patterns in yeast to show that the mutation rate is uniform genome-wide.
- Analyzed sequence conservation in yeast promoters to estimate the total amount of non-coding functional sequence in yeast, both genome-wide and in each promoter.
- Identified the yeast genes which are likely to be under the strongest or weakest transcriptional regulation.
- Showed that mutation rates along the mouse, rat, and human genomes have persisted since species divergence.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, DEPT. OF PHYSICS Cambridge, MA
Graduate Student - Computational and analytical studies in biophysics and polymer physics. Advisors: Alexander Grosberg, Toyochi Tanaka, and Mehran Kardar (1996-2001).

- Justified a method for the computerized design of protein structures, by analyzing the energetic properties of random polymer sequences.
- Formulated an analytic model for the adsorption and release of ligands by collapsible heteropolymer gels.
- Modeled the kinetics of polymers aggregating in solution.
- Developed a theory for the dynamics of DNA passing through a pore in a membrane.

HARVARD UNIVERSITY, DEPT. OF PHYSICS Cambridge, MA
Undergraduate research assistant – Theoretical and experimental projects at Harvard and in summer research programs (1992 – 1996).

- Simulated the behavior of ions in an electromagnetic trap, in a project to create anti-hydrogen. Advisors: E. Heller (Harvard), G. Gabrielse (Harvard).
- Experiments in high temperature superconductivity. Advisors: B. Maple (UCSD), A. Hamed (Houston).
- Theoretical studies on nuclear structure. Advisor: V. Zelevinsky (Michigan State).

teaching experience SCIENCE AND HEALTH EDUCATION PARTNERSHIP San Francisco, CA
Guest speaker - Taught a series of computational biology and genetics classes to students at Wallenberg High School, in an outreach program between UCSF and the San Francisco school district (2002).

MASSACHUSETTS INSTITUTE OF TECHNOLOGY Cambridge, MA
Teaching assistant – Delivered lectures, planned and conducted discussion sections, wrote problem sets, and advised students for courses in first year physics and upper-level statistical mechanics (1999-2000).

THE DALLAS MORNING NEWS Dallas, TX
Reporter – One of two fellows selected by the American Association for the Advancement of Science and the American Physical Society to report science news, as part of a fellowship to improve public understanding of science. Wrote articles on a variety of topics, including evolutionary biology, acoustics, geology, traffic modeling, inorganic chemistry, and space exploration (Summer 1997).

HARVARD UNIVERSITY Cambridge, MA
Teaching assistant – Planned and taught discussion sections, held office hours, and advised students for an undergraduate course in multivariable calculus, linear algebra, and physics (1993-1994).
Tutor – Provided individual tutoring for students in first year physics courses (1993-1995).

SCIENCE THEATER Houston, TX and East Lansing, MA
Exhibit presenter – Planned and presented science demonstrations on fluid dynamics and chemiluminescence for several public science festivals (1993, 1994).

publications **Jeffrey H. Chuang** and H. Li, *PLOS Biology* 2, e29 (2004). "Functional Bias and Spatial Organization of Genes in Mutational Hot and Cold Regions in the Human Genome."

C.S. Chin, **Jeffrey H. Chuang**, and H. Li. *Genome Research*, in press (2005). "Genome-wide Regulatory Complexity in Yeast Promoters: Separation of Functional and Neutral Sequence."

Jeffrey H. Chuang and H. Li. "Regional Mutation Rates are Conserved in Rodents and Humans." In preparation.

K. Ito, **Jeffrey Chuang**, C. Alvarez-Lorenzo, T. Watanabe, N. Ando, and A. Yu. Grosberg, *Macromolecular Symposia* 207, 1 (2004). "Multiple Contact Adsorption of Target Molecules by Heteropolymer Gels."

K. Ito, **Jeffrey Chuang**, C. Alvarez-Lorenzo, T. Watanabe, N. Ando, and A. Yu. Grosberg, *Progress in Polymer Science* 28, 1489 (2003). "Multiple point adsorption in a Heteropolymer Gel and the Tanaka Approach to Imprinting: Experiment and Theory."

Jeffrey Chuang, Y. Kantor, and M. Kardar, *Physical Review E*, 65, 011802 (2001). "Anomalous Dynamics of Translocation."

H. Hiratani, C. Alvarez-Lorenzo, **Jeffrey Chuang**, O. Guney, A. Yu. Grosberg, and T. Tanaka, *Langmuir*, 17, 4431 (2001). "Effect of Reversible Cross-linker, N,N'-Bis(acryloyl)-cystamine, on Calcium Ion Adsorption by Imprinted Gels."

Jeffrey Chuang, A. Yu. Grosberg, and M. Kardar, *Physical Review Letters*, 87, 078104 (2001). "Free Energy Self-Averaging in Protein-Sized Heteropolymers."

T. Enoki, **Jeffrey Chuang**, T. Tanaka, A. Yu. Grosberg, et al., *Physical Review Letters*, 85, 5000 (2000). "Frustrations in Polymer Gels and Their Minimization through Molecular Imprinting."

Jeffrey Chuang, A. Yu. Grosberg, and T. Tanaka, *Journal of Chemical Physics* **112**, 6434 (2000). "Topological Repulsion between Polymer Globules."

posters and presentations “Functional Significance of Spatial Variations in Mutation Rates: Mammals and Yeast.”
 Invited talk, Intelligent Systems for Molecular Biology Workshop on Biopathways (2004).

 “Mutation Rates in Rodents and Human are Correlated.”
 Poster, Intelligent Systems for Molecular Biology Conference (2004).
 Poster, UCSF Tetrad Retreat (2004).
 Poster, UCSF Biophysics Retreat (2004).

 “Functional Bias and Spatial Organization of Genes in Mutational Hot and Cold Regions in the Human Genome.”
 Talk, UCSF Research in Progress Seminar Series (2003).

 “Mutation Rates in Rodents and Humans.”
 Poster, UCSF Biophysics Retreat (2003).

 “Mutational Hot and Cold Spots in the Human Genome.”
 Poster, UCSF Tetrad Retreat (2002).

 “Multiple Point Adsorption in a Heteropolymer Gel and the Tanaka Approach to Imprinting.”
 Talk, Europolymer Conference (2002).

 “Searching for Regulatory Elements in the *Caulobacter Crescentus* Genome.”
 Poster, UCSF Biophysics Retreat (2001).

 “Entropic Slowdowns in Aggregation and Translocation of Biopolymers.”
 Invited talk, National Institute of Standards and Technology, Gaithersburg, Maryland (2001).

 “Free Energy Self-Averaging in Protein-Sized Random Heteropolymers.”
 Talk, American Physical Society March Meeting (2001).
 Talk, 84th Statistical Mechanics Conference at Rutgers University (2000).
 Poster, Enrico Fermi Summer School in Protein Folding and Design (2000).

 “Protein-Induced Bending in Membranes.”
 Poster, Biophysical Society Annual Conference (2000), with Prof. Thomas Chou, UCLA.

 “Topological Repulsion between Polymer Globules.”
 Poster, American Physical Society March Meeting (1999).

 “Smart Gels.”
 Exhibit, Discover Magazine awards at Epcot Center (1998).

references

Professor Alexander Yu. Grosberg

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(612) 624-7542
grosberg@physics.umn.edu

Professor Mehran Kardar

Massachusetts Institute of Technology, Department of Physics
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Professor Hao Li

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