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DISTINGUISHED DISSERTATION
AWARDS

———— April 9, 2024 ————



**RACKHAM
GRADUATE SCHOOL**
UNIVERSITY OF MICHIGAN

Welcome

The quality and diversity of doctoral dissertations produced each year by Rackham students is key to the distinction that the University of Michigan has earned as one of the world's great research universities. Rackham's doctoral students contribute innovative research and scholarship at the highest level in many fields.

Each year, truly exceptional dissertations are recognized with the ProQuest Distinguished Dissertation Awards. Faculty who have served as chairs of dissertation committees nominate outstanding students who have completed their dissertations. These nominations are reviewed by a faculty panel and then read closely by postdoctoral fellows who are members of the Michigan Society of Fellows, a unique interdisciplinary community of outstanding scholars.

The awards are co-sponsored by ProQuest, a global information-content and technology company based in Ann Arbor that publishes more than 200,000 dissertations and theses annually, including more than 800 by University of Michigan graduate students. We are delighted to have ProQuest, part of Clarivate, as a partner in celebrating the accomplishments of these scholars and recognizing the excellence of their doctoral dissertations.

Mike Solomon

Dean and Vice Provost for Academic Affairs

Maria Ahmed

Generation of Sparse, Combinatorial Wiring for Sensory Coding

Ph.D., Molecular, Cellular, and Developmental Biology, 2023

B.S., Biology, Lahore University of Management Sciences, 2017

Maria Ahmed's dissertation, "Generation of Sparse, Combinatorial Wiring for Sensory Coding," was chosen for the Proquest Distinguished Dissertation Award for its focused, inventive, and well-executed design. Ahmed investigated an important and intriguing question – how are animals with finite neurons able to sense the infinite unique combinations of environmental stimuli? She approached this question with a creative experiment on one of the most extensively studied model organisms, the fruit fly *Drosophila*. By perturbing the flies' development, she varied how many sensory neurons and how many combinatorial neurons (Kenyon cells) different flies had. She was then able to compare how these differences changed the response of the flies to environmental stimuli. The dissertation describes this core experiment clearly with great detail. Additionally, Ahmed includes a grounded discussion of the anatomy of the *Drosophila* brain and further study of the mechanisms underlying the development of individual Kenyon cells. The combination of creative experimental design and a deep understanding of the organism and study system made Ahmed's dissertation stand out among a pool of many other excellent candidates. We would like to congratulate Ahmed for these impressive scientific contributions and are thrilled to award her for an outstanding dissertation.

Comments by Anne Kort, Earth and Environmental Sciences

Dissertation Committee:

John Kuwada, Chair

Catherine Collins

Sung Eun Kwon

Swathi Yadlapalli

Tzumin Lee

Markus Borsch

Theory of Lightwave-Driven Quantum Electronics in Solids

Ph.D., Electrical and Computer Engineering, 2023

M.Sc., Physics, Philipps-Universität Marburg, 2016

B.Sc., Physics, Philipps-Universität Marburg, 2014

In his dissertation, Markus Borsch expounds a comprehensive many-body quantum theory, which he applies to lightwave-driven many-body excitations in quantum materials. This groundbreaking work creates a foundation for the next generation of quantum engineering, specifically in the field of lightwave electronics. Borsch's work bears significant implications for semiconductor technology and has resulted in multiple publications in prestigious peer-reviewed journals.

Comments by Dmitri Brown, American Culture

Dissertation Committee:

Mackillo Kira, Chair

Steven T. Cundiff

Parag B. Deotare

Theodore B. Norris

Salem Elzway

Arms of the State: A History of the Industrial Robot in Postwar America

Ph.D., History, 2023

B.S.B.A., Finance, University of Nebraska-Lincoln, 2006

“Arms of the State: A History of the Industrial Robot in Postwar America,” the first archivally based history of the industrial robot, stands as a major contribution to the fields of science and technology studies as well as several major subfields of United States history in the post-World War II period, including the history of labor, business, politics, and the economy. Elzway moves us beyond the caricature of technology as either utopian or dystopian, or as resulting from the mind of genius and applied to either solve social problems or obliterate humanity. It moves fluently across the registers of culture, politics, and technology in analyzing the robot and broader processes of automation as an idea/symbol and as a material object; and it moves brilliantly across scale and sites of production from the university labs and corporate ventures of scientists and inventors, to the funding streams of the national security state, to the realms of science fiction literature and journalistic hype, to the automation visions of organized labor and the worker-management showdowns on the shop floor.

