Danielle McDermott

Curriculum Vitae

Education

2008–2014 **University of Notre Dame**, *Ph.D., M.S. Theoretical Condensed Matter Physics*.

2002–2006 **Western Washington University**, *B.S. Physics, Honors College, Minors: Math and Astronomy*.

Professional Experience

2017–present **Assistant Professor of Physics**, Pacific University, Forest Grove, OR.

2014–2017 **Visiting Assistant Professor of Physics**, Wabash College, Crawfordsville, IN.

2012–2014 **Graduate Researcher**, Los Alamos National Laboratory, Los Alamos, NM.

2008–2014 **Graduate Researcher/Teaching Assistant**, U. of Notre Dame, Notre Dame, IN.

2007–2008 **QuarkNet Researcher**, University of Notre Dame, Notre Dame, IN.

2006–2007 **Physics / Math Teacher**, Teach for America, Palestine-Wheatley HS, Palestine, AR.

2003-2006 **WWU Teaching Assistant**, Western Washington University, Bellingham, WA.

Publications

1. ***Detecting Depinning and Nonequilibrium Transitions with Unsupervised Machine Learning***, *D. McDermott, C.J.O. Reichhardt, C. Reichhardt*, Phys. Rev. E 101, 042101 (2020).
2. ***Dynamic Phases, Stratification, Laning, and Pattern Formation for Driven Bidisperse Disk Systems in the Presence of Quenched Disorder***, *D. McDermott, Y. Yang, C.J. Olson Reichhardt, C. Reichhardt*, Phys. Rev. E 99, 042601 (2019).
3. ***Enhancing Pinning For Vortices in Hyperuniform Substrates and Emergent Hyperuniform Vortex States***, *Q. Le Thien, D. McDermott, C.J. Olson Reichhardt, C. Reichhardt*, Phys. Rev. B 96, 094516 (2017).
4. ***Dynamic Phases, Clustering, and Lane Formation for Driven Disk Systems in the Presence of Quenched Disorder***, *Y. Yang, D. McDermott, C.J. Olson Reichhardt, C. Reichhardt*, Phys. Rev. E 95, 042902 (2017).
5. ***Structural Transitions and Hysteresis in Clump- and Stripe-Forming Systems Under Dynamic Compression***, *D. McDermott, C.J. Olson Reichhardt, C. Reichhardt*, Soft Matter, 12, 9549-9560 (2016).
6. ***Collective ratchet effects and reversals for active matter particles on quasi-one-dimensional asymmetric substrates***, *D. McDermott, C.J. Olson Reichhardt, C. Reichhardt*, Soft Matter, 12, 8606 - 8615 (2016).
7. ***Avalanches, Plasticity, and Ordering in Colloidal Crystals Under Compression***, *D. McDermott, C.J. Olson Reichhardt, C. Reichhardt*, Phys. Rev. E 93, 062607 (2016).
8. ***Orientational Ordering, Buckling, and Dynamic Transitions for Vortices Interacting with a Periodic Quasi-One Dimensional Substrate***, *Q. Le Thien, D. McDermott, C.J. Olson Reichhardt, C. Reichhardt*, Phys. Rev. B 93, 014504 (2016).

Dept. of Physics - Pacific University
2043 College Way UC Box A121 Forest Grove, OR 97116
(574) 360 8539 • ☎ (503) 352 2840 • ✉ mcdermott@pacificu.edu

9. ***Wades Rules and the Stability of*** $\mathrm{Au_nGe_m}$ ***Clusters***, *D. McDermott, K.E. Newman*, The European Physical Journal D 69 3, 1-13 (2015).
10. ***Stripe Systems with Competing Interactions on Quasi-One Dimensional Periodic Substrates***, *D. McDermott, C.J. Olson Reichhardt, C. Reichhardt*, Soft Matter, 10, 6332-6338, (2014).
11. ***Dynamic Regimes for Driven Colloidal Particles on a Periodic Substrate at Commensurate and Incommensurate Fillings***, *D. McDermott, J. Amelang, C.J. Olson Reichhardt, C. Reichhardt*, Phys. Rev. E, 88, 062301 (2013).
12. ***Domain and Stripe Formation Between Hexagonal and Square Ordered Fillings of Colloidal Particles on Periodic Pinning Substrates***, *D. McDermott, J. Amelang, L. Lopatina, C.J. Olson Reichhardt, C. Reichhardt*, Soft Matter, 9 (18), 4607 - 4613 (2013).

