Andrew Resnick

Department of Physics
Cleveland State University
2121 Euclid Avenue
Cleveland Ohio 44115

Phone: (216)-687-2437
email: a.resnick@csuohio.edu
http://facultyprofile.csuohio.edu/csufacultyprofile/detail.cfm?FacultyID=A_RESNICK
http://resnicklab.wordpress.com/

Date: July 1, 2014

Education:

July 1997: Ph.D. in Physics University of Alabama in Huntsville, Huntsville, AL

- Dissertation Title: Statics and Dynamics of Vibrating Liquid Bridges, (J. Iwan D. Alexander, advisor)

June 1991: B.S. in Physics, Rensselaer Polytechnic Institute, Troy, NY

Honors and Awards:

2014	Faculty Merit Recognition Award
2011-present	NIH R15 Research Award
2003-2008	NIH K25 Mentored Quantitative Research Award
2005	Research ShowCASE outstanding Postdoctoral Poster award
2000	Member, Outstanding Technical Team for Mine Detection Data Collection
1993-1997	NASA Graduate Student Research Program Grant

Professional Experience:

2009-Present	Assistant Professor, Department of Physics, Cleveland State University
2009-Present	Assistant Professor (secondary appointment), Department of Biology, Geology and Environmental Sciences, Cleveland State University
2013-Present	Assistant Professor (secondary appointment), Department of Chemical and Biomedical Engineering, Cleveland State University
2009-Present	Adjunct Staff, Department of Cell Biology, Cleveland Clinic Foundation
2009-Present	Adjunct Assistant Professor, Department of Physiology and Biophysics, Case Western Reserve University
2005-2009	Instructor, Department of Physiology and Biophysics, Case Western Reserve University
2004-2005	Post-doctoral Fellow, Department of Physiology and Biophysics, Case Western Reserve University

- The role of sensory cilia in cellular mechanosensation. Systems under investigation include renal and airway epithelial tissue. Primary experimental probes are laser tweezers, microscopy, and two-sided perfusion chambers.

2003-2004	Research Staff, National Center for Microgravity Research at NASA Glenn Research Center
1999- 2003	Senior Scientist, Northrop Grumman at NASA Glenn Research Center

- Participant in NASA projects including Ultraviolet-Visible-Infrared Spectrometer (UVIS), Vapor Phase Catalytic Ammonia Removal (VPCAR), Soft condensed matter program group, Bioscience New Directions.
- Senior member of the Light Microscopy Module (LMM) development team, responsible for the development of a fully automated microscope.
- Development of novel instrumentation (laser tweezers), spaceflight modifications to new microscopy technologies (confocal microscopy, spectrophotometer), and static and dynamic light scattering.
- Direct experience with a wide range of equipment including solid-state lasers, fiber optic systems, optical test and measurement equipment, acousto-optic and electro-optic modulators, digital cameras and interfaces, image processing and optical system design.
- Participated in several KC-135 reduced gravity flights, experienced over 400 zero-g parabolas.

1997 - 1999 Research Scientist, Nichols Research Corporation

- Responsible for the development of an accurate physical model for passive and active sensor simulations. Added polarization effects, millimeter wave imaging, rough surface scattering and improved thermal flow models.
- Developed and used a dual rotating retarder Mueller matrix spectropolarimeter with the goal of obtaining highly accurate and precise surface scattering measurements.

1992- 1997 Experimental investigation into dynamic behavior of contact line and contact angle of liquid bridges (Ph.D. dissertation).

- Fundamental research of a basic physical phenomena (liquid bridges) common to many technological processes, e.g. floating-zone crystal growth, fluid flow in porous materials, and adhesion
- Constructed a neutral buoyancy (Plateau) tank, computer controlled motion equipment, Schlieren, Fourier, and imaging optical systems
- Developed innovative and accurate measurements of contact angle and interfacial energy in reduced gravity conditions

Teaching Experience:

2009-Present Assistant Professor, Department of Physics, Cleveland State University

