RESEARCH & SCHOLARSHIP ANNUAL REPORT

# FY 2019 ANNUAL REPORT

INTERIM PROVOST AND EXECUTIVE VICE CHANCELLOR, CORINNE LENGSFELD



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a year's overview

# WHERE WE **ARE NOW**

August 15, 2019

At the University of Denver, we are passionate about moving forward as a thought leader in basic, applied, and community engaged research. We are seeing the fruits of our labor reflected in research and scholarship. FY 2019 was, yet again, another record-breaking year. Research expenditures increased 18% over FY 2018, topping \$36 million. DU faculty received 159 new awards totaling more than \$46 million, compared to 115 new awards totaling \$24 million in FY 2018.

It is clear we could not be successful without the passion and dedication of our faculty. In FY 2019, there were 27 principal investigators with more than \$300,000 in research expenditures, including Robin Leake of GSSW who topped \$5 million! There were three new large grants over \$3 million. Our faculty have increased appearances by 150% over last year, responsibly living our commitment to make our work accessible.

We performed and exhibited in places from Austria to Thailand. And our interventions and methodologies have been adopted and implemented states around the county in substance abuse, education, and child and family welfare. Several of our faculty have contributed so significantly to their discipline that their papers reached a status of hot or highly cited, while others have obtained prestigious recognition through awards for books or research.

FY 2019 also saw incredible contributions to research and scholarship from our students. DU hosted the first collaborative student Research & Scholarship Showcase, where more than 110 undergraduate and 75 graduate



students participated. DU also awarded 389 doctorates, 53 undergraduate summer research grants, and 32 Under-graduate Partners in Scholarship (PINS) grants.

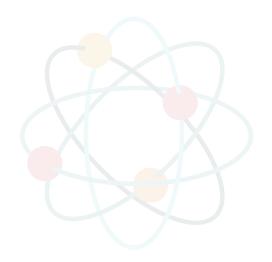
To say I am proud of the accomplishments of our faculty, staff, and students is an understatement. Thank you to our students who work tirelessly in the labs and field. Thank you to our devoted faculty and staff who raise the bar each year. I look forward to seeing our continued success as DU moves toward its core initiative of becoming an intentional community that integrates research, teaching, and engagement for the public good.

Corinne Lengsfeld

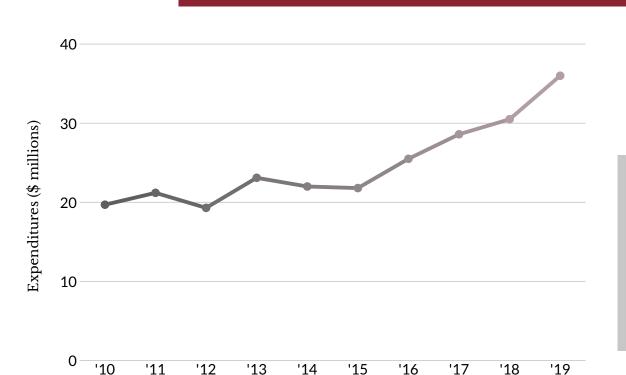
Interim Provost & Executive Vice Chancellor

# **OUR PERFORMANCE**

FY 2019 was yet another record breaking year for research at the University of Denver. Research expenditures increased 18% over FY 2018, topping \$36 million. DU received 159 new awards totaling over \$46 million, compared to 115 new awards totaling \$24 million in FY 2018.



# \$36 m RESEARCH EXPENDITURES

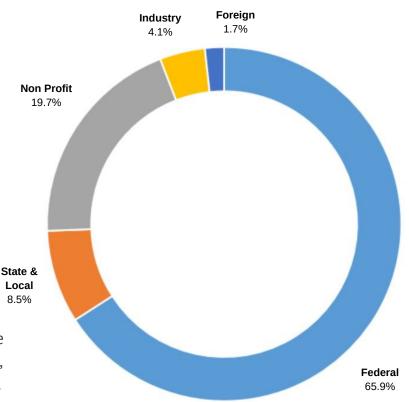


Years

Figure 1.
Highlights the 10-year trend.
Research
expenditures have increased 82%
from FY 2010 to FY 2019.



Expenditures for FY 2019 were more than \$36 million, an increase of approximately 18% over FY 2018. Federal expenditures are the most significant, followed by non profit, state & local, industry, and foreign funding.