Awards

2020 Boxer Makerspace Award, Pacific University Berglund Center, Project Title: Incorporating Design Projects in Engineering Statics (PHY377) with the Boxer Makerspace (BOMA), $1,000

2020 American Physical Society (APS) Women in Physics Group Grant, $1,000.

2019 IMS Rapid Response Award 2020-R&D-1, Institute for Materials Science, Los Alamos National Laboratory, Project Title: Artificial Intelligence for Dynamic Phase Transitions in Materials, $25,000

2017 M.J. Murdock Charitable Trust, Faculty Start up Grant, $80,000

2015 Department of Energy, Visiting Faculty Program Summer Fellowship, $15,000

2012 University of Notre Dame, Dept. of Physics Outstanding Teaching Assistant Award

2012 Department of Energy, Computational Physics Summer Fellowship

Research Interests

Machine Learning; Soft matter & statistical physics; Granular Materials; Flocking and motion of active matter; phase transitions & critical phenomena, Patterns & critical currents in superconductors

Invited Talks

January 2020 **Detecting Depinning and Nonequilibrium Transitions with Unsupervised Machine Learning**, *Theoretical Division (T4) Group Seminar*, Los Alamos National Laboratory, Los Alamos, NM.

May 2019 **Forces and Flow of Active Matter**, *Dept. of Physics and Astronomy*, Evergreen State College, Olympia, WA.

October 2018 **Segregation Effects in Granular Materials**, *Dept. of Physics and Astronomy*, Western Washington University, Bellingham, WA.

Sept 2018 **Segregation Effects in Granular Materials**, *Dept. of Physics*, Reed College, Dept. of Physics, Portland, OR.

March 2018 **Segregation Effects in Granular Materials**, *Dept. of Physics*, Willamette University, Dept. of Physics, Salem, OR.

Jan 2018 **What to say when a student asks about Condensed Matter Physics**, *2018 AAPT Winter Meeting*, San Diego, CA.

Nov 2017 **Ratchet Effects in Active Matter Systems**, *Soft Matter Super Group Meeting*, University of Oregon, Dept. of Physics, Eugene, OR.

May 2017 **Structural Transitions and Hysteresis in Clump and Stripe-forming Colloids Under Dynamic Compression**, *Glotzer Group Meeting*, University of Michigan, Dept. of Chemical Engineering, Ann Arbor, MI.

Feb. 2017 **Studying Swarms and Flows with Colloids**, *EEMPAC (Engineering, Earth-Space, Math, Physics, And Computer Science) colloquium*, University of Indianapolis, Indianapolis, IN.

Nov. 2016 **Studying Natural Patterns with Colloids**, *General Science Series Talk*, Saint Mary's College, Notre Dame, IN.

April 2016 **Studying Natural Patterns with Colloid Systems**, *Dept. of Physics Colloquium*, Valparaiso University, Valparaiso, IN.

Nov. 2015 **Avalanches, Plasticity, and Ordering in Colloidal Crystals Under Compression**, *Condensed Matter Seminar*, University of Notre Dame, Notre Dame, IN.

Nov. 2015 **Stripes on Stripes in Colloid Systems**, *Dept. of Physics Colloquium*, DePauw University, Green Castle, IN.

August 2015 **Dynamics of Compressed Colloid Systems**, *Theoretical Division, T-4*, Los Alamos National Lab, Los Alamos, NM.

