CAS

Center for Advanced Study

RESEARCH APPOINTMENTS / ASSOCIATES AND FELLOWS 2022 - 23

University of Illinois Urbana-Champaign

ILLINI SPINE: MAKING ROBOTS NATURAL THROUGH DISTRIBUTED ACTUATION • UNPACKING STATUS-LEVELING DYNAMICS AND THEIR IMPLICATIONS FOR WOMEN IN MALE-DOMINATED OCCUPATIONS • BEYOND MEASURE: CHALLENGING THE UNIFIED LOGICS OF CAPITALISM AND COMPUTING • WITH A WIDER LENS: REDISCOVERING LOST ISRAELI CINEMA 1948-1964 • INFRASTRUCTURES OF POWER: U.S. EMPIRE BUILDING AT THE DAWN OF THE BIG CARBON ERA • SEARCHING FOR NEW PHYSICS WITH THE ATLAS DETECTOR AT THE LARGE HADRON COLLIDER • ENERGY FROM LIGHT STORED, SHUTTLED, AND USED ON DEMAND • PROBING THE MICROSCOPIC STRUCTURE OF A CELL FROM DIFFUSIVITY OF THE PROTEOME • RACISM UNTAUGHT • THE FUTURE OF STEROLBIOME RESEARCH • COMMUNITY HEALTH WORKERS: WHO THEY ARE AND WHY THEY MATTER • STUDYING THE QUARK-GLUON PLASMA WITH SPHENIX • CONVERSATIONAL AGENTS FOR CORRECTION OF HEALTH MISINFORMATION • CHIRAL ELECTROCHEMICAL INTERFACES FOR ENANTIOSELECTIVE INTERACTIONS • INTEGRATING RESOURCE USERS INTO THE MANAGEMENT OF RECREATIONAL FISHERIES TO ENHANCE SUSTAINABILITY • CETACEAN (THE WHALE)

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Research Appointments 2022-23

Each year, tenured and untenured University of Illinois faculty are invited to submit scholarly/creative proposals for consideration by the Center's permanent Professors. Faculty members with winning proposals are appointed Associates and Fellows and awarded one semester of release time to pursue their projects in the coming academic year.

In accordance with the Center for Advanced Study's mission, these appointments provide incentives to pursue the highest level of scholarly achievement. They also provide faculty members with unusual opportunities to explore new ideas and demonstrate early results.

Along with the Professors, Associates and Fellows form the intellectual core of the Center for Advanced Study community. They participate in a yearly roundtable discussion of research interests, are invited to participate in CAS events, and have opportunities to present their work to campus and off-campus communities. Thus, each year brings together the established and the new in an ever-changing flux of ideas and disciplines.

In this brochure, we are pleased to introduce the projects of the 2022-23 Associates and Fellows.

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CAS Review Committee

The review committee for the Associates and Fellows program consists of the Center for Advanced Study Professors. Their permanent appointment to the Center is among the highest forms of campus recognition.

May R. Berenbaum
entomology, chemical ecology

Antoinette Burton
British empire, colonial India, race and sexuality mobility

Leon Dash
immersion journalism, domestic and international reporting

Sharon M. Donovan
pediatric nutrition, neonatal intestinal and cognitive development

Matthew W. Finkin
labor and employment law, legal issues in higher education

Eduardo H. Fradkin
quantum field theory, condensed matter physics

Martha U. Gillette
cellular neuroscience, circadian rhythm

Martin Gruebele
computational modeling, laser techniques, complex molecular systems

Bruce Hajek
communications engineering, stochastic methods

Stephen P. Long
environmental physiology, global atmospheric change, C4 photosynthesis

Jeffrey S. Moore
mechanochemistry, composites manufacturing, energy storage

Michael S. Moore
law and philosophy, jurisprudence, criminal law, ethics and meta-ethical philosophy, philosophy of punishment and responsibility, philosophical psychology

Harriet Murav
Slavic languages and literature, global and transnational studies, phenomenology

Catherine J. Murphy
nanomaterials, cellular imaging, chemical sensing, photothermal therapy

Tere O'Connor
dance, choreography, consciousness

Cynthia Oliver
choreography and performance, women's studies, African-Caribbean cultural history

Donald R. Ort
plant biology, crop sciences, agricultural systems

Gary Parker
delta evolution, bedrock meandering, drainage network formation, meandering rivers

Gene E. Robinson
genomics, social behavior, social insects

Nancy Sottos
autonomous function, self-healing polymers and composites

Jonathan Sweedler
bioanalytical chemistry, peptide hormones, neurotransmitters, neuromodulatory agents

Dale J. Van Harlingen
experimental low-temperature physics, superconductivity, microfabrication of superconductor devices, scanning probe microscopy, mesoscopic systems

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Invitation to Apply
We invite the campus faculty to submit proposals for the **2023-24** academic year.

