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*.

Ph.D. Thesis

Title *Pattern Formation in Nano and Microsystems*

Supervisors Professor Kathie Newman
Dr. Cynthia Reichhardt – Staff Scientist at Los Alamos National Lab

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.

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

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

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

Awards

2018 APS National Mentoring Community Travel Award

2017 Murdock Trust Start up Grant

2015 Department of Energy Visiting Faculty Program Summer Fellowship

2015 Gordon Conference Travel Award, Crystal Growth and Self Assembly

2015 APS Professional Skills Development Travel Award

2014 APS Professional Skills Development Travel Award

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

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*, (4 student co-authored peer reviewed papers).

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

University of Notre Dame, *Diana Gutierrez*.

Publications

1. ***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).
2. ***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).
3. ***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).
4. ***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).
5. ***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).
6. ***Avalanches, Plasticity, and Ordering in Colloidal Crystals Under Compression***, *D. McDermott, C.J. Olson Reichhardt, C. Reichhardt*, Phys. Rev. E 93, 062607 (2016).
7. ***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).
8. ***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).
9. ***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).
10. ***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).
11. ***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).

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.

Invited Talks

May 2018 **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

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 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.

Outreach and Public Presentations

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

August 2015 **QuarkNet Virtual Center Meeting Host**, *Bradbury Science Museum*, Los Alamos, NM.

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.

Professional Memberships/Academic Activities

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

2011–2013 **Executive Board**, *Graduate Physics Students (GPS)*.
Founding Member of an organization to increase professional and academic development within ND Physics Graduate Student Community.

2011–2013 **Seminar Leader**, *Condensed Matter Grad Students* .
Organized of a Condensed Matter Student Seminar to encourage student development and collaboration.

2009 – Present **American Physical Society**, *APS Member*.

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

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