May 2013 **Static and Dynamic Pattern Formation in Colloid Systems**, *Dept. of Physics and Astronomy Colloquium*, Western Washington University, Bellingham, WA.

Nov. 2012 **Tailoring Complex Pattern Formation on Simple Substrates for Materials Science Applications**, *Center for Nonlinear Studies Seminar*, Los Alamos National Lab, Los Alamos, NM.

Campus Talks

Nov. 2016 **Superconductivity meets Hyperuniformity: Confronting Energy Challenges with Theoretical Physics**, *co-speaker: Quan Le Thien*, Physics Colloquium, Wabash College. Crawfordsville, IN

Jan. 2016 **The Mathematics of Crystals**, *Dept. of Mathematics Colloquium*, Wabash College, Crawfordsville, IN.

Feb. 2015 **Stripes on Stripes**, *Dept. of Physics Colloquium*, Wabash College, Crawfordsville, IN.

Contributed Talks

March 2020 **Detecting Depinning and Nonequilibrium Transitions with Unsupervised Machine Learning**, *2020 APS March Meeting*, Virtual Presentation due to Meeting Cancellation. `http://meetings.aps.org/Meeting/MAR20/Session/M34.2`

June 2018 **Segregation Effects in Granular Materials**, *2018 Annual Meeting of the APS Northwest Section*, Tacoma, WA.

March 2018 **Dynamic Phases, Stratification, Laning, and Pattern Formation for Driven Bidisperse Disks**, *2018 APS March Meeting*, Los Angeles, CA.

June 2017 **Structural Transitions and Hysteresis in Clump and Stripe-forming Colloids Under Dynamic Compression**, *Midwest Thermodynamics and Statistical Methods Conference*, University of Notre Dame, Notre Dame, IN.

March 2017 **Structural Transitions and Hysteresis in Clump and Stripe-forming Colloids Under Dynamic Compression**, *American Physical Society Meeting*, New Orleans, LA.

March 2016 **Reversible Ratchet Effects and Structural Ordering for Self-Propelled Disks on Quasi-1D Asymmetric Substrates**, *American Physical Society Meeting*, Baltimore, MD.

Nov. 2015 **Avalanches, Plasticity, and Ordering in Colloidal Crystals Under Compression**, *Fall Meeting of the APS Prairie Section*, University of Notre Dame, Notre Dame, IN.

July 2015 **Dynamics of Compressed Colloid Systems**, *Gordon Research Conference*, Crystal Growth and Self Assembly Mechanisms, University of New England, Biddeford, ME.

March 2015 **Ordering of colloids with competing interactions on quasi-1D periodic substrates** , *American Physical Society Meeting*, San Antonio, TX .

March 2014 **Assembling Ge_6Au_N Structures From Ge_6 Building Blocks**, *American Physical Society Meeting*, Denver,CO.

March 2014 **Dynamic Regimes for Driven Colloidal Particles on a Periodic Substrate at Commensurate and Incommensurate Fillings**, *American Physical Society Meeting*, Denver, CO.

July 2013 **Complex Pattern Formation on Simple Substrates for Materials Science Applications**, *Gordon Research Seminar*, Thin Films and Crystal Growth Mechanisms, University of New England, Biddeford, ME.

March 2013 **Domain, Stripe, and Pattern Formation for Colloids on Optical Trap Arrays**, *American Physical Society Meeting*, Baltimore, MD.

March 2011 **Nanowire Building Blocks: Structural Analysis of Bonding in Au-Ge Clusters**, *American Physical Society Meeting*, Dallas, TX.