For more information, please consult our website at www.cas.illinois.edu

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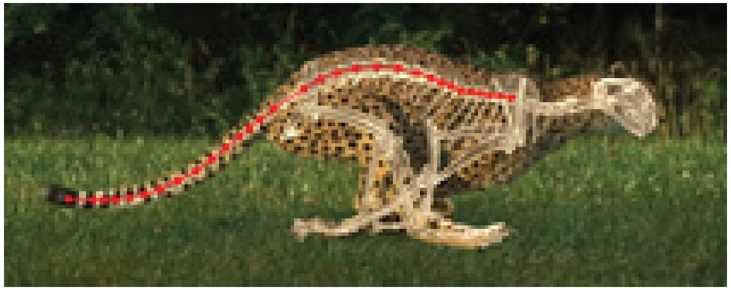
Application deadline: October 4, 2022

Contents

ILLINI SPINE: MAKING ROBOTS NATURAL THROUGH DISTRIBUTED ACTUATION

Arijit Banerjee
Beckman Fellow

Electrical & Computer Engineering



An articulated spine of a cheetah is an example of a distributed actuator that enables its extreme agility as it moves between gather and extended aerial phases.

Robots impact countless aspects of human life. There is a critical need to re-imagine them not only as an embodiment of mechanical joints and artificial intelligence but also as a complex network of electromechanical actuators. Professor Banerjee's mission is to create a class of modular and distributed electromechanical actuators that enable robots to be agile, efficient, and capable of reproducing biological motions that are impossible today. As an embodiment of a distributed actuation mechanism, the project aims to emulate a biological spine. A spine is fundamental to providing flexibility and balance in animals while allowing efficient locomotion. The construction of a synthetic spine is remarkably different from other standard robotic mechanisms—such as arms and legs—due to the presence of multiple single-joint segments, each with a limited range of motion. Synthesizing such an actuator will need engineering expertise as well as artistic creativity. The proposed design strategy will take advantage of the limited displacement requirement to increase the actuator's torque-to-weight ratio. Integrated design of mechanical springs and electromagnetics will enable a customized torque-displacement characteristic to achieve compliance and high efficiency similar to muscles. The deployment of appropriate control and estimation techniques is proposed to vary output torque and compliance. The design methodology will be validated by constructing a hardware prototype of a ten-link synthetic spine.

UNPACKING STATUS-LEVELING DYNAMICS AND THEIR IMPLICATIONS FOR WOMEN IN MALE-DOMINATED OCCUPATIONS

M. Teresa Cardador
Associate

Labor & Employment Relations

Researchers, organizations, and policy-makers are focused on how to attract, support the progression of, and retain women in traditionally male-dominated occupations such as engineering, research, and medicine. A sizable body of research documents the myriad barriers to promotion, success, well-being, and retention faced by women in these professions. Collectively, this research has examined the culture of male-dominated occupations, focusing on the actions of male colleagues and supervisors towards women that result in discrimination, stereotyping, harassment, and devaluation of their work. Professor Cardador's recent research has identified an entirely new set of challenges that women in male-dominated professions experience when they collaborate across occupational boundaries with women in female-dominated occupations who are lower in the organizational status hierarchy. In particular, women in subordinate occupational roles expect higher-status women to diminish their status to be more equal in what can be described as a "status-leveling burden." Status-leveling demands mean that women in male-dominated occupations must not only face the challenges of being a minority in a high-status occupation, but also negotiating demands that they not fully use the status that they've earned by succeeding in a male-dominated job.

Professor Cardador's initial research into the status-leveling phenomenon shows that it adds additional stressors and burdens to women's careers, thus potentially undermining their retention and productivity. During her CAS appointment, she plans to expand her status-leveling research to understand the many unanswered questions that remain, such as (1) what mechanisms underlie the status tensions between women collaborating across occupations, (2) under what conditions is the status-leveling burden most likely to exist, and (3) what are the career, performance, and well-being implications of the status-leveling burden and its management?

BEYOND MEASURE: CHALLENGING THE UNIFIED LOGICS OF CAPITALISM AND COMPUTING

Ben Grosser
Associate

Art + Design

Characters watching, tracking, and celebrating numbers in contemporary film and TV. Screenshots clockwise from top left: *The Social Network* (2010), *Silicon Valley* (2018), *Severance* (2022), *Startup* (2018).

Despite the threats posed by big tech platforms for everything from individual agency and liberty to national and global democracy, why are so many resigned to accept a 21st-century digital infrastructure created by an industry that puts growth and profit ahead of users and society? How did we come to rely on metrics as the primary tool for evaluating everything about our social world, from how many “likes” we get on social media to how and why racism spreads online? Who most benefits from the idea that more data always leads to more knowledge, and who is made most vulnerable by it?

This project will investigate such questions through an aesthetic lens aimed at movies and television from 1980-2020. The outcome will be two companion films that play side-by side, each a long-duration “supercut”—a form of video art that uses carefully-composed extraction rules to mine short clips from a vast archive and assembles the result into a new composite narrative work. One of these films will present a chronologically-ordered look at the glorification of capitalism in our popular media landscape, extracting small moments when well-known characters talk about numbers and dollars and growth and markets. The companion film will trace how computing and its interfaces have increasingly driven on-screen narratives ever since the introduction of the personal computer, extracting moments when characters pause to watch and wait for the thinking computer to deliver the answer they’re waiting for or to tell them what to do next. When viewed together, these two films will reveal when capitalism and computing began to converge in our collective unconscious. Such overlaps and intersections will provoke questions about how and why capitalism’s need for endless growth and big tech’s need for endless data combined into a singular logic that now pervades all aspects of society.

