

Board Meeting
January 18, 2018

APPOINT ASSOCIATES TO THE CENTER FOR ADVANCED STUDY, URBANA

Action: Appoint Associates to the Center for Advanced Study

Funding: State Appropriated Funds

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

The Chancellor, University of Illinois at Urbana-Champaign, and Vice President, University of Illinois recommends the following list of Associates selected for the 2018-2019 academic year, and offers brief descriptions of their projects:

Brian Cunningham, Professor, Electrical and Computer Engineering and Bioengineering, *Digital resolution biosensing, disease diagnostics, and DNA sequencing using dielectric nanoantenna-microcavity hybrids*

The goal of the proposed project is to develop a novel approach for coupling electromagnetic energy into dielectric nanoantennas to enhance the excitation and energy extraction of fluorescent photon emitters in the context of single-analyte resolution sensing of biomolecular interactions. Dielectric nanoantennas will be utilized to achieve highly localized enhancement of electromagnetic energy, and a detection instrument approach that enables simple and efficient optical coupling with spectroscopic detection of photon output for specific detection of biomolecules for disease diagnostics, and for high throughput DNA sequencing.

Sandy Dall'erba, Associate Professor, Agricultural and Consumer Economics, *Agricultural production, global trade and export of virtual water under future climate conditions*

This project investigates the sustainability of the current amount of water embedded in the production level and global trade of agricultural products under future climate conditions. It also quantifies the cost of implementing three water-saving policies for the countries expected to suffer from a water balance deficit in the future.

Lynford Goddard, Professor, Electrical and Computer Engineering, *Multi-depth Atomic Layer Etching of Silicon using Photo-Electro-Thermo-Chemistry*

The thicknesses of the film stacks in modern electronic devices are approaching 10 to 20 atomic layers and therefore etching device patterns with an accuracy of a single atomic layer is critical. This project explores using high speed optical, electrical, and thermal effects to realize a new approach for atomic layer etching.

Stephanie Hilger, Professor, Comparative and World Literature and Germanic Languages and Literatures, *Liminal Bodies: Hermaphrodites in the Eighteenth Century*

Liminal Bodies examines the eighteenth-century fascination with sexually ambiguous bodies, so-called hermaphrodites, and will argue that they became the symbol of an era in which centuries-old ways of knowing were collapsing. Examining case studies from three national contexts (British, French, and German), *Liminal Bodies* demonstrates that, rather than being characterized by scientific certainty, the period typically called the Enlightenment was marked by intellectual anxiety.

Bo Li, Associate Professor, Statistics, *Prediction of Future HIV New Diagnosis Rates using Spatial Bayesian Method*

The Centers for Disease Control and Prevention has reported dramatic outbreaks in regions that were not traditionally affected with HIV, besides the geographic regions that consistently exhibit high HIV rates, and the National HIV/AIDS Strategy has identified a key goal of intensifying efforts in the communities with the greatest concentration of HIV cases. This research project proposes a new statistical Bayesian method that utilizes the spatiotemporal correlation in the HIV data to predict the HIV new diagnosis rates in the future, and will provide the algorithm and results to the health department helping to deploy the health prevention timely and efficiently.

Rui Loja Fernandes, Professor, Mathematics, *Poisson manifolds of compact type*

Poisson manifolds are the phase space of classical mechanics and also the starting point of quantum mechanics. While the study of global properties of general

Poisson manifolds is very hard, the class of Poisson manifolds of compact type play a central role, and this project aims at deepening our understanding of their global behavior.

Vidya Madhavan, Professor, Physics, *Imaging Light Induced Excitations at the Nanoscale*

The CAS time-release award will be used to investigate light coupled-STM spectroscopy and integrate instruments in a multifunctional MBE, ARPES, and M-EELS System (SEAMS) facility. If successful, the new instruments will facilitate studies of dynamic properties of materials as well as ultra-thin films of solids, which have a huge potential to lead to new and unexpected discoveries.

David O'Brien, Professor, Art History, *The Cult of Napoleon and French Visual Culture, 1815-1848*

Professor O'Brien is completing a book of depictions of Napoleon and his regime in French visual culture during the Restoration (1815-1830) and the July Monarchy (1830-1848). Representations of Napoleonic subjects dominated the burgeoning and highly innovative visual culture of this period and, as O'Brien argues, mixed history, memory, politics, art, and entertainment in new ways.

Elyse Rosenbaum, Professor, Electrical and Computer Engineering, *Machine Learning Models for Reliability Analysis*

Modern electronic systems—ranging from a computer tablet to an automotive electronic control unit—contain so many complicated components that it is unthinkable to bring one to the manufacturing stage without first verifying its operation using simulation. To enable system reliability verification, machine-learning methods will be utilized to derive stochastic models of component aging and soft errors, especially those resulting from electrostatic discharges.

Gisela Sin, Associate Professor, Political Science, *The Disempowered Executive: Reconsidering the Line Item Veto*

This project investigates how legislators strategically adjust their behavior when the executive wields the power to veto, at his or her own discretion, parts of a legislative bill, while allowing the rest of the bill to become law. Contrary to existing arguments, this project claims that this power, known as line item veto, makes bargaining between the branches more difficult, and often results in reducing, rather than increasing, the executive's capacity to leave his or her imprint on policy outcomes.

Rebecca Stumpf, Professor, Anthropology, *Surveillance Sampling to Identify, Predict, and Prevent Disease Transmission and Antibiotic Resistance in Western Uganda*

The goal of this research is a zoonotic and anthropogenic community-wide characterization of the presence and prevalence of AMR genes and two common viruses in Western Uganda. Ultimately, this research will help to identify and track the interacting anthropogenic and environmental forces driving the spread of AMR and disease in this region and beyond, leading to more effective prevention and treatment of infection.

Smitha Vishveshwara, Associate Professor, Physics, *Quantum pancake vortices on Earth and beyond*

This project explores vortices—swirling currents—in quantum fluids in two contexts brought together by a common theoretical framework. In nanomaterials, it investigates the prospects for quantum vortices as building blocks for quantum computation, and in ultra-cold atomic gases, it studies their potential manifestation within shell-shaped superfluids in outer space.

Assata Zerai, Professor, Sociology, *African Women, ICT and Neoliberal Politics: From Gendered Digital Divides to People-Centered Governance*

Professor Zerai will challenge the androcentrism in recent research that has shown that broad access to cell phones and other information and communications technologies (ICTs) is linked to more democratic governance structures in African countries. She will examine whether access to ICTs by marginalized groups, especially women, results in the successful creation of bottom-up governance structures, and demonstrate how research by African scholars, too often marginalized, must be used to expand and redefine the goals and indicators of democratic governance in African countries.

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 Executive Vice President and Vice President for Academic Affairs concurs.

The President of the University recommends approval.