# Perry W.M. Ellis

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## EDUCATION

**Georgia Institute of Technology**, Atlanta, GA
Ph.D., Physics, G.P.A. 3.9/4.0 — Expected Spring 2018
Master of Science, Physics, G.P.A 3.9/4.0 — December 2012

**Harvey Mudd College**, Claremont, CA
Bachelor of Science, Physics, G.P.A. 3.4/4.0 — May 2011

**Study Abroad**
University of Granada, Granada, Spain — Spring 2010

## HONORS AND AWARDS

FLAMEL Doctoral Fellowship, Georgia Institute of Technology, Fall 2015 - Summer 2017 • Member, Gamma Beta Phi, Georgia Institute of Technology Chapter, Summer 2012-Spring 2014 • National Merit Scholar, 2007-2011 • Harvey Mudd Merit Scholarship, 2007-2011 • Harvey Mudd College Dean's List, Spring 2008, 2009, 2011, Fall 2009, 2010

## SKILLS

Matlab • Python • C • Mathematica • Origin • Adobe Illustrator • LaTeX • Microsoft Office • Linux • C • Written and Spoken Spanish.

## TECHNICAL EQUIPMENT EXPERIENCE

Optical Microscopy (bright field, crossed polarizers, fluorescence and fluorescence confocal) • Microfluidic Systems (generation of monodisperse single emulsions) • Pulsed and Continuous Wave Laser Systems (maintenance and use) • Machining and Fabrication (mill, lathe, 3D printing) • High Vacuum Systems (design, maintenance, and use) • High Voltage Systems (use)

## PROJECT AND RESEARCH EXPERIENCE

**Graduate Researcher**, Georgia Institute of Technology, Atlanta, GA — Spring 2015 - Present
- Use fluorescence confocal microscopy to study an active nematic liquid crystal confined to a toroidal surface
- See defect density dependence on the local Gaussian curvature, the activity, and the toroid aspect ratio
- See curvature-induced defect unbinding in the time-averaged defect charge

**Graduate Researcher**, Georgia Institute of Technology, Atlanta, GA — Fall 2014 - Present
- Investigate nematic liquid crystal confined to a toroidal droplet with homeotropic boundary conditions
- Use optical microscopy and simulation to investigate the role of curvature in the defect and director configuration
- Find a structural transition away from an escaped radial configuration depending on the aspect ratio of the toroidal droplet

**Graduate Researcher**, Georgia Institute of Technology, Atlanta, GA — Spring 2014 - Present
- Investigate nematic liquid crystal confined between parallel plates with variable separation
- Use polarized microscopy, fluorescence microscopy, and simulation to determine defect structure and type as a function of plate separation and droplet volume
- Find a transition between a ring defect and a point defect depending on bridge aspect ratio
- Find that the Gaussian curvature of the free surface of the liquid crystal determines the sign of the defect

**Graduate Researcher**, Georgia Institute of Technology, Atlanta, GA — Fall 2012 - Present
- Simulate nematic textures based on a given director field and confining geometry.
- Used simulation in conjunction with experimental results to confirm a director hypothesis for toroidal nematic liquid crystal droplets.

**Lawrence Livermore National Laboratory Clinic Team**, Claremont, CA Fall 2010 - Spring 2011
- Developed a test bed to evaluate the photocathode for a dynamic transmission electron microscope in order to overcome limiting factors in the current setup.
- Served as team leader: managed the four-person team and interacted with the project liaisons.

## TEACHING EXPERIENCE

**Graduate Teaching Assistant**, Georgia Institute of Technology, Atlanta, GA Fall 2013 - Spring 2014
- Develop a laboratory section for a future graduate course in Soft Condensed Matter.
- Designed lab experiments to introduce the student to important broad concepts in Soft Condensed Matter while developing critical thinking and experimental technique.

**Graduate Teaching Assistant**, Georgia Institute of Technology, Atlanta, GA Spring 2013 - Summer 2013
- Developed a laboratory section for a future class, P21CS, Physics for $21^{st}$ Century Students.
- Designed course to impart an intuitive understanding of basic physics concepts relevant for the modern citizen without focusing on the math.