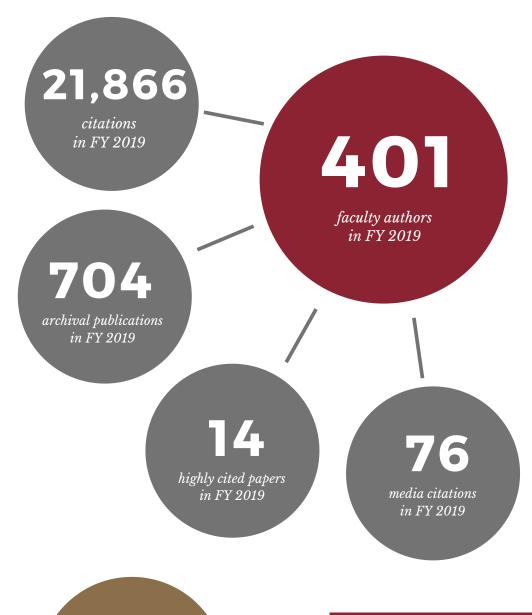


# ΑII Others (\$2.9m) 8% **KHIA** (\$926k) **GSSW** 3% (\$11.2m) 31% **JKSIS** (\$2.9m) 8% **RSECS** (\$3.4m) 9% **CAHSS** (\$4.2m) 12% NSM (\$5.9m) 15% MCOE (\$4.7m)13%

# FY 2019 EXPENDITURES BY DIVISION

GSSW led the way in expenditures for FY 2019, followed by NSM, MCOE, CAHSS, RSECS, JKSIS, KIHA, and others. Others includes Colo Eval & Action Lab (4%), DCB (1%), UCOL (1%), other centers & institutes (1%), Project X-ITE (<1%), Grad Tax (<1%), Sturm (<1%), and GSPP (<1%).

# FY 2019 Faculty Report



PIs with \$300k+ research expenditures in FY 2019

159
new grant agreements

in FY 2019

188

funded principal investigators in FY 2019 \$1m+ grants awarded in FY 2019

\$1.3 m

FACILITIES & ADMINISTRATION COSTS

Total indirect costs paid back to divisions in FY 2019.

# NATIONAL SCIENCE FOUNDATION

CAREER AWARDS

Robin Tinghitella Associate Professor Biological Sciences \$789,292

# HIGHLY-CITED PAPERS

DURING THE 2019 FISCAL YEAR

# HIGHLY-CITED PAPERS

2019

Yolanda Anyon, GSSW
Black Girls and School Discipline:
The Complexities of Being
Overrepresented and
Understudied

Andrei Kutateladze, NSM
The Value of Universally Available
Raw NMR Data for Transparency,
Reproducibility, and Integrity in
Natural Product Research

### 2019 CONTINUED

### **David Gao, RSECS**

Consensus-Based Distributed Economic Dispatch Control Method in Power Systems

### Andrew Linshaw, NSM

Cosets of Affine Vertex Algebras
Inside Larger Structures

# HIGHLY-CITED PAPERS

2018

## Robin Tinghitella, NSM

On the Role of Male Competition in Speciation: A Review and Research Agenda

### Lauren McGrath, CAHSS

Analysis of Shared Heritability in Common Disorders of the Brain

## Angela Narayan, CAHSS

Positive Childhood Experiences
Predict Less Psychopathology and
Stress in Pregnant Women with
Childhood Adversity: A Pilot Study of
the Benevolent Childhood
Experiences (BCEs) Scale

### Lisa Conant, CAHSS

Mobilizing European law

### Shannon Murphy, NSM

Bottom-up vs. Top-down Effects on Terrestrial Insect Herbivores: A Meta-Analysis

## Jesse Owen, MCE

Therapeutic Alliance, Empathy, and Genuineness in Individual Adult Psychotherapy: A Meta-analytic Review

# Julie Sarama & Douglas Clements, MCE

Risky Business: Correlation and Causation in Longitudinal Studies of Skill Development

# TOP PRINCIPAL INVESTIGATORS

BASED ON FY19 EXPENDITURES

**\$5,000,000 +**Robin Leake, GSSW

## \$1,000,000 +

Elaine Belansky, MCE
CO Eval & Action Lab, Barton
Doug Clements &
Julie Sarama, MCE
Jonathan Moyer, JKSIS
Margaret Franko, GSSW
Galena Rhoades, CAHSS