WITH A WIDER LENS: REDISCOVERING LOST ISRAELI CINEMA 1948-1964

Rachel S. Harris
Associate

Comparative & World Literature

Still of Margo (Gila Almagor) from *El Dorado* (1963), directed by Menachem Golan.

Professor Harris's new book project explores the origins of the Israeli film industry. Using recently restored films and newly available archive materials, the book explains how these nearly-forgotten films, celebrated in their day, reposition our knowledge of the film industry's development. The book project uncovers this little-known period of Israeli cinema, in which filmmakers experimented with genre, and taboo themes such as inter-marriage, racism, Holocaust trauma, discrimination against Arabs, and desire for emigration. Drawing on international networks in which they had been previously employed, filmmakers were able to craft the foundation for a now internationally recognized and award-winning film industry. Yet, following changes in financing and studio control in the mid-1960s, it would take three decades before Israeli film would again engage such politically explosive subject matter.

Combining traditional film analysis with new methods in film history that focus on a wider range of industry primary materials such as censorship files, diaries, fan magazines, production materials, and correspondence, *With a Wider Lens* also considers influences on film production, financing, and distribution. By examining the mechanisms that operated in relation to the state's institutional and legal regimes, Professor Harris challenges a tradition that privileges the roles of auteurs, particularly directors, writers, and producers. Focusing away from these traditionally male professions elucidates the impact of other film-industry workers such as studio heads, casting directors, and film-editors—more traditionally female professions—in the shaping of cinema. Returning to this history reveals the major but often overlooked responsibility women had for its growth. Through a careful reading of the films; close study of the economic, ideological, and political influences that impacted and shaped the film industry; and a consideration of international dynamics on production and distribution, this book will offer a new account of this founding phase of Israeli cinema.

INFRASTRUCTURES OF POWER: U.S. EMPIRE BUILDING AT THE DAWN OF THE BIG CARBON ERA

Kristin Hoganson
Associate

History

Frederick Upham Adams, *Conquest of the Tropics: The Story of the Creative Enterprises Conducted by the United Fruit Company*, New York: Doubleday, Page & Company, 1914.

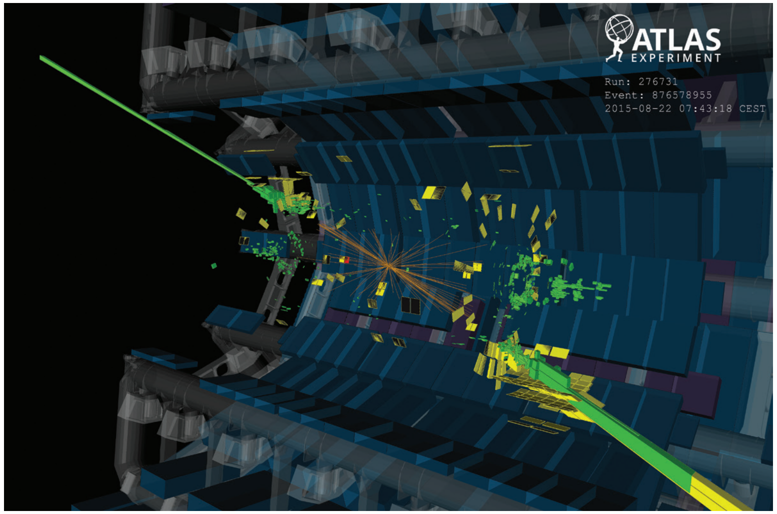
Recent disasters have made it clear that our infrastructures are not up to the challenges of climate change; they must be re-engineered for a climatically different era. The issue goes well beyond technical specifications. Fires, floods, droughts, and coastal erosion have also focused attention on the political dimensions of infrastructures and questions of equity and justice. Professor Hoganson's research contributes to deliberations over the future of infrastructure by illuminating the political backstory to the energy and energy-supporting systems we have inherited. Many of the infrastructures that continue to shape the world we inhabit can be traced back to the late nineteenth and early twentieth centuries—a belt-and-road era of railroad, streetcar, and macadamized road building, harbor improvements, trans-Isthmian canal construction, and the establishment of water and sewage systems, long-distance communications networks, and electrical grids. Significantly, and not coincidentally, this time period was also an age of empire building.

Professor Hoganson's project goes beyond studies of U.S. imperialism that focus either on corporate or state actors by tracing private-public collaborations in infrastructural development. Her research will take a wide-angle-lens approach so as to connect the greater Caribbean to places such as the Philippines and the Great Lakes and to register rivalries and collaborations across empires. The goals are to understand how infrastructures emerged from fields of power and in turn affected these fields as they remapped social, political, and economic relations, fostered imperial buy-in and anti-imperial resistance, and laid the groundwork for the manifestly anthropocenic world we inhabit today.

SEARCHING FOR NEW PHYSICS WITH THE ATLAS DETECTOR AT THE LARGE HADRON COLLIDER

Benjamin Hooberman
Associate

Physics



The goal of particle physics is to understand the basic building blocks of matter and the fundamental forces that mediate their interactions. In 2012, the Higgs boson was discovered by the ATLAS and CMS experiments at the Large Hadron Collider, the most powerful particle accelerator in the world. This Nobel Prize-winning discovery explained the origin of mass and completed the “standard model” of particle physics, which summarizes our current understanding of the fundamental particles and forces. However, several important unanswered questions—including the existence of mysterious dark matter—indicate that the standard model is an incomplete theory of nature. The current primary goal of the Large Hadron Collider research program is the search for beyond-the-standard model physics, which can resolve these questions and pave the way to a “grand unified” theory of nature.

