

Sea Squirts

Associate Professor Dinah Loerke (NSM) belongs to a team of researchers that is taking a close look at epithelial tissues in sea squirts—photo courtesy of Delany Rodriguez (UCSB)



UNIVERSITY of
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RESEARCH & SCHOLARSHIP MATTERS

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Publication of the
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Corinne Lengsfeld

IN THE NEWS

The Butler Institute Leads Initiative on Center for Tribes



The Butler Institute for Families at the Graduate School of Social Work leads the collaborative partnership for the **Child Welfare Capacity Building Center for Tribes**, a five-year cooperative agreement sponsored by the federal Children's Bureau at the Administration of Children and Families. The Center for Tribes collaborates with American Indian and Alaska Native nations to help strengthen Tribal child welfare systems and services in order to nurture the safety, permanency, and well-being of children, youth, and families. Other organizations in the partnership include the Tribal Law and Policy Institute, Westat, and the

University of Southern Maine, along with a strong national network of tribal experts and consultants. The Center for Tribes hosts a rich library of tools, resources and products that can be found on our website, <https://www.tribalinformationexchange.org/>. The Center provides peer-to-peer networking opportunities for tribal leaders about the Indian Child Welfare Act (ICWA) and other issues. The Center also directs capacity building supports to identify program needs and design, and implements and evaluates interventions to strengthen tribal child welfare programs. The Center is currently working with 19 tribes across the country to build capacity to address a vast array of needs including comprehensive program development, developing and implementing a trauma-informed practice model and supporting tribes in their efforts to maximize access federal funding sources. The Center for Tribes is part of the Child Welfare Capacity Building Collaborative that also includes the Capacity Building Centers for States and Courts. The Collaborative is designed to help public child welfare agencies, Tribes, and courts enhance and mobilize the human and organizational assets necessary to meet Federal standards and requirements; improve child welfare practice and administration; and achieve safety, permanency, and well-being outcomes for children, youth, and families.

Smithsonian magazine- "The Surprising History of the infographic" - quotes from Susan Schulten, Professor, AHSS

PBS News Hour- "Counting the Benefits of Teaching Math to 3-year-olds" Julie Sarama and Doug Clements, Professors, MCE

Los Angeles Times- "Bosnian Muslims in Southern California May Not Fit the Stereotype but They feel the Prejudice" - quotes from Andrea Stanton, Assistant Professor, AHSS

CPR's Colorado Matters- "Violent Lives Make Inmates Prone to Brain Trauma" - audio interview with Kim Gorgens, Clinical Associate Professor, GSPP

PBS News Hour- "A High-tech, High-end Clothing Company that's Keeping Jobs in America" -quotes from Kerry Plemmons, Professor of the Practice, DCB

The New York Times- "Ronald Lauder, Advocate of Art Restitution, Says His Museum Holds a Clouded Work" Elizabeth Campbell, Associate Professor, AHSS

Newsweek- "Will Anti-Abortion Activists Insist on Zika Births?" op-ed by Joshua Wilson, Associate Professor, AHSS

FOR MORE INFORMATION

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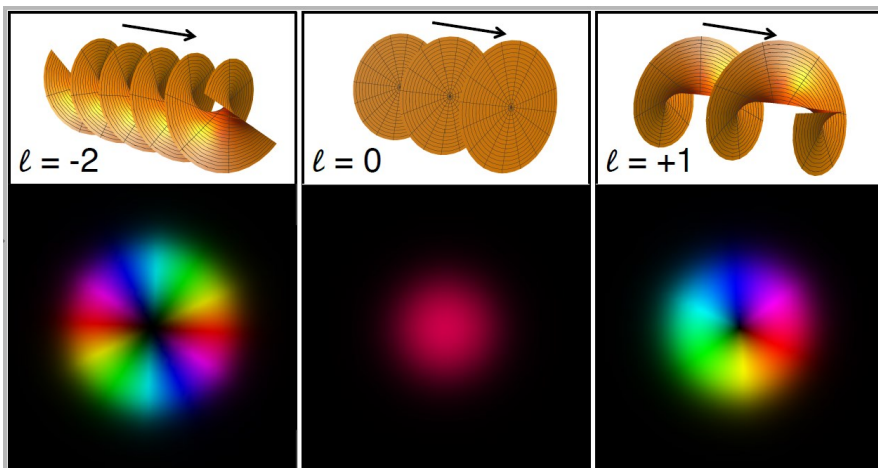
Light with a Twist!

Did you know light has momentum? The linear component is related to the wavelength. Spin angular momentum (SAM) is related to polarization. Orbital angular momentum (OAM) is related to the light's rotation about the propagation axis. While the linear and SAM components have been well-understood for nearly a decade, the realization and control of light's OAM is less than 25 years old. Possible applications of OAM include communications, where "twisted light" makes bandwidth nearly infinite. However, questions remain about the fundamentals of how OAM is manifested in light-matter interactions.