- PH 221 (College Physics I), Fall 2009-2013, approximately 60 undergraduate students per class
- PH 222 (College Physics II), Spring 2010-2013, approximately 30 undergraduate students per class
- PH 455/555 (Advanced Optics Lab), Spring 2012, approximately 15 undergraduate and graduate students
- PH 460/560 (Lasers and Photonics), Fall 2012, approximately 12 graduate students
- PH 480/580 (Optical Materials), Spring 2014, approximately 6 undergraduate and graduate students

2003-2009 Instructor, Department of Physiology and Biophysics, Case Western Reserve University

- Anat/Phol 517, "Optical Imaging and Microscopy for Biologists" May 19-23, 2003 (Anna-Liisa Nieminen, course director)
- Anat/Phol 517, "Optical Imaging and Microscopy for Biologists" May 23-28, 2004 (Anna-Liisa Nieminen, course director)
- PHOL 476, "Cellular Biophysics", Spring 2005 (Ulrich Hopfer, course director)
- PHOL 476, "Cellular Biophysics", Spring 2006 (Ulrich Hopfer, course director)
- PHOL 476, "Cellular Biophysics", Spring 2007 (Ulrich Hopfer, course director)
- MBIO 525, "Advances in Biological Imaging", Fall 2006 (David McDonald, course director)
- GENE 537, "Light and Video Microscopy", Fall 2007 (Patty Conrad, course director)
- Block 2 small group "Cell signaling" 8/25/08 (George Dubyak, course coordinator)
- Block 2 small group "Cell signaling" 8/27/07 (George Dubyak, course coordinator)
- Trained over 20 microscopy users as manager of the Cystic Fibrosis Center Core Imaging Laboratory

2000-2001 Lecturer, Department of Physics, Case Western Reserve University.

- PHYS 115, "Physics I", Summer 2000
- PHYS 115, "Physics I" and PHYS 121 "Mechanics", Fall 2000

1997-1999 Research Scientist, Nichols Research Corporation

- "Infrared phenomenology" (in-house training)
- "Polarization and Polarimetry" (in-house training)

Research Support:

Grant Number: Cleveland State University Faculty Innovation Fund Program
Project Title: Microperfusion Tissue Interrogator: platform technology development
Project dates: April 1, 2014- March 31, 2015
Award amount: $40000

Grant Number: NSF 1161152
Project Title: Mathematics Achievement as a STEP for STEM Success
Project Dates: August 1, 2013- July 30, 2017
Award amount: $875,900
Principal Investigator: John Holcomb
Co-PI(s): Andrew Resnick, Debbie Jackson, Stephen Duffy

Grant Number: NSF 1337859
Project Title: MRI: Acquisition of an integrated atomic force microscope/ Inverted optical microscope for interdisciplinary research at Cleveland State University
Project Dates: 08/13/13
Award Amount: $289,939
Principal Investigator: Chandrasekhar Kothapalli
Co-PI(s): Andrew Resnick, Xue-Long Sun, Nolan Holland, Orhan Talu

Grant Number: Cleveland State University GRHD Faculty Development Program
Project Title: Microfluidic Fabrication Facility

Project dates: June 1, 2013- July 31, 2014
Award amount: $8000

Grant Number: 1 R15 DK092716-01
Project Title: Fluid flow is an environmental modifier of ADPKD
Project dates: May 1, 2011- April 30, 2014
Award amount: $332,343

Grant Number: Cleveland State University Faculty Development Program
Project Title: The Primary Cilium Mediates Cellular Mechanosensation
Project dates: July 1, 2011- June 30, 2012
Award amount: $19,797

Grant Number: 1 K25 DK071027-01 (NIH/NIDDK)
Project Title: Flow Effects on Primary Cilium Deflection
Project dates: July 1, 2005- June 30, 2010

Grant Number: Cystic Fibrosis Foundation R447-CR02
Project Title: Role of Primary Cilium in Airway Surface Liquid Regulation
Project dates: July 1, 2006-June 30, 2008

NIH NCRR Shared Instrumentation Grant Program
Project Title: Upright Light Microscope Workstation
Project dates: 4/1/2006-3/31/2007

Grants- in- kind:

Laser Diode Power Supply: Keithley Instruments, 5/11, est. $10,000

Peer-reviewed Papers:

[1] Alexander, J. I. D., Delafontaine, S., Resnick A. and Carter, W. C., "Stability of Non-axisymmetric Liquid Bridges", *Microgravity Sci. Technol. IX/3*, 1996, 193-200.
[2] Slobozhanin L., Alexander J.I.D., and Resnick A, "Bifurcation of the equilibrium states of a weightless liquid bridge", *Phys. Fluids* 9 (7), 1997, 1893-1905.
[3] Resnick A and Alexander J.I.D., "A Plateau tank apparatus for liquid bridge research" *Review of Scientific Instruments* 68 (3), 1997, 1495-1500.
[4] Resnick A and Alexander J.I.D., "A Coherent Fourier Optical Imaging System for Liquid Bridge Research" (*Proceedings of the SPIE Aerosense 1997 meeting, vol 3073*)
[5] Watson J., Wellfare M., Foster J., Owens M., Vechinski D., Richards M., and Resnick A, "Irma Multisensor Predictive Signature Model", *Proc. SPIE Vol. 3375*, p. 78-92, Targets and Backgrounds: Characterization and Representation IV, Wendell R. Watkins; Dieter Clement; Eds. (1998).
[6] Resnick A, Persons C., and Lindquist G., "Polarized Emissivity and Kirchhoff's Law", *Applied Optics* 38, 1999, 1384-1387.
[7] Resnick A, "Design and Construction of a space-borne optical tweezer apparatus", *Review of Scientific Instruments* 72, 2001, 4059-4065.
[8] Resnick A, Differential interference contrast microscopy as a polarimetric instrument", *Applied Optics* 41, 2002, 38-45

[9] Resnick A, "Use of laser tweezers for colloid science", *J. Colloid and Interface Science* 262, 2003, 55-59.
[10] Resnick A, Hopfer U. "Force-response considerations in ciliary mechanosensation.", *Biophys J.* Aug 15;93(4): 2007, 1380-90. Epub 2007 May 25.
[11] Resnick A, Hopfer U. "Mechanical stimulation of primary cilia", *Frontiers in Bioscience* 2008 Jan 1;13:1665-80.
[12] Yu Cheng, Anna C. Samia, Jun Li, Ping Zhang, Malcolm E. Kenney, Andy Resnick, Clemens Burda "Quantification the Release of a Gold Nanoparticle-Caged PDT Drug Pc 4 into Human Cancer Cells", *Langmuir*, 2010 Feb 16;26(4):2248-55 (feature article)
[13] Resnick A, "Use of optical tweezers to probe epithelial mechanosensation", *J. Biomedical Optics* 2010 January/February 15 (1), 015005 1-8.
[14] Resnick A, "Chronic Fluid Flow is an Environmental Modifier of Renal Epithelial Function", *PLoS ONE* 2011 6(10): e27058. doi:10.1371/journal.pone.0027058.
[15] Boslett, B., Nag, S. and Resnick, A. "Detection and Antibiotic Treatment of Mycoplasma arginini Contamination in a Mouse Epithelial cell line Restores Normal Cell Physiology", *BioMed Research International* 2014, Article ID 532105.
[16] Glaser, J., Hoeprich, D. and Resnick A, "Real-Time Measurement of Forces Applied by an Optical Trap to a Rigid Cylindrical Object" *(Optical Engineering, to appear)*

Submitted for Publication:

[17] Resnick, A and Burciaga, J. "Depth of focus- A guided inquiry" (submitted to American Journal of Physics)

In Preparation:

[18] Lofgren, I and Resnick, A. "A Simplified Model for the Optical Force exerted on a Vertically Oriented Cilium by an Optical Trap and the Resulting Deformation"

Patents:

U.S. provisional application no. 61/907,833 (filed 11.22.13), "Microperfusion Tissue Interrogator"

Technical Reports:

[A] Resnick, A., "Light Microscopy Module Baseline Performance Document", document # LMM-DOC-0021, prepared for NASA Glenn Research Center, (2001)

Presentations:

"Dynamics of liquid bridges: Importance of support geometry and contact line and angle dynamics" NASA GSRP meeting 1995 Talk
"Influence of support geometry and gravity on the stability of liquid bridges" APS fluids meeting 1996 Talk
"Modeling Polarization in the Irma Synthetic Imaging Code" OSA meeting 1998 Talk
"Multi-function Light Microscopy Module for the International Space Station" Space Technology Applications International Forum 2000 Talk
"PHYSICS OF HARD SPHERES EXPERIMENT-2 (PHASE 2)" ISS Utilization Conference 2001 Talk