## \$500,000 +

Elysia Davis, CAHSS Benjamin Ingman, MCE Suzanne Kerns, GSSW Pilyoung Kim, CAHSS Paul Rullkoetter, RSECS Phillip Strain, MCE Carole Wilcox, GSSW

### \$300,000 +

Cedric Asensio, NSM
Deborah Avant, JKSIS
Ann-Charlotte
Granholm-Bentley, KIHA
Elrie Chrite, DCB
Gareth Eaton, NSM
Michele Hanna, GSSW
Amin Khodaei, RSECS
Maciej Kumosa, RSECS
Lena Lundgren, GSSW
Kevin Morris, GSSW
Donald New, ARTI
Kevin Shelburne, RSECS

# STUDENT RESEARCH & SCHOLARSHIP

The University of Denver increased funding for student research and scholarship in FY 2019. More than 500 undergraduate and graduate students were supported by \$5.9 million in grant funding, resulting in 20% of all students paid on campus being supported by grant funding.

Additionally, the number of graduate assistantships are on the rise, doubling from FY 2010 to present. Students who graduate from DU often come back as faculty members. For FY 2019, 26 DU graduates held faculty positions.

In the eight years of awarding conference travel grants, DU graduate students, representing nine divisions and more than 37 programs, have presented at a number of competitive conferences in 85 U.S. cities, 37 U.S. states, and 29 countries. In FY 2019, awards averaged \$511, an increase of 15% over last the last fiscal year, allowing DU's students to advance the scholarship in their respective fields through innovative and groundbreaking research.

504

students were supported
by \$5.9 million
in grant funding
in FY 2019

in grant funding supported
115 graduate research
assistantships during
FY 2019

20%

of all students paid on campus were supported by grants for FY 2019

# 06

UNDERGRADUATE SCHOLAR TRAVEL FUND GRANTS

> AWARDED IN FY 2019 TOTALING \$6,000

# 53

UNDERGRADUATE SUMMER RESEARCH GRANTS

AWARDED IN FY 2019 TOTALING \$175,689

# 02

**GRFP AWARDS** 

AWARD RECIPIENTS:

ABIGAIL EUSTACE

LAURA RIVER

# 32

UNDERGRADUATE
PARTNERS IN
SCHOLARSHIP
(PINS) GRANTS

AWARDED IN FY 2019 TOTALING \$39,169 \$08 k

**GRANT** 

TO STUDENT PRINCIPAL INVESTIGATOR STEPHEN GROSS OF NSM FROM THE AMERICAN HEART ASSOCIATION

389

**DOCTORATES** 

AWARDED IN FY 2019

# RESEARCH & SCHOLARSHIP SHOWCASE

# Combining two, separate events for OneDU

Previously the Undergraduate Research and Scholarship Symposium and the Graduate DURAPS Research Symposium, now one collaborative event

**75** 

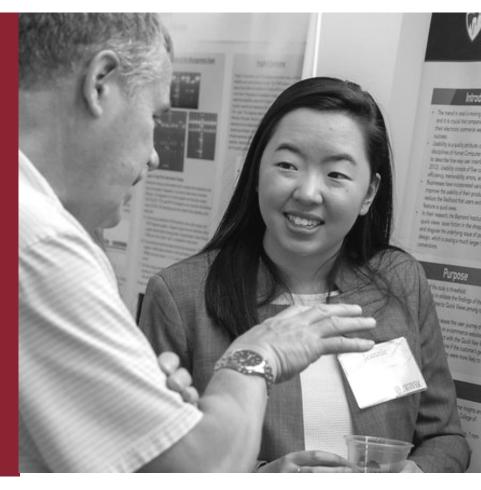
graduate students

participated in the 2019 Research & Scholarship Showcase

110

undergraduate students

participated in the 2019 Research & Scholarship Showcase



The DU Research & Scholarship Showcase is a unique opportunity for students to showcase their research and scholarly work to friends and family, community members, and research partners. The objective of the event is to celebrate, build connections across disciplines, and build community. This is the first year of a collaborative event between our graduate and undergraduate students. What better way to continue our path toward DU's core initiative--OneDU--of becoming an intentional community that integrates research, teaching and engagement for the public good. The event was held in collaboration with the Undergraduate Research Center, the Office of Research and Graduate Education, and the Interdisciplinary Research Institute for the Study of (In)Equality, the Center for Community Engagement to Advance Scholarship & Learning, Career and Professional Development, and the Writing Center.



