

Board Meeting  
January 15, 2009

APPOINT FELLOWS TO THE CENTER FOR ADVANCED STUDY, URBANA

**Action:** Approve Appointments of Fellows to the Center for Advanced Study for the Academic Year 2009-10, Urbana

**Funding:** Private Gift Funds from the Beckman Endowment and State Appropriated Funds

Each year the Center for Advanced Study awards appointments as Fellows in the Center, providing one semester of release time for creative work. Fellows are selected in an annual competition from the faculty of all departments and colleges to carry out self-initiated programs of scholarly research or professional activity.

The double asterisks denote faculty members who have been recommended for appointment as Beckman Fellows in the Center for Advanced Study named for the donor of a gift that permits additional recognition for outstanding younger Fellow candidates who have already made distinctive scholarly contributions.

The Chancellor at Urbana recommends the following list of Fellows selected for the 2009-10 academic year, and offers a brief description of their projects:

**\*\*Oleksii “Aleksei” Aksimentiev, Assistant Professor, Physics, *Nanopore Electrostatic Tweezers for Single Molecule Manipulation and Detection***

Through all-atom and multiscale computer simulations, this program explores the feasibility of using the electrostatic field in a silicon nanopore for single molecule force spectroscopy, protein segregation, and DNA sequence detection. The key question under investigation is the microscopic origin and the magnitude of the force experienced by a biomolecule in a silicon nanopore.

**Jozsef Balog, Assistant Professor, Mathematics, *Probabilistic Methods in Combinatorics***

The focus of this work is to work on the following question. In extremal graph theory the central question is to characterize the structure of graphs which does not contain a fixed forbidden graph  $H$ . The classical results focused on the maximum edge cardinality of  $H$ -free graphs. However, in the last 40 years, motivated by computer science (property testing), the probabilistic point of view became more important, i.e.: What is the structure of almost all  $H$ -free graphs? This question is difficult when  $H$  is a bipartite graph.

**Christina Bashford, Assistant Professor, School of Music, *Violin Culture in Britain and Beyond, 1880-1930***

This project aims to establish a historical study of the upsurge and proliferation of string-instrument playing in Britain and beyond in the late nineteenth and early twentieth century. Specifically, during the fellowship, archival research will be conducted into targeted aspects of the project, and produce a preliminary paper that will contextualize the growing interest in the violin family in Britain, 1880-1930, presenting it at a major musicological conference in 2010.

**Marcelo Bucheli, Assistant Professor, Business Administration and History, *The Origins of U.S. Oil Operations Abroad: Standard Oil Company (New Jersey) in Venezuela***

What are the historical foundations of U.S. foreign oil policy? How did American oil corporations originally learn how to deal with foreign governments? This study attempts to answer these questions by studying the operations of Standard Oil Company of New Jersey (now ExxonMobil) in Latin America during the first half of the twentieth century. Before initiating major operations in the Middle East, the first field of foreign operation of U.S. oil companies was Latin America. His analysis suggests that Latin America provided a testing ground for later U.S. oil policy, since it was in this region where the oil companies negotiated with different kinds of political regimes, and also the setting in which the U.S. government intervened for the first time on behalf of U.S. oil companies. By using a body of recently declassified unpublished internal documents from Standard Oil Company, he compares the company's strategies in Venezuela, Colombia, and Peru between 1919 and 1968 and the evolution of the U.S. government's relationship with the multinational and with the governments of these three countries regarding oil politics. This analysis should identify the origins and foundational patterns of what would eventually become U.S. foreign oil policy, and the political strategies followed by American oil corporations operating abroad.

**\*\*Jonathan Hans Ebel, Assistant Professor, Religion, *A Wandering Oklahoman Was My Father: Religion, Migration, & the Great Depression***

This book-length study of the religious lives and thoughts of the men, women, and children displaced by the Great Depression of the 1930s will take up the question of lay religious responses to experiences of trauma and dislocation, asking how religious practices were maintained, if they were maintained, through the experience of migration and resettlement, and which religious ideas (promised land, exile, covenant, apocalypse) and narratives (Exodus, Job, Revelation) helped shape and give meaning to the experiences of dispossession in 1930s America. His working thesis is that the excruciating shattering of one covenant—the American gospel of prosperity and the benefits of individual industry—led many Americans to examine the terms and the history of the covenant between God and the Israelites for guidance and meaning.

