**Emily A. Gibson, Ph.D.**

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**SUMMARY**

I perform research in the field of biophotonics with a focus on development of optical microscopy and photonics devices for basic biomedical research and clinical applications. I have a background in physics and nonlinear optics with >15 years experience in optical device design and > 10 years expertise biological imaging. I have held continuous grant funding from NSF and NIH as PI since 2013 and was awarded the DARPA career award in 2010.

**EDUCATION**

**B.S., Engineering Physics, Minor: Chemistry** 1993-1997

Colorado School of Mines, Golden, CO

Research Advisor: Prof. Stephen R. Leone

Research Topics: Studies of organic/inorganic surface interactions using scanning tunneling microscopy

**Ph.D., Physics** 1998-2004

University of Colorado at Boulder

Thesis Advisors: Professors Margaret M. Murnane and Henry C. Kapteyn

Dissertation: Quasi-phase matching of soft x-ray light from high-order harmonic generation using waveguide structures

**Post-doc, Biophysics**  2004-2007

Quantum Physics Division, National institute of Standards and Technology, Boulder, CO

Research Advisor: Dr. Ralph Jimenez

Research Topics: Nonlinear femtosecond spectroscopy for studies of protein folding and design of fast mixing microfluidic devices for initiating biochemical reactions

**Post-doc, Biochemistry** 2007-2008

University of Colorado at Boulder

Research Advisor: Prof. Amy Palmer

Research Topics: Development of a microfluidic platform for screening libraries of Ca2+ FRET-based fluorescent protein sensors for high throughput optimization

**PROFESSIONAL POSITIONS**

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| 2019 - present | Associate Professor, Dept. of Bioengineering, University of Colorado Denver, Anschutz Medical Campus |
| 2021 - present | Affiliate Faculty, Department of Electrical, Energy, and Computer Engineering, University of Colorado Boulder |
| 2011 - 2019 | Assistant Professor, Dept. of Bioengineering, University of Colorado Denver, Anschutz Medical Campus |
| 2018 - present | Affiliate Faculty, Neuroscience Program, University of Colorado Denver, Anschutz Medical Campus |
| 2011 - present | Affiliate Faculty, Department of Physiology and Biophysics, University of Colorado Denver, Anschutz Medical Campus |
| 2009 - 2011 | Assistant Professor, Department of Physics, University of Colorado Denver |

**AWARDS AND HONORS**

1993 - 1997 Undergraduate Fellowship, Professional Research Experience Program

National Institute of Standards and Technology

1997 Outstanding Graduating Senior in Engineering Physics, Colorado School of Mines

1998 Graduate Student Fellowship, Department of Physics, University of Colorado at Boulder

2004 - 2006 National Research Council/National Academy of Sciences Postdoctoral Fellowship

2005 Thesis Award Finalist, Division of Atomic Molecular and Optical Physics, American Physics Society

2006 Burroughs Wellcome Career Award at the Scientific Interface Finalist

2010 Defense Advanced Research Projects Agency (DARPA) Young Faculty Award

2013 Faculty Development Grant, University of Colorado Denver

2022 AB Nexus Grant Awardee, University of Colorado Anschutz and Boulder

2023 Faculty Excellence Award in Research and Creative Activities, CU Denver

2023 Chang Research Award, College of Engineering, Design, and Computing, CU Denver

**PROFESSIONAL AFFILIATIONS**

* Society for Neuroscience, Optica (formerly Optical Society of America), International Society for Optics and Photonics (SPIE), Colorado Photonics Industry Association

**PROFESSIONAL SERVICE: EXTRAMURAL**

**Conference Service**

2009 Scientific Presenter, Conference of Colorado Science Teachers, Denver, CO

2013 Panel Member, National Eye Institute, NIH, Audacious Goals Initiative Meeting

2019-2021 Chair (committee member from 2017-2018), Sub-committee S&I 10:Photonics Innovations in Biological Sciences, Optica Conference on Lasers and Electro-optics (CLEO).

2018 Committee Member, Optics in the Brain. Optica Biophotonics Congress.

2020 Organizer, Rocky Mountain Summit on Wearable Miniature Microscopes

2021-2022 Co-Chair, Optics in the Brain. Optica Biophotonics Congress.