# **KEYNOTE SPEAKERS**

**Jasmine Andersen**, NSM, Optical Vortices - Shedding Light on Dark Places in a Laser Field

Patrice Greene, Kahlea Hunt-Khabir, and Elizabeth Ndika, IRISE, Seeking Grace: Mining Archives and Oral Histories for the Lived Experiences of Black Women at PWI's in the American West

**Jimmy Hessler**, CAHSS & CCESL Community - Engaged Fellow, Innovative Ways to Enhance Education Access for Vulnerable Youth Populations

**Laura Hosman**, JKSIS, Strategic Litigation and Rights Revolution in Latin America: When Civil Society Activism Checks Corporate Misbehavior

**Elizabeth Karney**, Lamont School of Music, *Before the Stage* 

**Katie Massey Combs**, GSSW, Evaluation of a Sexual Health Training for Child Welfare Workers

# **AWARDS**

### **Outstanding Poster Presentation**

**Austin Johnson,** NSM, Elucidating the Mysterious Mechanistic Relationship Between Amyloid-Beta and Polyamines: How Naturally Produced Molecules Can Lead to Unnatural Consequences

Audrey Miklitsch, CAHSS, Unnamed

**Haley Paez**, CAHSS, Nutritional Literacy In The Denver Community

**Cole Pollina**, NSM, Biomolecular Labeling & Specificity of Red-Shifted Synthetic Fluorescent Dyes with Lipid Bilayers

# OFFICE OF RESEARCH INTEGRITY & EDUCATION

1179 submissions

In 2019, the volume of submissions to the research compliance committees increased for projects involving human subjects, animal welfare and biosafety. Through the Office of Research Integrity and Education (ORIE), the professional staff and the involvement of our committee members processed over 1,100 submissions while implementing new programs to improve and monitor new and ongoing research as well as provide on-going consultations to the faculty, staff and student investigators. Students represent 45% of those submissions.

19%
IRB submissions

increase

**37**%

IACUC submissions increase

42%

IBC submissions increase

ORIE introduced post approval monitoring (PAM) to the DU research community in FY 2019. PAM is a program that monitors research projects to confirm that the research is being conducted as approved, thus ensuring compliance with the federal regulations and guidelines that govern research. Other goals of the PAM program are to ensure the well-being of human subjects and animals in research, to provide assistance to PIs in preparing for audits, and to serve as a compliance resource to the research community. PAM visits and reviews are conducted by ORIE professional compliance team members.



# **TECHNOLOGY TRANSFER**

The mission of the Office of Intellectual Property & Technology Transfer (OIPTT) is to facilitate and celebrate innovation within the University community for the purpose of enhancing the University's reputation and visibility. This year, there has been a continued growth in number of research-related agreements, which indicates a steady growth in research activities conducted on DU campus. To ensure DU's researchers' intellectual property rights are appropriately protected in externally sponsored research, OIPTT has taken a more active role in the contract negotiation process. We hope that securing more favorable terms in data and intellectual property ownership would allow both DU researchers and the university more opportunities to explore commercialization opportunities in the future.

Building the necessary legal and administrative infrastructure continues to be one of OIPTT's main focuses. An updated University Intellectual Property Policy was official approved by the Board of Trustees in FY 2019, and we also have launched a brand new office website. We will continue to strive to build trust and achieve a high level of satisfaction for services and outcomes for the DU community.

Material Transfer Agreements
(12 stand-alone +
35 orders under master
agreements)

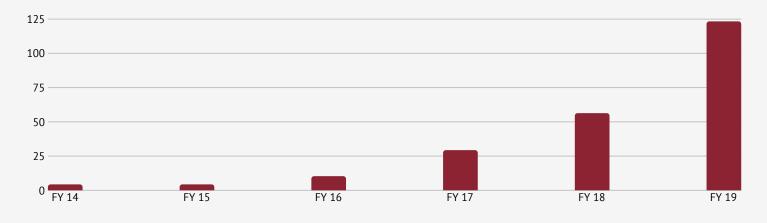
Non-Disclosure
Agreements (NDA) /
Confidentiality
Agreements (CDA)

18
Data Use Agreements (DUA) /
Data Share Agreements

43
Other agreements which implicate DU's intellectual property

# **TOTAL AGREEMENTS PROCESSED**

Since FY 2014, the total agreements processed has increased significantly.