"Design and Construction of a space-borne optical tweezer apparatus" Conference on Lasers and Electro-Optics 2001 Talk

"The Light Microscopy Module: An Autonomous, Multifunction, Space Borne Microscope" Conference on Lasers and Electro-Optics 2001 Talk

"Mechanosensation and the Primary Cilium" Research Day Cleveland State University 2010 Poster

"Position Detection & Tracking for the Calibration of Optical Trap Stiffness" Research Day Cleveland State University 2011 Poster

"Optimizing Cell Growth within a Flow Chamber" Research Day Cleveland State University 2011 Poster

"Amplification and electroporation of plasmid EGFP-tba2 for live cell imaging of the primary cilia in mCCD cells" Research Day Cleveland State University 2011 Poster
Research Day Cleveland State University 2012 Poster

"Curvature-Mediated Interactions Between Membrane Proteins" Cystic Fibrosis seminar, Department of Pediatric Pulmonology Case Western Reserve University 13-Dec-04 Talk

"The Primary Cilium is a Sensory Organelle" Gordon Research Conference on Cilia, Mucus, and Mucociliary Interactions Buellton, CA 26-Feb-05 Poster

"The Primary Cilium as a Flow Sensor" Research ShowCASE Case Western Reserve University 6-Apr-05 Poster

"The Primary Cilium is a Sensory Organelle" Experimental Biology San Francisco, CA 1-Apr-06 Poster

"Force-response considerations in ciliary mechanosensation" Gordon Conference on Cilia, Mucus, and Mucociliary Interactions Ventura Beach Marriott, Venture Beach, CA 4-Feb-07 Poster

"Thermal Noise Level Force Applied Chronically to Epithelial Cilia Induces a Cellular Response" Biophysical Society Meeting Baltimore, MD 3-Mar-07 Poster

"Force-response considerations in ciliary mechanosensation" Research ShowCASE Case Western Reserve Unviersity 11-Apr-07 Poster

"Force-response considerations in ciliary mechanosensation" CaseMed New Faculty Case Western Reserve University 18-Apr-07 Poster

"The Possible role of Primary Cilia in Cellular Mechanotransduction" Gordon Conference on Mechanosensory Transduction University of New England 22-Jul-07 Poster

"Possible role of the primary cilium as a flow sensor" Physics Department Kent State University 13-Sep-07 Invited talk

"Possible role of the primary cilium as a flow sensor" Nephrology Department Case Western Reserve University 31-Oct-07 Invited Talk

"Forces and Torques in Renal Tubules: Modeling and Effects" Physics, Chemistry, and Biology Department Ashland University 5-Nov-07 Invited talk

"Forces and Torques in Renal Tubules: Modeling and Effects" Physics Department Wright State University 9-Nov-07 Invited Talk

"Forces and Torques in Renal Tubules: Modeling and Effects" Department of Physiology and Biophysics Case Western Reserve University 6-Dec-07 Talk

"Possible role of the primary cilium as a flow sensor" Department of Physiology and Biophysics Case Western Reserve University 22-Jan-08 Talk

"Mechanosensation and the Primary Cilium" Experimental Biology San Diego, CA 5-Apr-08 Poster

"Mechanosensitive stimulation via the primary cilium" Experimental Biology San Diego, CA 5-Apr-08 Invited Talk

"What would I do with the APS?" Future Directions Workshop Advanced Photon Source, Argonne National Laboratory 20-Oct-08 Invited Talk