**Grant Reviewing**

2012 Grant Reviewer, Medical Research Council Grant Program, UK

2014- present Grant Reviewer, National Science Foundation

2016- present Grant Reviewer, National Institutes of Heath

**PROFESSIONAL SERVICE: INTRAMURAL**

**University-Level Service**

2009 – 2010 Faculty Sponsor, Experiential Learning Center Internship Program, University of Colorado Denver

2010 - 2011 Organizer, Biophotonics Seminar Series, University of Colorado Denver

*Organized seminar series with a focus on biophotonics with invited speakers from University of Colorado Denver and nearby universities*

2010- present Faculty Mentor, BRAiN Program (Building Research Achievement in Neuroscience) and N-CORE program, University of Colorado Anschutz Medical Campus

2014 Reviewer, Grant Review Panel, Faculty Development Grants, Univ of Colorado Denver

2015 Reviewer, Grant Review Panel, Butcher Innovation Grants, Biofrontiers Institute, University of Colorado Boulder

2017 Reviewer, Grant Review Panel, Undergraduate Research Opportunities Program (UROP), University of Colorado Denver

2016- 2019 Co-Director, Advanced Light Microscopy Core, University of Colorado Anschutz Medical Campus

2019- present Member, Advisory Committee, Advanced Light Microscopy Core Facility, University of Colorado Anschutz Medical Campus

**Departmental-Level Service**

2009 Member, Instructor Search Committee (Dept. of Physics)

2010-present Member, Graduate Affairs Committee (Chair 2010-2012)

2011 Member, Faculty Search Committee

2016-present Faculty Advisor, Biomedical Engineering Society Student Chapter

2017 Organizer, Bioengineering Department Teaching Development Book Club

*Organized meetings every three weeks involving instructors and faculty members in the Bioengineering department to discuss books and literature on teaching practices*

2017-present Organizer, Research in Progress Seminar Series

2023–present Member, Primary Unit Committee

2023-present Advisor, Neural Engineering Certificate Program

**JOURNAL REVIEWER**

* Nature Methods
* Nature Photonics
* Cell
* Science Advances
* Biophysical Journal
* Journal of Biomedical Optics
* Biomedical Optics Express
* Journal of Neurophotonics
* IEEE Photonics Journal
* Review of Scientific Instruments
* Investigative Ophthalmology and Visual Science (IOVS)
* Molecular Vision

**RESEARCH ACCOMPLISHMENTS: PUBLICATIONS**

**Peer-reviewed Journal Publications**

(Underlined names: Student Mentees, *Underlined and italicized names*: Postdoc mentees); \*indicates Corresponding Author)

1. D. Sarkisyan\*, B.D. Paul, S.T. Cundiff, **E.A. Gibson**, A. Gallagher, “Conical emission by 2-ps excitation of potassium vapor,” JOSA B 2001; 18(2), 218-224.

