

# CHRISTOPHER C. DOMBROWSKI

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## EDUCATION

- UNIVERSITY OF ARIZONA 2007  
Doctor of Philosophy | Physics  
*Bacterial Motility: From Propulsion to Collective Behavior*
- UNIVERSITY OF ARIZONA 2004  
Master of Science | Physics
- UNIVERSITY OF ARIZONA 2001  
Bachelor of Science | Physics  
Bachelor of Science | Astronomy

## EMPLOYMENT

- UNIVERSITY OF CALIFORNIA AT DAVIS 2007-2013  
DEPARTMENT OF MICROBIOLOGY AND MOLECULAR GENETICS  
Postdoctoral Fellow  
*Single molecule imaging and force measurements of DNA repair proteins, Tid1 and BRCA2*  
*Designed, built, & maintained fluorescence microscopy, microfluidics, and optical trapping systems*  
*Wrote and maintained software to control instruments and process images*
- ARS TECHNICA, NOBEL INTENT 2010-2011  
Contributing Science Writer
- UNIVERSITY OF ARIZONA, DEPARTMENT OF PHYSICS 1999-2007  
Graduate Research Associate  
*Studied bacterial motility from individual bacterium propulsion to collective behavior using DIC and fluorescence microscopy*  
*Designed and built an optical trap for nm scale manipulation and pN force measurements*  
*Designed and implemented data acquisition software and apparatus using Schlieren imaging for fluid dynamics experiments dealing with fluid entrainment of decelerating fluid jets*  
Laboratory Instructor: Optics, E&M, and General Physics  
*Designed laboratory exercises and lectures for a new general education class in the Physics Department*
- SANTA FE INSTITUTE 2002  
Complex Systems Summer School Laboratory Instructor  
*Designed and implemented laboratory experiments and apparatus*  
*Assisted students in the laboratory, tailoring the experiments to their specific projects*
- COLUMBIA UNIVERSITY, BIOSPHERE CENTER 2001  
Astronomy Instructor  
*Taught observational astronomy & developed public outreach and public lectures*
- UNIVERSITY OF ARIZONA, DEPARTMENT OF ASTRONOMY 1997-1999  
Undergrad Research Associate  
*Observed an irregular variable star with the 61" Kuiper Telescope. Determined the star's period for comparison to stellar models of variable stars*  
*Reduced SMT (SubMillimeter Telescope) data of CO emissions from carbon rich red giant stars and prepared the data for combination with interferometer data*  
*Designed and implemented hardware & tracking software for the Student Radio Telescope*  
*Head & Coordinator of the Undergraduate Graders; worked directly with course instructors*

## AWARDS & SCHOLARSHIPS

Oncogenic Signaling and Chromosome Biology Postdoctoral Fellowship	2009-2011
University of Arizona Imaging Fellow	2003-2004
NASA Astrobiology Program, Astrobiology Graduate Conference	2004
University of Arizona College of Science Galileo Circle Scholarship	2003
IGERT Fellow (Math, Biology, and Physics Initiative, NSF)	2002-2005

## SELECTED PRESENTATIONS

<i>Techniques in Visual Biochemistry</i>	
Yale Cancer Center, Department of Therapeutic Radiology	(seminar) 2013
<i>Single Molecule Determination of the Subunit Composition of Tid1, A DNA Translocase</i>	
Biophysical Society 56 <sup>th</sup> Annual Meeting (San Diego)	(poster) 2012
<i>The Elastic Basis for the Shape of Borrelia burgdorferi: Individual and Collective Fluid Mechanics of Swimming Microorganisms</i>	
University of Glasgow	(seminar) 2010
<i>Experiments in Bacterial Motility</i>	
Mount Holyoke College	(seminar) 2010
Franklin & Marshall College	(seminar) 2010
<i>Single Molecule Studies of BRCA2</i>	
T32 Oncogenic Signals and Chromosome Biology Retreat (UC Davis)	(seminar) 2009

## SKILLS

### FABRICATION, ENGINEERING & OPTICS

Microscopy: Fluorescence, TIRF, DIC, TEM, AFM

Microfluidic design and fabrication

Ultra-high vacuum techniques, including X-ray, ion, and electron gun assemblies

General machining (manual and CNC), custom apparatus design and fabrication

Optical instrument design, fabrication, and automation

### PROGRAMMING

Proficient in: LabView, C, Fortran, and MATLAB

Developed software tools for scientific image processing on multiple platforms

Developed software for instrument automation and control

### MOLECULAR BIOLOGY

PCR, DNA extraction, protein purification, gel electrophoresis & tissue culture

### MENTORING & EDUCATIONAL LEADERSHIP

Mentored several undergrads students at UC Davis and the University of Arizona

Team Organizer of the 2005 Arizona BioPhest Biophysics Conference

Head of the Physics Graduate Council at the University of Arizona

Representative to the College of Science Graduate Council at the University of Arizona