"Mechanosensation and the Primary Cilium" Gordon Conference on Cilia, Mucus & Mucociliary Interactions Il Ciocco, Italy 4-Feb-09 Poster
"Mechanosensation and the Primary Cilium" Department of Biology, Geology, and Environmental Science Cleveland State University 16-Oct-09 Invited Talk
AAPT New Faculty Workshop 12-Nov-09 Poster
"Mechanosensation and the Primary Cilium" American Physics Society, Ohio regional meeting Marietta, OH 8-Oct-10 Poster
"Mechanosensation and the Primary Cilium" American Physiological Society, Ohio regional meeting Cleveland, OH 14-Oct-10 Poster
"Biofluiddynamics and the physiological role of the primary cilium" Cystic Fibrosis seminar, Department of Pediatric Pulmonology Case Western Reserve University 7-Jan-11 Invited Talk
"Biofluiddynamics and the physiological role of the primary cilium" Department of Chemistry Cleveland State University 30-Apr-11 Invited Talk
"Imaging the Primary Cilium: Challenges and Approaches" Microscopy and Microanalysis Conference Nashville, TN 8-Sep-11 Invited Talk
"Biofluiddynamics and the physiological role of the primary cilium" Department of Biology, Geology, and Environmental Science Cleveland State University 19-Sep-11 Invited Talk
"Biofluiddynamics and the physiological role of the primary cilium" Department of Chemistry Cleveland State University 2-Dec-11 Invited Talk
"Mechanosensation and the Primary Cilium" Department of Biology, Geology, and Environmental Science Cleveland State University 16-Dec-11 Invited Talk
"Mechanosensation and the Primary Cilium: when push becomes shove" University of Toledo, Department of Pharmacology Toledo, OH 4-Apr-12 Invited Talk
"Mechanosensation and the Primary Cilium: when push becomes shove" Akron Physics Club Akron, OH 23-Apr-12 Invited Talk
"Fluid Mechanics" Department of Mathematics Cleveland State University 27-Jun-12 Invited Talk
"Mechanosensation and the Primary Cilium: when push becomes shove" Department of Biomedical Engineering Cleveland State University 24-Oct-13 Invited Talk

Student Advisees:

Primary Thesis/Dissertation advisor:

Brianna Boslett (Ph.D, Regulatory Biology, est. 2016) Interleukins, flow, and renal cilia
Brianna McGuiness (Ph.D., Regulatory Biology, est. 2016) Asthma and ciliated airway epithelia
Subhra Nag (Ph.D., Regulatory Biology, est. 2016) Hypoxia and the primary cilium
Vikram Seetharaman (in process of switching to Ph. D., Regulatory Biology, est. 2016) Fluid flow connection to Polycystic Kidney Disease
Andreea Sandu (BS, Biology,Spring 2012) Amplification and transfection of Plasmid EGFP-TBA2 for Live Cell Imaging of Primary Cilium. **Andreea was chosen as Spring 2012 COSHP College Valedictorian**

Committee Member:

Jonathan Damsel (Ph.D, Bioanalytic Chemistry, 2012) “Development of a Virtually Imaged Phased Array (VIPA) Line-scan Imaging Spectrograph for Mapping Strain in Polymer Implants”
Chesinta Voma (Ph.D, Bioanalytical and Clinical Chemistry, 2014), “Magnesium as a Regulator of Reticular NADPH in the Hepatocyte: A novel role of Magnesium in Diabetes and Obesity Onset”
Ibrahim Seven (Ph.D, Applied Biomedical Engineering, est. 2014), “Characterization of Corneal Biomechanical Properties with OCT Elastography”

Robert Cannon (M.S., Chemistry, 2013) "Automated Spectral Identification of Materials with Spectral Identity Mapping"

Tim Palinski (M.S., Chemistry, 2014) "Fourier Transform Infrared Spectroscopy with Application to the Venusian Atmosphere"

Terri Harford (Ph. D., Regulatory Biology, December 2009) "Apoptotic Threshold Regulation by the Muscle Regulatory Transcription Factor MYOD"

Synergistic Activities (Selected)

1. *Volunteer services to involve underrepresented group in science*

Since 2009, the PI participated as a mentor in the MC2STEM and Design Lab Early College High Schools program operated by Cleveland State University. The purpose of this program is to encourage high school students from underrepresented demographics to develop their curiosity in science, technology, engineering, and mathematics. Additional participation in recent program developments at CSU (announcement of a new on-campus K-12 public school using the International Baccalaureate program; CSUTeach; expansion of Health Science initiatives) will create additional opportunities for the PI to involve minority students.