The objective of our recent work is to demonstrate and measure unexplored OAM-activated optical transitions in semiconductor nanostructures. We are doing experimental work with quantum rings, quantum dots and quantum wells in order to: 1.) Demonstrate that never-seen-before orbital states are accessed with twisted light by studying the OAM dependence of transmission spectra 2.) Measure the relaxation of these orbital states and 3.) Control the relaxation of orbital states with optical pumping. We are working closely with a leading theory group to complement these experiments with detailed theoretical models, providing a complete picture of the physics of OAM coupling from light to semiconductor nanostructures. We hope to become the first to demonstrate direct coupling of orbital angular momentum between photons and electrons in semiconductor nanostructures. Understanding this "missing dimension" is fundamentally very interesting because:

- It enables access to unexplored quantum states with azimuthally-phased electron and hole wavefunctions
- These wavefunctions have no spatial overlap (no dipole moment) and so should be very robust against decoherence
- It suggests an additional optical selection rule for OAM
- It provides a new dimension for full control of electronic and quantum state in semiconductors.

This work has tremendous potential to impact future technologies. For example, spintronics applications can benefit from enhanced control of quantum spins and possibly increased coherence times of OAM-excited excitons because of non-overlapping electron and hole wavefunctions. This enhanced control could also be useful in preparing and measuring qubits for quantum computing. Also, the new quantum states that will be accessed could be used for higher-bandwidth OAM-enabled memory, with straightforward coupling to OAM-enabled communications. Finally, demonstration of the interaction between photon OAM and semiconductor nanostructures opens up a new vista of scientific possibilities in which non-conventional optical transitions can be accessed to prepare exotic quantum states.



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DU Alum-Run Company Creates Math Game for Children

DU and Elephant Head Software, a Denver software development company founded in 2009 by DU Alumnus in Math and Computer Science, Aditya Nagrath, executed a license agreement for intellectual property developed by Alvaro Arias and Jeff Farmer of the Math Department, and Mario Lopez of the Computer Science Department. The proprietary algorithm developed by the DU researchers adjusts the difficulty of the math questions based on the tester's previous answers, to properly measure a student's knowledge and to prevent them from becoming frustrated with questions beyond their ability. Arias, Farmer, and Lopez's algorithm will be used in "Elephant Learning" an educational software game created by Elephant Head. The game, accessible on smartphones, tablets, laptops, or desktop computers, can be played by students ranging from pre-kindergarten to sixth grade, and will be available for download from the iTunes store and Google Play store, as well as from the company's website. Elephant Head has a proven track record bringing software products to market quickly, with high levels of quality and reliability; and has been involved with earlier DU faculty projects, including the "Kids Play Math" program. The full version of the software will be available to the public in December 2016.

FOR MORE INFORMATION

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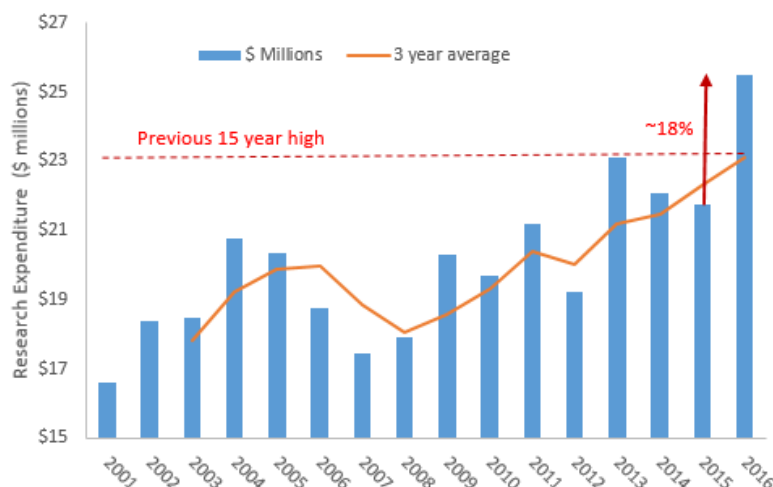
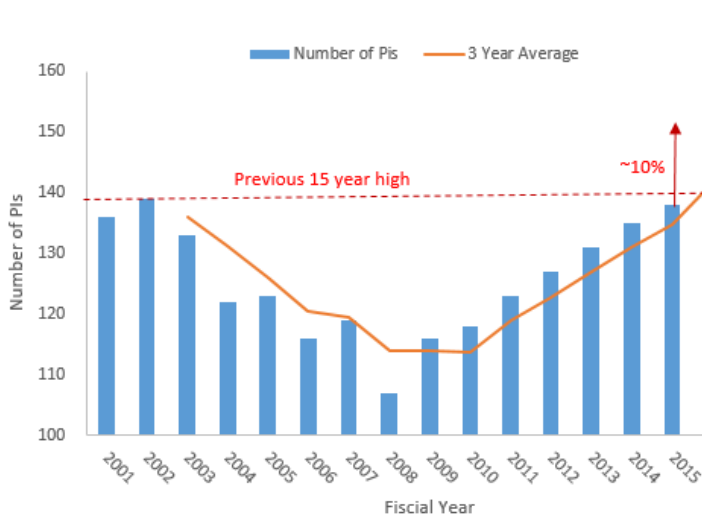
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FAST FACTS