# **TECH TRANSFER**

During FY 2019, The Office of Intellectual Property & Technology Transfer worked with faculty members to assist in technology licenses, invention disclosures, and granted patents.

Active Technology Licenses	
Faculty Invention Disclosures	

# FREQUENCY SHIFT KEYED CONTINUOUS WAVE RADAR

United States Patent 10,145,950

### **DU Inventors:**

Kimon Valavanis; Professor, and Matthew Rutherford; Associate Professor Department of Electrical & Computer Engineering; Ritchie School of Engineering and Computer Science

WAVELENGTH DISPERSIVE MICROSCOPE SPECTROFLUOROMETER FOR CHARACTERIZING MULTIPLE PARTICLES SIMULTANEOUSLY

United States Patent 10,145,950

### **DU** Inventor:

Alex Huffman; Associate Professor; Department of Chemistry and Biochemistry; College of Natural Sciences and Mathematics

# MAGNETIC ARTICLE AND ROTATION OF MAGNETIC SPINS VIA SPIN-ORBIT EFFECT IN SAME

United States Patent 10,049,710

## **DU** Inventor:

Xin Fan, Assistant Professor, Department of Physics and Astronomy; College of Natural Sciences and Mathematics

MEMS AEROSOL IMPACTOR

United States Patent 10,203,272

### **DU Inventor:**

James Wilson; Professor; Department of Mechanical & Materials Engineering; Ritchie School of Engineering and Computer Science





# JONATHAN MOYER, JKSIS

Data Metrics and Forecasting Effort, \$4.2m



# ANN-CHARLOTTE GRANHOLM-BENTLEY & MARTIN MARGITTAI, KIHA





Tau Pathology in Down Syndrome and Alzheimer's, NIH, \$3.35m

Down syndrome (DS) is a genetic condition that occurs in 1 out of 700 births with more than 350,000 Americans affected. Although Alzheimer's disease (AD) occurs with high penetrance in DS, few treatment options are available. The current project is focused on discovery-based research of the tau protein, a major component of Alzheimer pathology and associated dementia seen in DS.

# JULIE SARAMA, DOUGLAS CLEMENTS & CRYSTAL DAY-HESS, MCE







Evaluating the Efficacy of an Interdisciplinary Preschool Curriculum Institute of Educational Science, \$3.29m

Although the importance of young children gaining competence in 4 core curricular domains-social-emotional, language and literacy, mathematics, and science-is well established, research results on the efficacy of comprehensive curricula is dismal. Connect4Learning (C4L), is a newly-published comprehensive interdisciplinary curriculum which builds upon and integrates empirically-tested practices, connecting the 4 domains to achieve more than the sum of its parts. This project will evaluate the efficacy of C4L.

# SUZANNE KERNS, GSSW



Pay for Success - MST Colorado Office of State Planning, \$2.29m

This project will bring Multisystemic Therapy (MST) to underserved regions of Colorado. MST is an evidence-based intervention for youth 12-17 who are at high risk for out-of-home placement due to delinquent or antisocial behaviors and/or substance use. Through this project, 6 new MST teams will be implemented across Colorado.





# DOUGLAS CLEMENTS & JULIE SARAMA, MCE

STEM Center University of North Carolina, \$1.96m





DU's Marsico Institute will lead the STEM knowledge and development activities and ensure alignment of these activities with other Center activities in collaboration with other leads in areas such as inclusion and disability services.

# KEVIN SHELBURNE, PETER LAZ, PAUL RULLKOETTER, CHADD CLARY BRADLEY DAVIDSON, RSECS

A Lower Extremity Neuromusculoskeletal Human Simulator: Addressing Multiscale Challenges NIH, \$1.93m











The goal of this research is to create data and models of the human musculoskeletal system that can be used to simulate individuals to understand disease and improve treatment. This project is to create a comprehensive multiscale neuromusculoskeletal model of the human lower extremity including continuous interactions between tissue and whole-body functions during dynamic human activities.

# **ROBIN LEAKE, GSSW**

NCWWI 3 State University of New York, \$1.67m



This project will provide Project Direction, LINKD (Leading Information-sharing Networks, Knowledge-management & Dissemination) services, and evaluation for the National Child Welfare Workforce Initiative Round 3 (NCWWI 3). Butler has provided similar services for the prior two rounds.