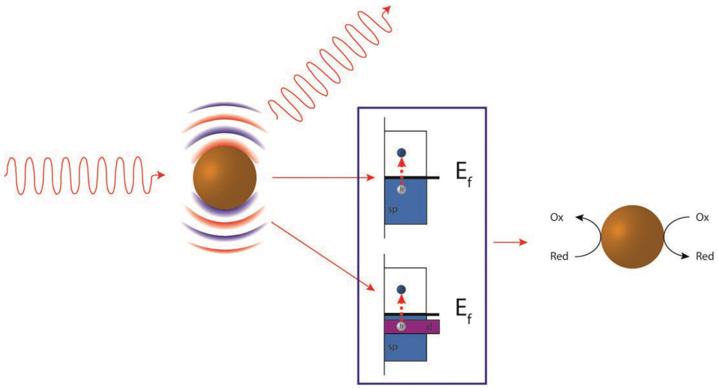
Supersymmetry is an extension to the standard model that can resolve its theoretical shortcomings and explain the origin of dark matter. Supersymmetry predicts an exotic new “super-partner” for each of the known elementary particles, which could be produced in the high-energy proton-proton collisions at the Large Hadron Collider. As “Convener” of the ATLAS Supersymmetry Group, Professor Hooberman will lead an international team of 250 physicists in the search for supersymmetric particles in ATLAS data. They will also perform searches for “long-lived” supersymmetric particles, which travel large distances through the ATLAS detector before decaying, and contribute to upgrades of the ATLAS trigger system that will enable this physics program in future data. The discovery of supersymmetric particles would provide a paradigm shift in our understanding of nature similar to the transition from classical physics to relativity and quantum mechanics in the early 20th century.

ENERGY FROM LIGHT STORED, SHUTTLED, AND USED ON DEMAND

Prashant Jain

Associate

Chemistry



Solar to energy carriers. Credit: Smith/Jain, University of Illinois

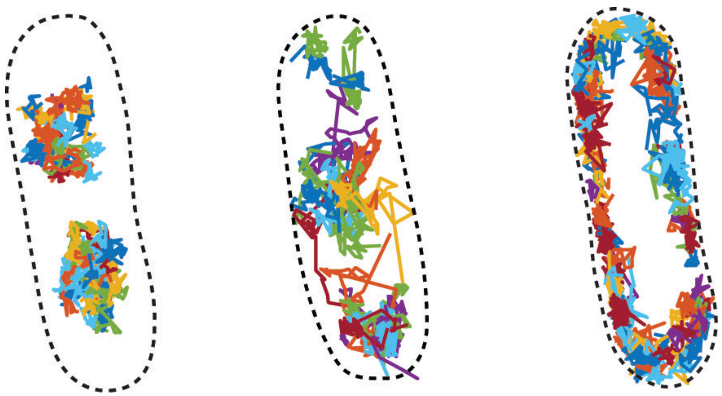
The intermittency of solar radiation is a major bottleneck in the widespread adoption of photovoltaics for renewable power generation. Being able to store energy harvested from the sun and deploying this stored energy on demand is a central challenge of our times. Nature has solved this challenge: photosynthetic organisms harvest solar energy and store it in the form of redox cofactors. Taking a page from nature, Professor Jain envisages a new solution to this challenge where light will be harvested by specially designed nanoscale antenna and stored in high density in the form of long-lived energetic chemical species. Upon demand, the energy carriers will be transported to a manufacturing site where they will be used to power thermo-dynamically uphill reactions for the green production of chemicals and fuels. In this manner, sunlight can be deployed on demand as a source of energy, a chemical reagent, and a tool for building complex molecules. For harvesting solar radiation, Professor Jain will engineer nanoscale architectures optimized to function as antennas for capturing light and converting it to energetic charge carriers. Metal complexes with multiple oxidation states will be used to capture these energetic carriers and stabilize them so that they can be stored and transported to the manufacturing site.

As one manufacturing goal, the energy carriers will be used to power the conversion of nitrogen gas to ammonia, a high-demand chemical required for food production and a hydrogen energy economy. The conversion of nitrogen gas to ammonia is a demanding reaction carried out on a global scale with immense energy demands; the conventional Haber-Bosch process uses an estimated 1% of the world's energy consumption. This new strategy will lead to the sustainable method for local ammonia production using abundant renewable resources such as nitrogen gas, water, and sunlight without the need for fossil-fuel-derived hydrogen gas.

PROBING THE MICROSCOPIC STRUCTURE OF A CELL FROM DIFFUSIVITY OF THE PROTEOME

Sangjin Kim
Beckman Fellow

Physics



Cells are Nature's test tubes, in which the biochemical reactions of life take place. Unlike laboratory test tubes, in which scientists can create a well-defined reaction condition, the physico-chemical properties of the cellular interior remain poorly understood. Recently, the importance of understanding the cellular interior has been increasingly emphasized due to novel findings from interdisciplinary research such as studies of liquid-liquid phase-separation inside a cell and efforts to engineer synthetic cells. A new technological breakthrough is urgently needed to characterize the cellular interior in greater detail.