1. **E.A. Gibson**, A. Paul, N. Wagner, R. Tobey, D. Gaudiosi, S. Backus, I.P. Christov, A. Aquila, E.M. Gullikson, D.T. Attwood, M.M. Murnane\*, H.C. Kapteyn\*, “Coherent Soft X-ray Generation in the Water Window with Quasi-Phase Matching,” Science 2003; 302: 95-98.
2. **E.A. Gibson**, A. Paul, N. Wagner, R. Tobey, S. Backus, I.P. Christov, M.M. Murnane\*, H.C. Kapteyn\*, “High-Order Harmonic Generation up to 250 eV from Highly Ionized Argon,” Physical Review Letters 2004; 92: 033001-1-4.
3. N.L. Wagner, **E.A. Gibson**, T. Popmintchev, I.P. Christov, M.M. Murnane\*, and H.C. Kapteyn\*, “Self-compression of Ultrashort Pulses through Ionization-induced Spatiotemporal Reshaping,” Physical Review Letters 2004; 93: 173902-1-4.
4. D. M. Gaudiosi, E. Gagnon, A. L. Lytle, J. L. Fiore, **E. A. Gibson**, S. Kane, J. Squier, M. M. Murnane, H. C. Kapteyn, R. Jimenez and S. Backus\*, “Scalable multi-kilohertz repetition rate Ti:sapphire amplifier based on down-chirped pulse amplification,” Optics Express 2006; 14: 9227-9283.
5. **E. A. Gibson**, D. M. Gaudiosi, H. C. Kapteyn, R. Jimenez, S. Kane, R. Huff, C. Durfee, J. Squier\*, “Efficient Reflection Grisms for Pulse Compression and Dispersion Compensation of Femtosecond Pulses,” Optics Letters 2006; 31: 3363-3365.
6. D. Schafer, **E. A. Gibson**, W. Amir, R. Erikson, J. Lawrence, T. Vestad, J. Squier, R. Jimenez, D. W. M. Marr\*, “Three-dimensional chemical concentration maps in a microfluidic device using two-photon absorption fluorescence imaging,” Optics Letters 2007; 32: 2568-2570.
7. W. Amir\*, C.G. Durfee, D.N. Schafer, **E.A. Gibson**, L. Kost, E. Przekwas, R. Jimenez, J. Squier, “Linear spatio-temporal characterization of a UV microscope objective for nonlinear imaging and spectroscopy by using two-dimensional spectral interferometry,” Journal of Microscopy 2008, 230: 4-8.
8. **E.A. Gibson**, Z. Shen, R. Jimenez\*, “Three-pulse photon echo peak shift spectroscopy as a probe of flexibility and conformational heterogeneity in protein folding.” Chemical Physics Letters 2009; 473: 330-335.
9. D.A. Ammar, T.C. Lei, **E.A. Gibson**, M.Y. Kahook\*, "Two-photon imaging of the trabecular meshwork," Molecular vision. 2010; 16:935-44.
10. J.E. McCombs, **E.A. Gibson**, and A.E. Palmer\*, “Using a genetically targeted sensor to investigate the role of presenilin-1 in ER Ca2+ levels and dynamics,” Molecular Biosystems 2010; 6(9): 1640–1649.
11. D.A. Ammar, T.C. Lei, *O. Masihzadeh*, **E.A. Gibson**, M.Y. Kahook\*, "Trans-scleral imaging of the human trabecular meshwork by two-photon microscopy," Molecular Vision. 2011; 17:583-90.
12. **E.A. Gibson**, *O. Masihzadeh*, T.C. Lei, D.A. Ammar, M.Y. Kahook\*, “Multi-photon microscopy for ophthalmic imaging,” Journal of Ophthalmology 2011; 2011: 870879-1-11.
13. *O. Masihzadeh*, D.A. Ammar, T.C. Lei, **E.A. Gibson**, M.Y. Kahook\*, “Real-time measurements of nicotinamide adenine dinucleotide in live human trabecular meshwork cells: Effects of acute oxidative stress,” Experimental Eye Research 2011;93(3):316-20.
14. T.C. Lei, D.A. Ammar, *O. Masihzadeh*, **E.A. Gibson**, M.Y. Kahook\*, “Label-free imaging of trabecular meshwork cells using Coherent Anti-Stokes Raman Scattering (CARS) microscopy,” Mol Vis. 2011; 17: 2628–2633.
15. H. Ma, **E.A. Gibson**, P.J. Dittmer, R. Jimenez\*, A.E. Palmer\*, “High-throughput Examination of FRET-detected Metal-Ion Response in Mammalian Cells,” J. Am. Chem. Soc. 2012; 134 (5): 2488–2491.
16. *O. Masihzadeh*, T.C. Lei, D.A. Ammar, M.Y. Kahook, **E.A. Gibson\***, “A multiphoton microscope platform for imaging the mouse eye,” Mol Vis. 2012; 18:1840-1848.
17. C. Gonzalez-Silva, J. Vera, M.R. Bono, C. González-Billault, B. Baxter, A. Hansen, R. Lopez, **E.A. Gibson**, D. Restrepo\*, J. Bacigalupo\*, "Ca(2+)-Activated Cl(-) Channels of the ClCa Family Express in the Cilia of a Subset of Rat Olfactory Sensory Neurons," PloS One. 2013; 8(7): e69295.
18. *O. Masihzadeh*, D.A. Ammar, M.Y. Kahook, **E.A. Gibson**, T.C. Lei\*, "Direct trabecular meshwork imaging in porcine eyes through multiphoton gonioscopy," Journal Of Biomedical Optics. 2013; 18(3): 036009.
19. *M. Potcoava,* G.L. Futia, J. Aughenbaugh, I.R. Schlaepfer, **E.A. Gibson\***, “Raman and CARS microscopy studies of changes in lipid content and composition in hormone-treated breast and prostate cancer cells,” Journal of Biomedical Optics. 2014; 19(11): 111605-1-10.
20. B.N. Ozbay, J.T. Losacco, R. Cormack, R. Weir, V.M. Bright, J.T. Gopinath, D. Restrepo, **E.A. Gibson\***, “Miniaturized fiber-coupled confocal fluorescence microscope with an electrowetting variable focus lens using no moving parts,” Optics Letters. 2015; 40(11): 2553–2556.

\*Selected for feature in Virtual Journal for Biomedical Optics (VJBO)

1. S.A. Meyer†, B.N. Ozbay†, *M. Potcoava*, E. Salcedo, D. Restrepo\*, **E.A. Gibson\***, “Super-resolution imaging of ciliary microdomains in isolated olfactory sensory neurons using a custom two-color stimulated emission depletion microscope,” J. Biomed. Opt. 2016; 21(6): 066017-1-8.

†co-first authors

1. R.D. Niederriter, B.N. Ozbay, G.L. Futia, **E.A. Gibson**, J.T. Gopinath\*, "Compact diode laser source for multiphoton biological imaging," Biomed. Opt. Express. 2017; 8: 315-322.
2. J.N. Soltys, S.A. Meyer, H. Schumann, **E.A. Gibson**, D. Restrepo, J.L. Bennett\*, “Determining the Spatial Relationship of Membrane-Bound Aquaporin-4 Autoantibodies by STED Nanoscopy,” Biophys J. 2017;112(8):1692-1702.
3. G.L. Futia\*, L. Qamar, K. Behbakht, **E.A. Gibson**, “Statistical performance of image cytometry for DNA, lipids, cytokeratin, & CD45 in a model system for circulation tumor cell detection,” Cytometry A. 2017;91(7):662-674.