Comments by Paul Kurek, Germanic Languages and Literature

Dissertation Committee:

Matt Lassiter, Chair

Paul Edwards

John Carson

Joy Rohde

Luis Flores

The Regulatory Politics of Home-Based Moneymaking After the American Family Wage

Ph.D., Sociology, 2023

B.A., Political Economy, University of California, Berkeley, 2013

B.A., History, University of California, Berkeley, 2013

Luis Flores's dissertation explores the boundaries between formal economic markets and the informal ones of the household, challenging a well-accepted tenet in how capitalism became a social institution by separating the two. Through meticulous fieldwork and historical analyses, Flores convincingly shows how, over the past few decades, the household has become an integral part of modern capitalism, altering our traditional considerations of economic and sociological theories. Flores writes in a narrative style that evokes the most accomplished ethnographers, but with the detail and analytical clarity of a skilled historian, pushing the theoretical boundaries of contemporary sociology. The dissertation is a rare body of work that will greatly influence many research trajectories of future scholarship in the discipline.

Comments by Jeff Sheng, Information

Dissertation Committee:

Greta Krippner, Chair

Elizabeth Anderson

Robert Jansen

Fabian Pfeffer

Josh Pacewicz

Alex Kapiamba

Parabolic Towers and the Asymptotic Geometry of the Mandelbrot Set

Ph.D., Mathematics, 2023

**M.S., Applied and Interdisciplinary Mathematics,
University of Michigan, 2018**

B.A., Mathematics, Oberlin College, 2014

B.A., Biochemistry, Oberlin College, 2014

The geometry of the Mandelbrot set has been explored through holomorphic dynamics, describing the context of fractals for decades. Alex Kapiamba approached the set with parabolic and near-parabolic renormalization operators for maps, proposing an alternative definition to the parabolic towers. Beyond its well-articulated logical context, the dissertation discovered that polynomial external rays arise as the Hausdorff limits. This is a meaningful extension of the previous proof, establishing the set of dynamics in the uniformization of the complement. John H. Hubbard, one of the first developers of the Mandelbrot set, evaluated Alex Kapiamba's work as a superb thesis, stating that it "solves in a completely novel way a problem that has been open for close to 40 years, and that has attracted the attention of many leading mathematicians..." All of Alex's accomplished work showcases rigorous, innovative thinking, a careful critical approach, and deserves recognition through the ProQuest Distinguished Dissertation Award.

Comments by Sungon Park, Nursing

Dissertation Committee:

Sarah Koch, Chair

Kayla Kroning

Engineering Genetically Encoded Fluorescent Integrators for G-Protein-Coupled Receptor Agonist Detection

Ph.D., Chemistry, 2023

B.S., Chemistry, Gordon College, 2018

In this thesis Kroning set out to design reporter molecules to tag G-protein-coupled receptors (GPCRs) in the brain. The research performed was highly interdisciplinary and impactful, involving chemical, biophysical, and genetic engineering approaches to design very useful and applicable tools for researchers and diagnosticians in the biological and biomedical sciences. This is reflected by an impressive research output, including seven published papers across journals in multiple disciplines (plus one in review), of which Kroning was first author in five. GPCRs are a very large family of receptor proteins involved in a multitude of biological processes. This dissertation substantially improves our ability to inquire into many of these processes, facilitating both basic research in the biological sciences, as well as multiple biotechnological and diagnostic applications.

Comments by Roberto Marquez, Ecology and Evolutionary Biology

Dissertation Committee:

Wenjing Wang, Chair

Robert Kennedy

Peng Li

Anna Mapp

Graham Liddell

Narrative Wayfinding: Author-izing Arab and Afghan Migration across Morphing Borderscapes

Ph.D., Comparative Literature, 2023

**Graduate Certificate in Critical Translation Studies,
University of Michigan, 2022**

In “Narrative Wayfinding,” Liddell seeks to destabilize the existing legalistic reading of the category of “refugeedom” through their scholarship, making a valiant attempt at centering the voices of works of fiction written by authors who have some sort of refugee experience, and of refugees themselves. The work is commendable for its provocative and insightful interrogation of key assumptions about the lived experience of refugeedom, displacement, and narratives about displacement, its interdisciplinarity—drawing on methods of literary studies and anthropology—and its case study approach, which saw the creation of an impromptu archive of materials of displaced persons and refugees and advances the author’s stated goal to have “refugees speak for themselves.” Liddell has produced a dissertation that is worthy of commendation for the nuanced and insightful conceptual questions that it asks, and for its interdisciplinary approach, and in circumstances of a global pandemic, no less.