**\*\*Indranil Gupta, Assistant Professor, Computer Science, *Harnessing the Clouds--from Systems to Applications***

In the last few years, the amount of data generated and shared by humans that needs to be processed has grown steadily (from gigabytes to petabytes). This explosion in the size of data center stores (petabytes to exabytes or more per data center) has prompted an emerging industry called cloud computing. This project will explore new cross-disciplinary research in this new era of data-intensive cloud computing, with forays into the areas of computer systems, computer networking, and social networks. It seeks to leverage Indranil Gupta's co-PI involvement in the new Cloud Computing Testbed (CCT) at Illinois that is currently being set up jointly with Hewlett-Packard, Yahoo!, Intel, and the National Science Foundation. Concretely, this proposal will look at five key directions and research problems in cloud computing, related to both systems-level as well as to the application-level topics. These directions are: (1) cloud monitoring systems, (2) efficient computation paradigms for large data, (3) crawling online social networks, (4) cloud applications, and (5) lessons learned from CCT for cloud computing. The components of this proposal are part of a bigger effort to answer several fundamental long-term questions such as: what services belong in a complete Cloud Operating System (CloudOS), understanding the limits of the cloud computing paradigm, increasing scalability and performance of cloud systems, design of new distributed algorithms for clouds, and encouraging design and development of new research applications atop clouds.

**Jie "Jackie" Li, Assistant Professor, Geology, *Properties of Earth and Planetary Materials at Extreme Conditions and the Evolution***

The goal of this research is to investigate the melting behaviors and thermal conductivities of iron-rich alloys under high pressure and high temperature conditions found in planetary cores. A number of high-pressure techniques, either recently developed or under development, will be used. The research will be carried out at the University of Illinois and the Advanced Photon Source, Argonne National Laboratory. The novel and most significant parts of this research are 1) measuring thermal

conductivity of compressed solids using the thermo-reflectance method in the diamond anvil cell, and 2) studying the melting behavior of iron-rich alloys under high pressure using the synchrotron x-ray radiography technique. The expected data will provide critical constraints for understanding the thermal and chemical evolution history of planetary cores in the inner Solar System.

**\*\*Sergiy Merenkov, Assistant Professor, Mathematics, *Rigidity of Sierpinski Carpets***

The main objective of this proposal is to investigate quasisymmetric deformations of certain fractals, such as Sierpinski carpets. The primary motivation for this investigation comes from the geometric group theory, particularly from Cannon's and the Kapovich-Kleiner conjectures.

**\*\*Heather Hyde Minor, Assistant Professor, School of Architecture, *Piranesi's Imperfect Ruins***

G.B. Piranesi's (1720-78) engraved and etched images have captivated a wide range of viewers since he began printing them in the 1740s, with contemporary filmmakers, musicians, and software designers joining earlier architects, artists, archaeologists, and authors in celebrating his art. Her project is to write a book that will focus on a simple but overlooked aspect of Piranesi's art how word and image function in his work.

**\*\*Dan Shao, Assistant Professor, East Asian Languages & Cultures, *Remote Homeland, Recovered Borderland: Manchus, Manchoukuo and Manchuria, 1909-1985***

This book manuscript addresses a long over-looked question in studying community construction: How does the past failure of an ethnic group to build a nation in its homeland influence its contemporary reconfigurations of ethnic identity and notions of home place? To answer this question, this book focuses on the Manchus in 20<sup>th</sup>-century Manchuria, whose ancestors conquered and ruled China from 1644 to 1912, but who failed to maintain their sovereignty over their homeland during the early 20<sup>th</sup> century, and failed to establish an ethnic autonomous region under the Chinese communist party today.

**Saurabh Sinha, Assistant Professor, Computer Science, *The New Frontier of Genomics: Predicting Biological Function of a DNA Sequence***

This project will study regulatory sequences of genomes--regions of DNA that control the functions of genes in a cell. We will combine concepts from statistical mechanics with techniques from bioinformatics, to predict the exact biological function of any regulatory sequence.

**Jacob J. Sosnoff, Assistant Professor, Kinesiology and Community Health,**  
*Wheelchair Use and Shoulder Pain: The Role of Motor Variability*

An estimated 35 to 70 percent of the 1.5 million manual wheelchair users in the United States suffer from shoulder pain. This project examines the novel hypothesis that alterations in the variability of wheelchair propulsion are a major determinant of shoulder dysfunction.

**\*\*Smitha Vishveshwara, Assistant Professor, Physics,** *Fractionalization in Strongly Interacting Quantum Systems*

The detection and manipulation of certain microscopic entities described as fractional quasiparticles would mark major milestones in fundamental physics as well as in applications to technology and computation. Towards this end, the proposed project identifies signature traits of fractional quasiparticles and investigates novel experimental geometries for controlling the dynamics of these quasiparticles.

**Sharra Vostral, Assistant Professor, Gender and Women's Studies and History,** *Rely Tampons and Toxic Shock Syndrome: Co-producing Technology and Disease*

This historical project will document how one particular tampon--Rely, designed and manufactured by Proctor & Gamble in the late 1970s and early 1980s--embodied two conflicting meanings: a technological panacea to solve the problem of menstrual flow and a threatening object linked to sudden death due to Toxic Shock Syndrome. The technological shift from cotton to synthetic components in tampons precipitated a heretofore-unknown disease, and this project interrogates how assumptions about progressive science, technological solutions, and women's bodies coalesced.

The Board action recommended in this item complies in all material respects with applicable State and federal laws, University of Illinois *Statutes*, *The General Rules Concerning University Organization and Procedure*, and Board of Trustees policies and directives.

The President of the University concurs.