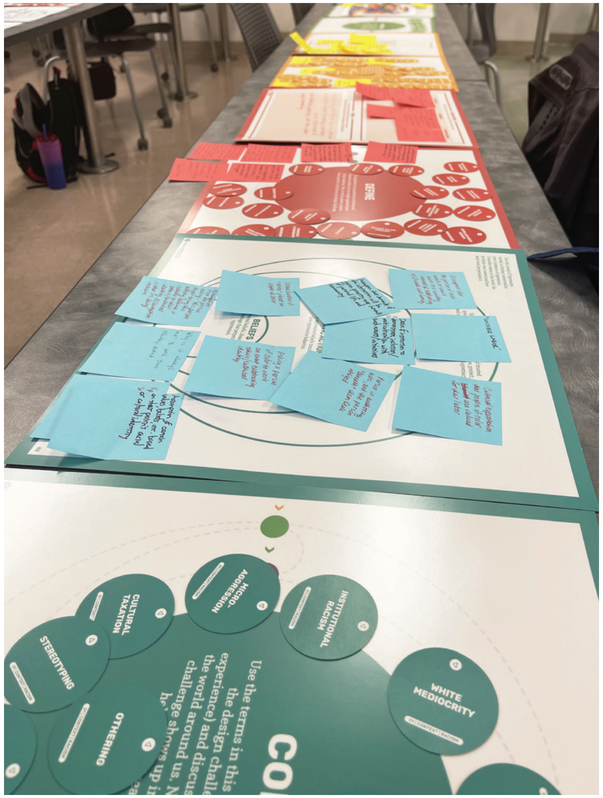
Professor Kim's long-term research goal is to use physics-inspired approaches to determine the microscopic structure of cells. Toward this goal, her group is developing new technology for mapping protein-protein interactions and macromolecular crowding at the molecular scale in live bacterial cells. The innovation is based on precisely measuring the "jiggling" thermal motion of proteins that is as small as ~10 nanometers in 1-10 milliseconds. This microscopic dynamic reflects spatial details about the molecule's immediate surroundings, hence offering an opportunity to profile macromolecules in the vicinity. The technology is based on single-particle tracking of proteins using single-molecule fluorescence microscopy and a machine learning-based analysis pipeline. This technology will enable scientists across multiple fields to obtain the high-resolution molecular picture of a cell's interior and provide mechanistic and systems-level insights into how cells operate properly.

RACISM UNTAUGHT

Lisa Mercer

Fellow

Graphic Design



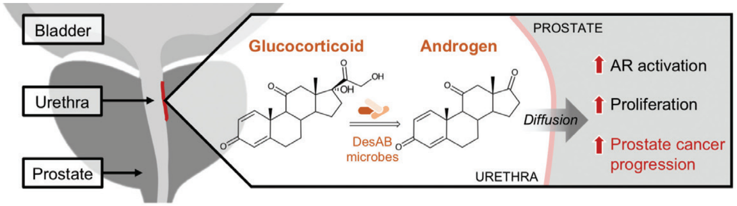
The *Racism Untaught* framework was sparked by an interest to support conversations on race and racism in any classroom, not only those with diversity, equity, and inclusion in the titles. Beginning in 2018, Professor Mercer has worked with Terresa Moses (University of Minnesota), to develop an anti-racist framework and toolkit that explores, reveals, and assists in unlearning racialized design approaches. This framework was developed out of a design research process meant to prompt thought, such as positionality in the design process, and a shared language to discuss artifacts, systems, and experiences that perpetuate oppression. The book project provides a methodology to analyze systems of oppression and design interventions that acknowledge the intersectionality of social identities and can be implemented by educators, researchers, and practitioners to foster conversations and promote learning environments that generate new ideas, critical thinking, and diverse forms of making.

The ability to identify and discuss designs that have supported the overgeneralization of historically marginalized communities is imperative to guide a social shift in the design community. The *Racism Untaught* project has reached over 1800 participants through over 600 hours of workshops, 12 college-level courses at different research institutions, and numerous national and international presentations in academia and industry. The participants and students have helped further understand the value and need for a shared vocabulary in conversations focused on forms of racialized design. This emerged as the crux of the research and has led to articles and conference presentations informed by interviews and the researchers' own primary data.

THE FUTURE OF STEROLBIOME RESEARCH

Jason Ridlon
Associate

Animal Sciences



Professor Ridlon's pioneering discovery of the genes encoding bacterial steroid desmolase provides a mechanism by which host-associated microbiomes generate androgen sex hormones. The genes, known as desABCE, were found in both the gastrointestinal tract microbial communities, and also bacteria inhabiting the urinary tract. The enrichment of these genes in the urinary tract of some men may represent a life-long risk factor for prostate cancer, which is driven by androgens. Professor Ridlon assembled a multi-disciplinary team to measure desAB genes in the urine of healthy control men, and men newly diagnosed with prostate cancer. He has been developing a research focus known as the host "sterolbiome," the collection of microbiome genes involved in steroid metabolism. His work resulted in characterization of many novel enzymes.

During his CAS release-time appointment, Professor Ridlon will utilize several approaches to map out the urinary sterolbiome. This work has significant implications for medical diagnostics which rely on accurate measurements of urinary steroids. If bacteria modify host steroids in the urine, patients may not receive the correct diagnosis. The production of androgens also has implications for the results of doping tests performed on professional athletes. Furthermore, epithelial cells that line the colon express androgen receptor, as do immune cells that infiltrate and survey the intestinal barrier. The gut is thus expected to be highly responsive to androgens, and this may represent a form of hostmicrobe communication that has yet to be explored.