2. *Volunteer services to the scientific community*

The PI has participated in the Intel Science Fair at local and national levels as a judge in 2003 and 2004. The PI has also participated in numerous Science Fair competitions at Cleveland State University, Case Western Reserve University, and NASA. The PI is also active in his local K-12 schools, bringing scientific demonstrations to K-12 students; leading "Science Day" activities at Cleveland State University, opening his laboratory to K-12 students and their teachers; and is involved in the local chapter of Sigma Xi.

3. Contributions to the science of learning

Curriculum development: member of the Committee on Medical Education while at CWRU, and is currently serving on the Faculty Senate, Academic Standards Committee, and Departmental steering committees related to the medical physics program. The PI is active in several CSU accreditation activities, including CAMPEP (Medical Physics) and the University-wide program assessment. Teaching workshops: American Association of Physics Teachers "New Faculty Workshop" (2009), the CSU Center of Teaching Excellence "Developing a Teaching Portfolio" (2009), and will continue to stay involved in teaching initiatives.

4. Contributions to the Research Community

The PI is a member of the American Physics Society, American Physiological Society, Optical Society of America, and Sigma Xi. The PI is an peer reviewer for Optical Engineering, Applied Optics, Optics Letters, Archives of Biochemistry and Biophysics, Optics Express, Progress in Electromagnetics research/ Journal of Electromagnetic waves and applications, and a book reviewer for Contemporary Physics. The PI has also been active in several region-wide affiliations (Biophotonics Initiative, Human Performance Consortium, John Glenn Biomedical Engineering Consortium). The PI has been active in the organization of topical sessions at Society meetings (Co-Chair, "Mechanotransduction Mediated by Primary Cilia", 2008 FASEB Meeting, April 5-9 2008 (San Diego). Carol Liedtke, Chair.)

Collaborators & Other Affiliations

1. Collaborators and co-authors

Dr. Clemens Burda (Case Western Reserve University), Dr. Carole Liedtke (CWRU), Dr. William Meyer (NASA Glenn Research Center), Dr. Surya Nauli (University of Toledo), Dr. Parthasarathy Srinivasan (Cleveland State University)

2. Students sponsored

Graduates: Briana Boslett (Biology), David Hoeprich (Physics), Brianna McGuiness (Biology), Vikram Seetharaman (Biology), Ian Lofgren (Physics), Laxmi Subhedi (Physics), Subhra Nag

(Biology), Phillip Simmers (Biomedical Engineering), Mario Muscarella (Physics), Russell Sundberg (Math)

Undergraduates: Marie Blatnik (Electrical Engineering), Prasenjit Bose (Physics), Joseph Glaser (Physics), Josh Orzel (Physics), Andreea Sandu (Biology), Anthony Hall (Mechanical Engineering), Benjamin Dozalski (Physics)

3. Advisors and Mentors

Dr. J. Iwan D. Alexander Ph.D. Advisor, University of Alabama in Huntsville (now at Case Western Reserve University, Cleveland, OH)

Dr. Ulrich Hopfer Postdoctoral Advisor, Case Western Reserve University, Cleveland, OH

Dr. Jearl Walker Mentor, Cleveland State University, Cleveland, OH

Dr. Crystal Weyman Mentor, Cleveland State University, Cleveland, OH

Professional Societies:

Optical Society of America (1997-current)
American Physical Society (1992-current)
American Physiological Society (2003- current)
Sigma Xi (2006-current)

Reviewer:

- Optics Letters, 2004-current
- Applied Optics, 2005-current
- Archives of Biochemistry and Biophysics, 2005-current
- Optical Engineering, 2006-current
- Cellular and Molecular Life Sciences, 2011-current
- Journal of Biomedical Optics, 2011-current
- Contemporary Physics, 2011-current
- NSF CAREER reviewer (ad hoc)
- Petroleum Research Fund reviewer (ad hoc)
- MRC Research Grant reviewer (ad hoc)

Related Service:

- **Departmental committees or assignments**
- Medical Physics Curriculum Committee
- Medical Physics Steering committee

- **College committees or assignments**
- Academic Standards Committee
- COSHP Dean Search committee

- **University committees or assignments**
- Faculty Senate
- Budget and Planning Advisory Committee
- Academic Misconduct Committee
- COSHP Representative, Graduate Council