# YAN QIN, NSM

Regulations of Organellar Zn2+ Homeostasis and Dynamics by TRPML1 in Neurons, NIH, \$1.6m



Zn2+ (or zinc ion) in brain function may be related to neurological diseases such as Mucolipidosis type IV disease (MLIV). However, the molecular mechanisms, nor the biological impacts of Zn2+ dysregulations are understood. Collectively, the proposed research will provide ultra sensitive tools for monitoring cellular Zn2+ dynamics, develop a better understanding about the roles of organellar Zn2+ dynamics in neuronal function, as well as significantly expand our knowledge about the pathological mechanisms of MLIV diseases.





# LYNN CLARK & REBECCA ARNO, PROJECT X-ITE

Colorado Media Project
Various Sponsors, Totaling \$1.5m+





Colorado Media Project I Gates Family Foundation, \$900k

Colorado Media Project II The Democracy Fund, \$300k

Colorado Media Project is an ecosystem-level convener, facilitator, and coordinator that will work to bring capacity-building expertise and implementation support to local news outlets as they seek to address gaps and galvanize broader community engagement and investment in public service journalism, as a means to meeting the local news and information needs of Coloradans.

Colorado Media Project - CPR/Denverite Initiative Bonfils-Stanton Foundation, \$150k

Colorado Media Project will assist with the acquisition of the Denverite by CPR. They will support the business transition and increased arts-related reporting growing from the CPR/Denverite Initiative.

Colorado Media Project - Collaborative Cultural Hub and Cultural Journalism Research Bonfils-Stanton Foundation, \$150k

Colorado Media Project (housed within DU's Project X-ITE) will work in collaboration with Colorado news organizations and arts and cultural institutions to conduct quantitative and qualitative research on coverage gaps on arts and culture, and host community events and conduct other activities to share this information with the public.

Colorado Media Project - Membership Puzzle Bonfils-Stanton Foundation, \$40k

This project will support the Colorado Media Project's experiment with an "Epic Pass for local news" that brings news outlets together in a partnership to test and develop staged plan for joint marketing, membership, and revenue strategies. The Colorado Media Project will bring together a variety of local news outlets to design, beta test and pilot a joint marketing pilot and staged membership, revenue sharing, and possibly content building effort.





# PHILLIP STRAIN, MCE

Technical Assistance Center on Positive Social, Emotional, and Behavioral Outcomes for Young Children University of South Florida, \$1.33m



Consultation and training to implement the Learning Experiences: An Alternative Program for Preschoolers and Parents ("LEAP") Preschool Model including content and coaching. In addition, it will provide training and support to external AEA consultants/coaches.

LEAP Sustainability: Exploring Malleable Factors that Predict Teachers' Initial and Long-Term Fidelity Institute of Education Science, \$1.22m

The purpose of this study is to explore factors (e.g., preschool center policies, staff buy-in, family involvement) that are related to teachers' initial and long-term fidelity of implementation of the LEAP Preschool Model, and intensive, inclusive intervention for children with autism spectrum disorders (ASD).

# BARBARA SMITH, MCE

Early Childhood Systems Technical Assistance Center University of North Carolina, \$1.28m



This project will work with the Center Leadership Team on development and implementation of the RP2 approach to inclusion including the products and tools to be used by the Center.

# JAMES BLANKENSHIP & DINAH LOERKE, NSM

Sliding Vertex Behaviors During Epithelial Morphogenesis and Tissue Elongation NIH, \$1.17m





A conserved convergent extension program that operates through oriented cell intercalation causes the tissue to narrow in one dimension and lengthen in a perpendicular dimension. This project seeks to elucidate the mechanisms that drive this rapid tissue reorganization.

# MARK SIEMENS, NSM

Topological Fluids of Light for Room-temperature Quantum Science and Computation W.M. Keck Foundation, \$1m



This project strives to measure the fundamental properties of, and identify control mechanisms for, topological photonic fluids (TPF) composed purely of linear light. The proposed work will result in a paradigm-shifting tool for room-temperature quantum science, engineering, and design testing that uses inexpensive equipment and simple measurement, providing unprecedented accessibility to catalyze new possibilities in quantum information.