COMMUNITY HEALTH WORKERS: WHO THEY ARE AND WHY THEY MATTER

Andiara Schwingel
Associate

Kinesiology & Community Health

Community Health Workers (CHWs) are frontline public health workers with limited formal education in healthcare and social services, but who are well positioned to make a difference in the fight to reduce health disparities. Their trusting relationships with individuals enable them to serve as liaisons between health and social services and the community to facilitate access to services and improve the quality and cultural sensitivity of service delivery. Although the CHW model is widely utilized across the globe, the U.S. and Illinois have only recently begun to recognize its importance and develop the infrastructure that supports these grassroots health workers.

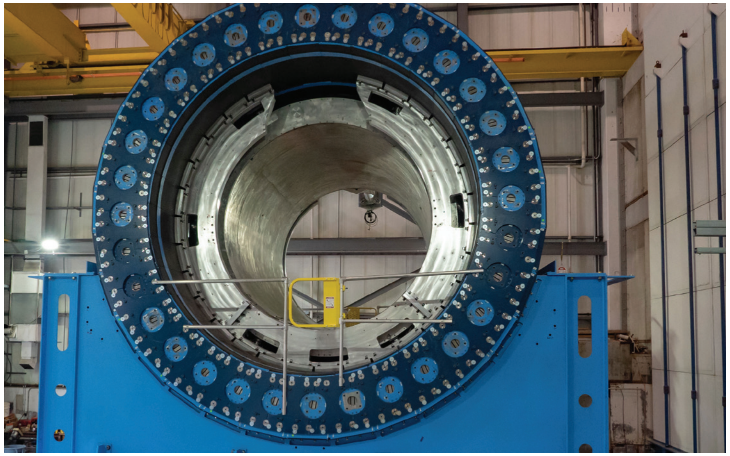
The concept of "who they are" and "why they matter" is not widely understood by researchers and healthcare organizations/professionals. During her CAS appointment, Professor Schwingel will address the basic need of improving health communication. She will examine effective ways to communicate with both the academic and clinical audiences about CHWs—who they are and why they matter. She will develop audience-specific communication messages and approaches and establish appropriate language and imagery, leveraging connections and information from past and current work, sharing the results in the form of a website, commentary in a journal for the academic community, and a white paper for clinical stakeholders, and press attention. This work offers an opportunity to increase awareness, interest, respect, appreciation, and funding for CHWs, shedding light on the complex problem of the disparities in health and healthcare that are impacting communities of color in Illinois and the U.S.

STUDYING THE QUARK-GLUON PLASMA WITH SPHENIX

Anne Sickles

Associate

Physics



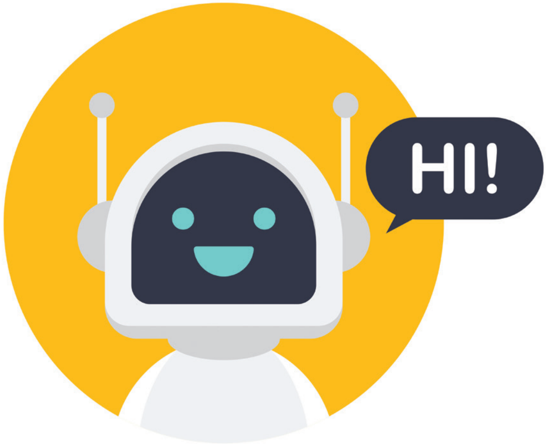
Quarks and gluons are not normally observed because of a property of the strong force called confinement, which keeps them normally bound within protons and neutrons. One way of studying the strong force is to collide nuclei together with enough energy to liberate the quarks and gluons from their bound states. These collisions result in the formation of quark-gluon plasma (QGP). It is the highest temperature matter created in the laboratory, and it can be created at Brookhaven National Lab's Relativistic Heavy Ion Collider (RHIC). These collisions make drops of QGP which live for a short time and then cool into normal matter. A major outstanding question is why they behave as a nearly perfect fluid. Over the last seven years, Professor Sickles and her research group have worked to design, test, and construct the electromagnetic calorimeter, a sub-detector of sPHENIX, which can measure the jets formed by very energetic quarks and gluons.

The commissioning process prepares a new detector to take data. sPHENIX commissioning will take place during Spring 2023. During her CAS appointment, Professor Sickles will be at Brookhaven for initial data taking. The success of this is a key part of the University of Illinois Physics program, as data from this detector will lead to several papers and provide theses for multiple graduate students.