Conference Proceedings

1. ***The dynamics of active matter on ordered and disordered substrates***, *C.J. Olson Reichhardt, D. McDermott, C. Reichhardt*, Proc. SPIE 9922, Optical Trapping and Optical Micromanipulation XIII, 99221H (2016).
2. ***Avalanches and Plasticity for Colloids in a Time Dependent Optical Trap***, *C.J. Olson Reichhardt, D. McDermott, C. Reichhardt*, Proc. SPIE 9548, 954818 (2015).
3. ***Ordering of colloids with competing interactions on quasi-one-dimensional periodic substrates***, *C. Reichhardt, D. McDermott, C.J. Olson Reichhardt*, Proc. SPIE 9164, 916420 (2014).
4. ***Frustration effects and grain boundaries in colloidal particle orderings on optical substrates***, *D. McDermott, A. Libal, G.W. Chern, C. Reichhardt, and C.J. Olson Reichhardt*, Proc. SPIE 8810, 881013 (2013).
5. ***A Cosmic Ray Detector Telescope: For use in Informal and Formal Education Settings.***, *B. Baumbaugh, T. Coiro, D. Karmgard, T. Loughran, B. Marchant, J. Marchant, D. McDermott, M. McKenna, C. Phillips, R. Ruchti, and M.Vigneault*, 2007 IEEE Nuclear Science Symposium Conference Record N15-247.

Outreach and Public Presentations

Oct. 2017 **What to say when a student asks about Condensed Matter Physics**, *QuarkNet Virtual Center Meeting*.

July 2015 **Pattern Formation in Colloids**, *LANL Comp. Physics Summer School*, Los Alamos, NM.

May 2015 **What is Science? Career Talk**, *9th Grade Students*, KIPP College Preparatory Academy, Blytheville, AR.

Nov. 2014 **Careers in STEM Education**, *Gifted/Talented Students*, Crawfordsville Middle School, Crawfordsville, IN.

March 2013 **Domain, Stripe, and Pattern Formation for Colloids on Optical Trap Arrays**, *QuarkNet Meeting for High School Physics Teachers*, South Bend, IN.

May 2012 **National Lab Day Presentation**, *National Lab Day with QuarkNet*, National Air and Space Museum, Washington D.C.

Nov. 2007 **A Cosmic Ray Detector Telescope: For use in Informal and Formal Education Settings**, *2007 IEEE Nuclear Science Symposium*, Honolulu, HI.

August 2007 **Software development for the Cosmic Ray interactive Lab**, *QuarkNet Teacher Presentation*, University of Notre Dame, Notre Dame, IN.

Service to Professional Physics Societies and Groups

2015 – Present **QuarkNet Virtual Center Mentor**.
Works with high school physics teachers seeking professional development via monthly web conference and annual meeting.

2009 – Present **American Physical Society**, *APS Member*, Journal Referee for APS journals: Physical Review Letters, Physical Review E, and Physical Review Research.

Service to Pacific University

2019–2022 **University Technology Committee**, *CAS representative*.

2019–2020 **Faculty Senate**, *at large representative*.

2018–2019 **Whiteley Lecture Committee**, *Committee Chair*.

Spring 2019 **Search Committee Member**, *Visiting Assistant Professor*, English Department.

2018–present **Consultant to Curriculum Committee**, *Natural World Core*.

Research Mentor of Undergraduate Students

Pacific University, *Ally Shuell '22, Shannon Gallagher '21, Tiare Guerrero '21, Adrian Martin '19*.

Wabash College, *Yang Yang '17, Aaron Wirthwein '17, Quan Le Thien '18*, (four student co-authored peer-reviewed papers).

University of Notre Dame, *Diana Gutierrez*.

Extracurricular University Service.

1. **Voyage Participant**, *Faculty Advisor*.
2. **Women in Physics Club**, *Faculty Advisor*.
3. **Physics and Astronomy Club**, *Faculty Advisor*.

Computer skills

Advanced C, PYTHON/matplotlib, bash, gnuplot

Intermediate HTML, LaTeX, Mathematica, Jupyter Notebooks

Basic perl, csh, tcl, C++, xmgrace

Visual Tools ParaView, Jmol, VMD

OS Linux, Mac, and PC

Dept. of Physics - Pacific University
2043 College Way UC Box A121 Forest Grove, OR 97116
(574) 360 8539 • ☎ (503) 352 2840 • ✉ mcdermott@pacificu.edu