FY16 was a phenomenal year for DU Research and Scholarship. Research and Sponsored Program expenditures hit \$25.5M, a 15 year (maybe all-time) high. The number of unique faculty with external support rose from 138 to 152. More than \$800K was distributed by internal grant programs and the associate provost invested more than \$300K to divisions for research infrastructure needs.



Rocky Mountain Land Use Institute Making a Difference

The Rocky Mountain Land Use Institute (RMLUI) at DU's Sturm College of Law has been engaged by the Metro Denver Nature Alliance (Metro DNA) to conduct research regarding the structure and function of regional greenspace organizations operating in other areas of the United States. The Metro DNA is a coalition of regional cultural institutions and non-profit organizations that have been working together for the last two years to provide a regional vision for conservation and to leverage resources to increase the Metro Denver community's engagement with nearby nature. As part of the planning process, Metro DNA provided a research grant to RMLUI to provide recommendations regarding best practices from similar efforts across the country. Over the course of the last three months, RMLUI Director, Susan Daggett, has been working with two DU students to research four models from Chicago, San Francisco, Portland, and Seattle. The recommendations from this research will form the basis for the Metro DNA's strategic and business plan. The research provides details to support some key findings, including recommendations that the Metro DNA spearhead the development of a regional conservation plan that can serve as both an engagement tool for stakeholders in the region and as a prioritization tool to influence conservation investments; that Metro DNA serve as a communication hub to facilitate coordination and collaboration among existing groups in the region, to leverage their work to the maximum benefit, and to help develop a common message about the importance of nature to people in the Denver region; and that Metro DNA develop regional conservation and human engagement goals and track success in meeting those regional goals over time.

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Cross-discipline Collaboration Studies Impact of Upcoming Ballot Measure

In November 2016, Colorado voters will have the opportunity to vote on an increase to the statewide minimum wage from \$8.31 per hour to \$12 by 2020. The impact of raising the minimum wage in Colorado was studied in the first collaborative, cross-university research initiative developed and funded by the new Colorado Women's College Collaboratory (CWC^c) of the University of Denver. This CWC^c research initiative is a partnership with The Women's Foundation of Colorado, and engaged research faculty from Daniels College of Business and the Graduate School of Social Work at the University of Denver, namely Jack Strauss (DCB), Jennifer Greenfield (GSSW), and Mark Plassmeyer, doctoral student and research assistant (GSSW). The study, *The Impact of a \$12.00 Minimum Wage on Women in Colorado*, examines how increases to the minimum wage impact earnings, poverty, and gender and racial equality, and also investigates the potential impact on child care affordability and families' eligibility for public support programs. CWC^c found that an increase in the minimum wage would have a significant positive impact on Colorado women and families, lifting many working women and their children out of poverty. Among the findings from the study:

- In Colorado women are over-represented in the bottom of the wage distribution.
- If the minimum wage is increased to \$12, it will boost the income for approximately 290,000 women increasing their annual wages from \$4000-\$7000.
- Nearly half of CO households with children under 18 are supported by women; the \$12 increase could cover the cost of six to eight months of food; seven to nine months of transportation expenses; four to seven months of rent; or a semester to a full year at a community college.



FOR MORE INFORMATION

Professor Jack Strauss

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NOTABLE ACCOMPLISHMENTS

Associate Professor Li (Li) Peters (AHSS) author of "Memory, Fluid Identity, and the Politics of Remembering" Brill Publishers, 2016.

Hot Papers (in the 0.1% citation rate of their field)

Assistant Professor Alex Huffman (NSM) co-authored a paper "A Marine Biogenic Source of Atmospheric Ice-nucleating Particles" *Nature* 525: 234-238, 2016.

Highly cited papers (1% citation rate of their field)

Professor Rachel Epstein (JKSIS) co-authored a paper "The Political Dynamics Behind Europe's New Banking Union" *Journal of West European Politics* 30, 3: 415-37, 2016.

Professor Martin Rhodes (JKSIS) co-authored a paper "The Political Dynamics Behind Europe's New Banking Union" *Journal of West European Politics* 30, 3: 415-37, 2016.