CONVERSATIONAL AGENTS FOR CORRECTION OF HEALTH MISINFORMATION

Leona Yi-Fan Su
Beckman Fellow

Advertising

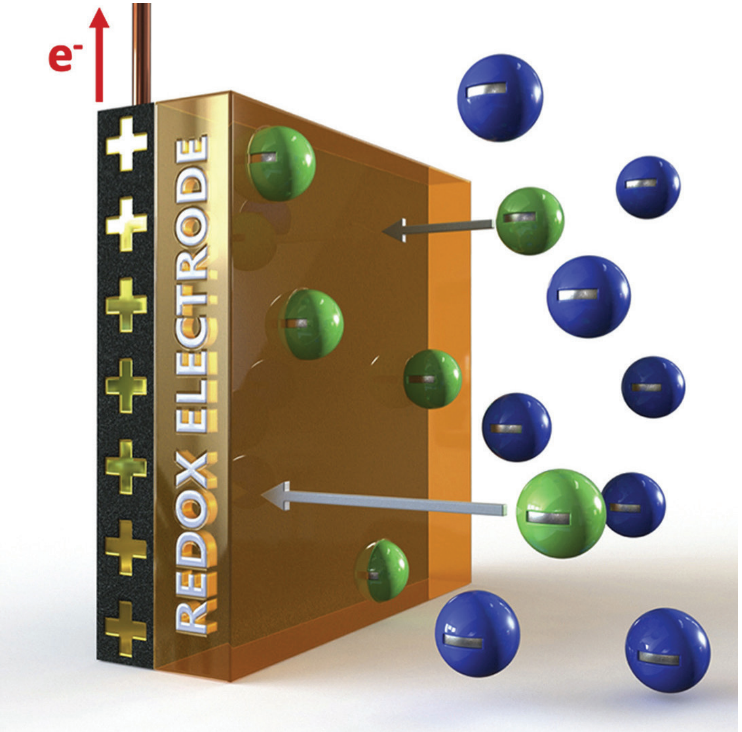


The wide and rapid spread of misinformation is a global problem and can pose serious threats to public health. The World Health Organization, along with the Mayo Clinic and the U.S. Centers for Disease Control and Prevention, has called for the development of effective tools to combat misinformation and deployed conversational agents to help the public navigate the COVID-19 pandemic. Yet, despite the increasing prevalence of conversational agents in daily life and their apparent promise for verifying information, many questions about their efficacy and mechanisms remain unanswered.

Professor Su's work will help bridge this gap by examining how and how well conversational agents' misinformation-debunking processes work. The results are expected to make an important theoretical contribution to scholarship on the use of digital technologies for debunking purposes and to underpin the design and development of digital tools that can effectively correct health misinformation—a task with strong practical benefits in this age of digital misinformation. This project extends Professor Su's ongoing work on misinformation-correction strategies involving the use of cutting-edge digital media and will enable the building of a comprehensive knowledge base at the intersection of misinformation, misinformation correction, and digital technologies that can be applied across numerous health contexts. Additionally, it will produce a more systematic understanding of the increasingly critical roles digital technologies play in shaping public knowledge, attitudes, and behaviors in the rapidly-evolving information ecosystem.

CHIRAL ELECTROCHEMICAL INTERFACES FOR ENANTIOSELECTIVE INTERACTIONS

Xiao Su
Beckman Fellow
Chemical & Biomolecular Engineering



Chirality is a fundamental property of molecules and materials with deep underlying implications for biological function and chemical activity. Key active molecules within our bodies are composed of chiral structural units, including amino acids, brain receptors, and various cell-signaling compounds. A majority of therapeutic drugs in the market are chiral, i.e. exist as enantiomers, which are non-superimposable mirror images of each other. Within our bodies, different enantiomers can have antagonistic functions such that one is therapeutic while another is toxic. Consequently, the development of materials for chiral recognition and purification is of critical importance for healthcare and the biochemical industry as well as fundamental chemistry and materials science.

Professor Su's objective is the discovery of new adaptive materials for enantioselective separations, especially through the use of electrochemistry and the elucidation of the molecular interactions. His team seeks to exploit electrochemical control to enhance the discrimination of surfaces towards desired enantiomers. They will investigate the interaction of their newly-developed chiral interfaces with a range of chiral amino acids and small molecule therapeutics, including antibiotics as well as antiviral pharmaceuticals. Professor Su aims to develop fundamental advances in chiral recognition and enantioselective separations, which will in turn accelerate drug manufacturing, fast-throughput diagnostics, and possibly even have implications within asymmetric catalysis. In the long term, electrochemical approaches for complex organic separations would be transformative for greener chemical and biochemical processing by lowering waste, eliminating chemical input, and introducing renewable-energy integration.

INTEGRATING RESOURCE USERS INTO THE MANAGEMENT OF RECREATIONAL FISHERIES TO ENHANCE SUSTAINABILITY

Cory Suski
Associate

Natural Resources & Environmental Sciences

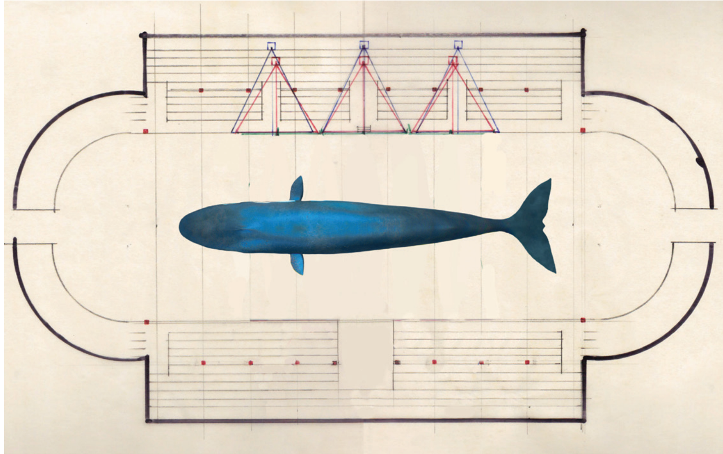
Around the world, recreational angling is an important and popular use of fishery resources. Improper management of recreational fisheries can lead to population declines, and, in some instances, population collapse. A key piece of information that can help managers generate successful conservation strategies is why fish strike fishing lures. To date, there are two extant hypotheses as to why fish strike fishing lures. One relates to "boldness," with bold individuals striking lures. The second relates to "calmness," with fish that are not easily startled more prone to strike fishing lures. Unfortunately, each of these mechanisms correlates with vastly different life history strategies for fish and would thereby necessitate different management and conservation interventions to ensure sustainability, resulting in a critical need to better understand mechanisms of lure striking in fish.