Comments by Ismael Biyashev, History

Dissertation Committee:

Anton Shamma, Co-chair

Andrew Shryock, Co-chair

Michèle Hannoush

Cameron Cross

Kevin J. Napier

Novel Methods of Detecting and Characterizing Solar System Objects

Ph.D., Physics, 2023

M.S., Physics, University of Michigan, 2020

B.S., Physics and Astronomy, Siena College, 2018

B.S., Mathematics, Siena College, 2018

Kevin Napier's dissertation develops innovative methodologies in astrophysics with a focus on the outer solar system. The work demonstrates expertise in computation, data analysis, observational astronomy, and theoretical calculations. The centerpiece of this dissertation involves the application of new techniques and software tools to the study of the Kuiper Belt. His pioneering research will contribute to future discoveries of distant celestial objects and advances in the field of planetesimal formation theory.

Comments by Dmitri Brown, American Culture

Dissertation Committee:

David Gerdes, Co-chair

Fred Adama, Co-chair

Michael Meyer

Matthew Holman

Gary Bernstein

Evan Radeen

Imagining World Order: International Law and Literature in Britain, 1876-1907

Ph.D., English Language and Literature, 2023

B.A., English and American Studies, Macalester College, 2011

This dissertation makes a compelling case for reimagining the late Victorian era's investment in international law, particularly in how international law "scaffolds" cultural forms like the novel. Radeen's new historicist analysis is novel, compelling, and commendable. "Imagining World Order" asks the field of Victorian studies to rethink our understanding of "barbarity" as the principle discursive mechanism of othering, and instead posits "legality" as the category for manufacturing the logics of empire. The chapters in the dissertation demonstrate Radeen as an astute, careful, and politically committed reader of texts, be they literary or jurisprudential. While it is obvious that Radeen unpacks the legal conceptions that structure familiar and beloved Victorian novels in surprising ways, what is also remarkable is Radeen's deftness at the close reading of legal texts to tease out their densely packed narrative logic as they use sovereignty and equality as contractual principles that make empire a legal, and not a looting, enterprise. This dissertation, as and when it becomes a book, will be well-placed within law and literature scholarship that has only recently started attending to Victorian empire.

Comments by Meghna Sapui, English Language and Literature

Dissertation Committee:

Daniel Hack, Chair

Adela Pinch

Hadj Bakara

Don Herzog

Lulu Shang

Statistical Methods and Computational Tools for Genetics and Genomics Data

Ph.D., Biostatistics, 2023

M.S., Biostatistics, Shanghai Jiao Tong University, 2018

B.S., Biology, Zhiyuan Honor College, 2016

Lulu Shang's dissertation develops statistical tools for multi-omics data, and applies these methods to understand epigenetic and gene regulation in African American populations, which according to their dissertation advisor, remains the, "largest eQTL mapping study ever performed on African Americans." In addition to this contribution, Shang explains their computational work in a way that makes clear how we might use their innovative methods in a wide range of biological problems. What stands out in our review is Shang's attention to how statistical methods can be used with multi-omics data: not only does Shang work to help practitioners use these computational tools, but she applies them to complex analytical problems with a clear social impact. We are happy to award Shang the ProQuest Distinguished Dissertation Award for their beautifully written and impactful dissertation.