Sarah Glaser (JKSIS) co-authored a paper "Equation-free Mechanistic Ecosystem Forecasting Using Empirical Dynamic Modeling" *Proceedings of the National Academy of Sciences* 112, no 13: E1569-76. 2015.

Assistant Professor Alex Huffman (NSM) co-authored two papers "Chamber Bioaerosol Study: Human Emissions of Size-resolved Fluorescent Biological Aerosol Particles" *Indoor Air* 2015 and "High Concentrations of Biological Aerosol Particles and Ice Nuclei During and After Rain" *Atmospheric Chemistry and Physics* 13, no. 13: 6151-64. 2013.

Assistant Professor Melissa Akaka (DCB) co-authored a paper "Innovation Through Institutionalization: A Service Ecosystems Perspective" *Industrial Marketing Management* 44: 63-72. 2015.

Professor Paul Sutton (NSM) co-authored paper "Changes in the Global Value of Ecosystem Services" *Global Environmental Change* 26:152-158. 2014.

Clinical Professor William Cross (MCE) co-authored a paper "Ethnic and Racial Identity During Adolescence and Into Young Adulthood: An Integrated Conceptualization" *Child Development* 85, no. 1: 21-39. 2014.

Assistant Professor Aimee Hamilton (DCB) co-authored a paper "Organizational Identity Formation and Change" *The Academy of Management Annals* 7, no. 1:123-193. 2013.

Associate Professor Martin Margittai (NSM) co-authored a paper "Small Misfolded Tau Species are Internalized via Bulk Endocytosis and Anterogradely and Retrogradely Transported in Neurons" *Journal of Biological Chemistry* 288, no. 3: 1856-1870. 2013.

RECENT MAJOR GRANTS AWARDED

Laurel Cepero (Graduate Research Fellowship Program) Advisor, Shannon Murphy (NSM)- \$209K
Effects of Fire-generated Disturbance on Multi-trophic Interactions, funded by the National Science Foundation

Phillip Danielson (NSM) - \$168K
Validation of a Mass Spectrometry Based Serological Assay, funded by the Center for Forensic Science Research

Schuyler Van Engelenburg (NSM) - \$240K
Boettcher Foundations Webb-Waring Biomedical Research Award, funded by the Boettcher Foundation

Erich Chapman (NSM) - \$746K
RNAs that Resist Degradation in the Cell and the Manipulation of RNA stability in Living Organisms, funded by the National Institutes of Health

Douglas Clements (MCE) - \$360K
Development & Research in Early Mathematics Education (DREME), funded by Heising-Simons Foundation

Anne Comstock (GSSW) - \$319K
New York Center for Development of Human Services, funded by the Research Foundation of State University of New York

Carole Wilcox (GSSW) - \$285K
Educational Stipend Program, funded by the Colorado Department of Human Services

Ali Nejatbakhsh Azadani (RSECS) - \$231K
Assessment of Paravalvular Aortic Regurgitation following Transcatheter Aortic Valve Replacement, funded by the American Heart Association

Galena Rhoades (AHSS) - \$308K
Strengthening Relationship Education and Marriage Services (STREAMS), Mathematica Policy Research, Inc

Events

Events that showcase DU faculty, staff, and student excellence in research and scholarship

September 16, 2016	Pioneer Symposium: Health & Aging
September 25, 2016	Research Administrators Day
November 11, 2016	Pioneer Symposium: History & Service
March 1, 2017	Pioneer Symposium: Social Justice & Community Building
April 7, 2017	Graduate Research and Performance Summit
May 5, 2017	Pioneer Symposium: Inclusive Excellence & Empowerment
May 10, 2017	Undergraduate Research & Scholarship Symposium
May 10, 2017	IRISE Showcase

Deadlines

Deadlines for internal funding opportunities intended to support research and scholarship

October 14, 2016	INTZ Grant Lighting Round focused on conferences
October 26, 2016	Fall Faculty Research Fund (FRF) Grant
January 13, 2017	(Tentative) INTZ Grants
January 16, 2017	Knoebel Institute for Healthy Aging Pilot Project Grant
January 27, 2017	Professional Research Opportunities for Faculty (PROF) Grant
January 27, 2017	Winter PinS Application
March 1, 2017	Spring PinS Application
March 22, 2017	Undergraduate Summer Research Grant

ABOUT THE PUBLICATION

Research and Scholarship Matters is a quarterly newsletter produced on behalf of the faculty of the University by the Associate Provost for Research.

Faculty with notable accomplishments or images suitable to the front panel of the next issue are encouraged to send them to Corinne Lengsfeld, Associate Provost for Research. Not all submissions can be included, but every attempt will be made to be inclusive of all high quality research, scholarship and creative works.

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