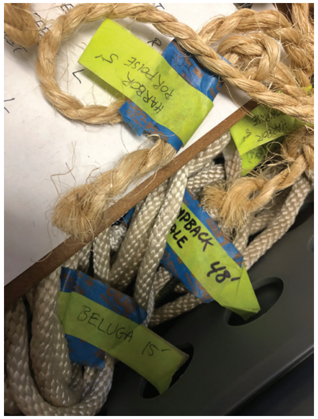
Professor Suski's research project has two main objectives. The first is to define mechanisms of lure striking in muskellunge—an important apex predator found in many lakes in Illinois, and a popular target for anglers. The second objective is to collaborate with angling groups that target muskellunge, not only to help integrate their experience and knowledge into project direction but also to help transfer knowledge and findings directly to stakeholders to ensure the adoption of conservation recommendations. Together, results from this work will have benefits for anglers in Illinois and serve as a model for the successful co-management of natural resources around the world.

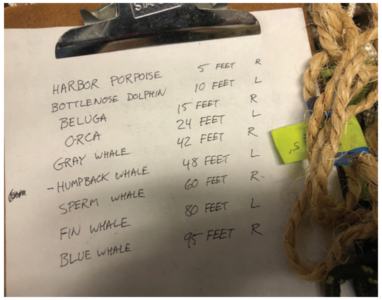
CETACEAN (THE WHALE)

Deke Weaver
Associate

Art + Design







A three-year project, *CETACEAN (The Whale)* will culminate in a public performance built around a full-scale blue whale marionette suspended and "swimming" through the air of the University of Illinois Stock Pavilion. The 100-foot-long creature will be built by students with recycled plastic—a haunting, crowd-sourced ghost whale. The work will feature performers in deep-sea diving costumes, large-scale video projection, music, and the story of 1881 's Pioneer Inland Whaling Association that toured a rotting whale carcass across the Midwest on the flatbed of a train. In addition to providing a cathartic communal moment, *CETACEAN* will serve as an educational platform for ideas about ecological systems, climate change, and resilience, while embodying collaborative processes, sustainability, and interdisciplinary storytelling.

CETACEAN will be the sixth event from *The Unreliable Bestiary*—a life-long venture presenting a performance for every letter of the alphabet, each letter representing an endangered animal or habitat. The ambitious gesture of creating 26 individual, full-length pieces is presenting a tiny sliver of our current catastrophic loss of habitat and biodiversity. Crafted from the many-faceted stories—anecdotal, scientific, historical, mythic, fictitious, environmental, economic—that surround each of these vulnerable creatures, these multidisciplinary performances are presented in settings that reflect the human relationship to the particular animal, from intimate venues such as living rooms or the corn-cribs of barns to larger stages: forests, prairies, or the length of the Mississippi River.

ILLINI SPINE: MAKING ROBOTS NATURAL THROUGH DISTRIBUTED ACTUATION • UNPACKING STATUS-LEVELING DYNAMICS AND THEIR IMPLICATIONS FOR WOMEN IN MALE-DOMINATED OCCUPATIONS • BEYOND MEASURE: CHALLENGING THE UNIFIED LOGICS OF CAPITALISM AND COMPUTING • WITH A WIDER LENS: REDISCOVERING LOST ISRAELI CINEMA 1948-1964 • INFRASTRUCTURES OF POWER: U.S. EMPIRE BUILDING AT THE DAWN OF THE BIG CARBON ERA • SEARCHING FOR NEW PHYSICS WITH THE ATLAS DETECTOR AT THE LARGE HADRON COLLIDER • ENERGY FROM LIGHT STORED, SHUTTLED, AND USED ON DEMAND • PROBING THE MICROSCOPIC STRUCTURE OF A CELL FROM DIFFUSIVITY OF THE PROTEOME • RACISM UNTAUGHT • THE FUTURE OF STEROLBIOME RESEARCH • COMMUNITY HEALTH WORKERS: WHO THEY ARE AND WHY THEY MATTER • STUDYING THE QUARK-GLUON PLASMA WITH SPHENIX • CONVERSATIONAL AGENTS FOR CORRECTION OF HEALTH MISINFORMATION • CHIRAL ELECTROCHEMICAL INTERFACES FOR ENANTIOSELECTIVE INTERACTIONS • INTEGRATING RESOURCE USERS INTO THE MANAGEMENT OF RECREATIONAL FISHERIES TO ENHANCE SUSTAINABILITY • CETACEAN (THE WHALE)

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