Comments by Natalie Hofmeister, Ecology and Evolutionary Biology

Dissertation Committee:

Xiang Zhou, Chair

Laura Scott

Jennifer Smith

Maureen Sartor

Honorable Mentions

Laura Carroll, Engineering Education Research Program
The Academic Success of College Students with ADHD: The First Year

Sarah Dobie, Urban and Regional Planning
*Integrated Planning for Climate Resilience and Food Security:
An Analysis of Urban Food System Resilience Planning in U.S. Cities*

Samuel Kerk, Cancer Biology
Metabolic Networks in Pancreatic Cancer

Jacqueline Larouche, Biomedical Engineering
*Understanding and Rewriting Cellular and Molecular Programs to
Restore Skeletal Muscle Homeostasis*

Sheng Long, Anthropology
*Numbering Land: The Mathematics of Geography and Subjectivity in
Agrarian Reforms*

Caleb Mayer, Mathematics
*Mathematical Modeling of Circadian Rhythms from Wearable Data
Across Populations and Health Conditions*

Sumeet Patwardhan, Philosophy
Consent, Blame, and Sex

Juan Rodriguez Barrera, American Culture
*Bronzeville's Tribunes: Sociology, Marxism, and Literary Afro-
Modernism in the Midwest Metropolis, 1936-1947*

Kristina Weaver, Molecular and Integrative Physiology
From Food to Phenotype: How Hungry Flies Eat and Age.

Xubo Yue, Industrial and Operations Engineering
Federated Data Analytics: Theory and Application

Distinguished Dissertation Award Nominees

Madison Adkins, Psychology

Maria Ahmed, Molecular, Cellular, and Developmental Biology

Najla Neamatallah Al Turkestani, Oral Health Sciences

Mohammed Alshehri, Middle East Studies

Matthew Bakko, Social Work and Sociology

Alexa Beemer, School of Kinesiology (Movement Science)

Markus Borsch, Electrical and Computer Engineering

Laura Carroll, Engineering Education Research Program

Paul Chao, Materials Science and Engineering

Judy Chen, Graduate Program in Immunology

Min Deng, Civil and Environmental Engineering

Changyu Deng, Mechanical Engineering

Sarah Dobie, Urban and Regional Planning

Salem Elzway, History

Janice Feng, Political Science

Luis Flores, Sociology

Nicholas Galioto, Aerospace Engineering

Isabelle Marie Anne Gillet, History of Art

Kayla Hale, Ecology and Evolutionary Biology

Huanqi He, Civil and Environmental Engineering (Environmental)

Mina Hernandez Garcia, Educational Studies

Sophie Hill, Neuroscience Graduate Program

Alex Kapiamba, Mathematics

Samuel Kerk, Cancer Biology

Kayla Kroning, Chemistry

Emily Lamond, Classical Studies
(Interdepartmental Program in Ancient History)

Jacqueline Larouche, Biomedical Engineering
Graham Liddell, Comparative Literature
Sheng Long, Anthropology
Caleb Mayer, Mathematics (Applied and Interdisciplinary)
Matteo Milesi, Classical Studies
Kevin Napier, Physics
Siva Kumar Natarajan, Molecular and Cellular Pathology
Tsz Lam Ngai, Communications and Media
Nafisa Nuzhat, Cell and Developmental Biology
Leanna Papp, Psychology and Women's and Gender Studies
Sumeet Patwardhan, Philosophy
Brian Peterson, Biological Chemistry
Andres Pinedo, Combined Program in Education and Psychology
Matthew Pun, Cellular and Molecular Biology/Medical Scientist
Training Program (M.D./Ph.D.)
Evan Radeen, English Language and Literature
Juan Rodriguez Barrera, American Culture
Omri Senderowicz, Anthropology and History
Lulu Shang, Biostatistics
Nishil Rakeshkumar Talati, Computer Science and Engineering
James Tan, Chemical Engineering
April Wang, Information
Kristina Weaver, Molecular and Integrative Physiology
Yanchen Ye, Composition
Xubo Yue, Industrial and Operations Engineering
Felix Zamora Gomez, Romance Languages and Literatures
Boya Zhang, Epidemiology Science

Readers from the Michigan Society of Fellows

Ismael Biyahsev

History

Dmitri Brown

American Culture

Ifolu David

Epidemiology

Elizabeth Durham

Anthropology

Natalie Hofmeister

Ecology and Evolutionary Biology

Rijul Kochhar

Anthropology

Anne Kort

Earth and Environmental Sciences

Paul Kurek

Germanic Languages and Literature

Roberto Márquez

Ecology and Evolutionary Biology

Sungwon Park

Nursing

Vyta Pivo

Architecture

Douglas Richstone

Astronomy

Meghna Sapui

English Language and Literature

Jeff Sheng

Information

Henry Stoll

Music, Theatre, and Dance

Mo Torres

Sociology and Public Policy

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