**Graduate Teaching Assistant**, Georgia Institute of Technology, Atlanta, GA Fall 2012
- Lectured, held office hours, and graded homework and exams for Physics 3141, Thermodynamics.

**Graduate Teaching Assistant**, Georgia Institute of Technology, Atlanta, GA Fall 2011 - Summer 2011
- Taught laboratory and recitation sections, tutored students, and graded exams for Physics 2211, Calculus-based Mechanics.

**Graduate Teaching Assistant**, Scripps College, Claremont, CA Summer 2011
- Assisted with laboratory sessions, tutored students, and graded homework assignments for General Physics 31, Calculus-based Electricity and Magnetism.

## PUBLICATIONS

P.W. Ellis, S. Huang, S. Klaneček, J. Vallamkondu, E. Dannemiller, M. Vernon, Y.W. Chang, P.M. Goldbart, A. Fernández-Nieves, *Defect transitions in nematic liquid crystal capillary bridges*, PRE. (Submitted)

P.W. Ellis, D.J.G. Pearce, Y.W. Chang, G. Goldsztein, L. Giomi, A. Fernández-Nieves, *Defect unbinding and dynamics in active nematic toroids*, Nat. Phys. (2017)

K. Nayani, R. Chang, J. Fu, P.W. Ellis, A. Fernández-Nieves, J.O. Park, M. Srinivasarao, *Spontaneous emergence of chirality in achiral lyotropic chromonic liquid crystals confined to cylinders*, Nat. Comm. (2015) **6**

A. Fragkopoulos, P.W. Ellis, A. Fernández-Nieves, *Teaching Rayleigh-Plateau instabilities in the lab*, EJP. (2015) **36**(5), 055023

E. Pairam, J. Vallamkondu, V. Koning, B. C. van Zuiden, P. W. Ellis, M. A. Bates, V. Vitelli, A. Fernández-Nieves, *Stable nematic droplets with handles*, PNAS. (2013) **110**, 9295-9300

P.W. Ellis, A. Fernández-Nieves, *Polarized optical microscopy textures of nematic liquid crystal tori*, (In preparation)

P.W. Ellis, K. Nayani, J.P. McInerney, D.Z. Rocklin, M. Srinivasarao, E.A. Matsumoto, A. Fernández-Nieves, *Curvature-induced twist in homeotropic nematics*, (In preparation)

## PRESENTATIONS

*Defects in an active nematic confined to a toroid.* P.W. Ellis, D. Pearce, L. Giomi, and A. Fernandez-Nieves. APS March Meeting, March 16, 2017, Oral Presentation

*Defect unbinding in active nematic toroids.* P.W. Ellis, Y.W. Chang, and A. Fernandez-Nieves. ACS Colloids and Surface Science Symposium, June 6, 2016, Oral Presentation

*Active nematics on the surface of as torus.* P.W. Ellis, Y.W. Chang, and A. Fernandez-Nieves. APS March Meeting, March 14, 2016, Oral Presentation

*Simulated textures of toroidal nematic liquid crystal droplets.* P.W. Ellis and A. Fernandez-Nieves. ACS Colloids and Surface Symposium, June 2014, Poster Presentation

*Simulated textures of toroidal nematic liquid crystal droplets.* P.W. Ellis and A. Fernandez-Nieves. APS March Meeting, March 4 2014, Oral Presentation

*Simulating nematic textures using Jones Matrices.* P.W. Ellis and A. Fernandez-Nieves. Soft matter bag lunch, November 13 2013, Oral Presentation

## SERVICE

### Professional Service

**PURA reviewer**, Georgia Institute of Technology, Atlanta, GA Spring 2013 - Present

- Reviewed applicants for the President's Undergraduate Research Awards (PURA), a program funding undergraduate research under a faculty mentor.
- Evaluated applications on scientific merit, student ability, and faculty endorsement of the student.

### Community Service

**Member of Gamma Beta Phi**, Georgia Institute of Technology, Atlanta, GA Summer 2012 - Spring 2014

- A national honor society focused on community service.

## HOBBIES

Cooking • Rock Climbing • Brazilian Jiu-Jitsu • Tabletop Games • Water Polo • Hiking • Swimming