Certified Toastmaster (public speaking)

## PERSONAL INTERESTS

Astronomy, Hiking & Camping, Climbing & Bouldering, Photography, Aeronautics (RC), archeology of the southwest

## PUBLICATIONS

**Exploring protein-DNA interactions in 3D using in situ construction, manipulation, and visualization of individual DNA-dumbbells with optical traps, microfluidics, and fluorescence microscopy** Anthony Forget, [Christopher C Dombrowski](#), Ichiro Amitani, Stephen C Kowalczykowski *Nature Protocols* 8 (3), 525-538 (2013).

**Direct imaging of RecA nucleation and growth on single molecules of SSB-coated ssDNA** Jason C Bell, Jody L Plank, [Christopher C. Dombrowski](#), Stephen C Kowalczykowski *Nature*, 491, 274-278 (2012).

*Comment in Nature News & Views*, Lovett ST. Biochemistry: A glimpse of molecular competition, *Nature*, Nov8; 491 (7423): 198-200 (2012).

*Faculty of 1000 recommended*

**Decatenation of DNA by the *S. cerevisiae* Sgs1-Top3-Rmi1 and RPA Complex: A Mechanism for Disentangling Chromosomes** Petr Cejka, Jody L Plank, [Christopher C. Dombrowski](#), Stephen C Kowalczykowski *Molecular Cell Volume* 47, Issue 6, Pages 886-896 (2012).

*Faculty of 1000 recommended*

**Saccharomyces cerevisiae Dmc1 and Rad51 preferentially function with Tid1 and Rad54, respectively, to promote DNA strand invasion during genetic recombination** Amitabh V Nimonkar, [Christopher C Dombrowski](#), Joseph S Siino, Alicja Z Stasiak, Andrzej Stasiak, Stephen C Kowalczykowski *Journal of Biological Chemistry* 287, 28727-28737 (2012).

**Watching individual proteins acting on single molecules of DNA** Ichiro Amitani, Bian Liu, [Christopher C. Dombrowski](#), Ronald J. Baskin, and Stephen C. Kowalczykowski *Single Molecule Methods*, Part A, 472 (2010)

**The Elastic Basis for the Shape of *Borrelia burgdorferi***

[Christopher Dombrowski](#), Wanxi Kan, Md. Abdul Motaleb, Nyles W. Charon, Raymond E. Goldstein and Charles W. Wolgemuth *Biophysical Journal* 96, 4409-4417 (2009)

**Fluid Dynamics of Self-Propelled Micro-organisms, From Individuals to Concentrated Populations** Luis H. Cisneros, Ricardo Cortez, [Christopher Dombrowski](#), Raymond E. Goldstein, and John O. Kessler *Experiments in Fluids* 43, 737-753 (2007)

**Bacterial Motility: From Propulsion to Collective Behavior** (*Dissertation*)

[Christopher C. Dombrowski](#), *University of Arizona: Tucson, Arizona* (2007).

**Reversal of Bacterial Locomotion at an Obstacle** Luis Cisneros, [Christopher Dombrowski](#), Raymond E. Goldstein and John O. Kessler *Physical Review E: Rapid Communications* 73, 030901(R) (2006)

**Coiling, Entrainment, and Hydrodynamic Coupling of Decelerated Fluid Jets**

[Christopher Dombrowski](#), Braddon Lewellyn, Adriana I. Pesci, Juan M. Restrepo, John O. Kessler, and Raymond E. Goldstein *Physical Review Letters* 95, 184501 (2005).

**Bacterial Swimming and Oxygen Transport Near Contact Lines**

Idan Tuval, Luis Cisneros, [Christopher Dombrowski](#), Charles W. Wolgemuth, John O. Kessler, and Raymond E. Goldstein

*Proc. Natl. Acad. Sci. (USA)* 102, 2277-2282 (2005)

**Self-Concentration and Large-Scale Coherence in Bacterial Dynamics**

[Christopher Dombrowski](#), Luis Cisneros, Sunita Chatkaew, John O. Kessler, and Raymond E. Goldstein *Physical Review Letters* 93, 098103 (2004)