\*Editor’s choice

1. A.K. Fontaine, **E.A. Gibson**, J.H. Caldwell, R.F.F. Weir\*, “Optical Read-out of Neural Activity in Mammalian Peripheral Axons: Calcium Signaling at Nodes of Ranvier,” Scientific Reports 2017;7(1):4744-1-11.
2. O.D. Supekar, B.N. Ozbay, M. Zohrabi, P.D. Nystrom, G.L. Futia, D. Restrepo, **E.A. Gibson**, J.T. Gopinath\*, V.M. Bright\*, “Two-photon laser scanning microscopy with electrowetting-based prism scanning,” Biomed Opt Express. 2017;8(12):5412-5426.
3. M. Zohrabi, R.H. Cormack, C. McCullough, O.D. Supekar, **E.A. Gibson**, V.M. Bright, J.T. Gopinath\*, “Numerical analysis of wavefront aberration correction using multielectrode electrowetting-based devices,” Opt Express. 2017;25(25):31451-31461.
4. B.N. Ozbay, G.L. Futia, M. Ma, V.M. Bright, J.T. Gopinath, E.G. Hughes, D. Restrepo, **E.A. Gibson\***, “Three dimensional two-photon brain imaging in freely moving mice using a miniature fiber coupled microscope with active axial-scanning,” Scientific Reports 2018;8(1):8108.
5. B.M. Heffernan, S.A. Meyer, D. Restrepo, M.E. Siemens, **E.A. Gibson**, J.T. Gopinath\*, "A Fiber-Coupled Stimulated Emission Depletion Microscope for Bend-Insensitive Through-Fiber Imaging," Scientific Reports. 2019; 9(1):11137.
6. M. Ma, G.L. Futia, F.M.S.d. Souza, B.N. Ozbay, I. Llano, **E.A. Gibson**, D. Restrepo\*, "Molecular layer interneurons in the cerebellum encode for valence in associative learning," Nature Communications. 2020; 11(1):4217.
7. A.K. Fontaine, G.L. Futia, P.S. Rajendran, S.F. Littich, N. Mizoguchi, K. Shivkumar, J.L. Ardell, D. Restrepo, J.H. Caldwell\*, **E.A. Gibson**\*, R.F.f. Weir\*, "Optical vagus nerve modulation of heart and respiration via heart-injected retrograde AAV," Scientific Reports. 2021; 11(1):3664.
8. M.C. Potcoava\*, G.L. Futia, **E.A. Gibson**, I.R. Schlaepfer, "Lipid profiling using Raman and a modified support vector machine algorithm," Journal of Raman spectroscopy: JRS. 2021; 52(11):1910-22.
9. Y.L. Simmons, K.J. Underwood, O.D. Supekar, B.M. Heffernan, T.A. Welton, **E.A. Gibson**, J.T. Gopinath\*, "Femtosecond diode-based time lens laser for multiphoton microscopy," Biomedical Optics Express. 2021; 12(10):6269.
10. B.M. Heffernan, P.S. Riley, O.D. Supekar, S.A. Meyer, D. Restrepo, M.E. Siemens, **E.A. Gibson**, J.T. Gopinath\*, "Two-photon, fiber-coupled, super-resolution microscope for biological imaging," APL Photonics. 2022; 7(3):036102.
11. M.C. Potcoava\*, G.L. Futia, **E.A. Gibson**, I.R. Schlaepfer, "Cancer Biomarkers, Methods and Protocols," Methods in molecular biology (Clifton, NJ). 2022; 2413:193-209.
12. O.D. Supekar, A. Sias, S.R. Hansen, G. Martinez, G.C. Peet, X. Peng, V.M. Bright, E.G. Hughes, D. Restrepo, D.P. Shepherd, C.G. Welle, J.T. Gopinath, **E.A. Gibson**\*, "Miniature structured illumination microscope for in vivo 3D imaging of brain structures with optical sectioning," Biomedical Optics Express. 2022; 13(4):2530.
13. M.A. Thornton, G.L. Futia, M.E. Stockton, B.N. Ozbay, K. Kilborn, D. Restrepo, **E.A. Gibson**\*, E.G. Hughes\*, "Characterization of red fluorescent reporters for dual-color in vivo three-photon microscopy," Neurophotonics. 2022; 9(3):031912.
14. C.M. McCullough, D. Ramirez-Gordillo, M. Hall, G.L. Futia, A.K. Moran, **E.A. Gibson**\*, D. Restrepo\*, "GRINtrode: a neural implant for simultaneous two-photon imaging and extracellular electrophysiology in freely moving animals," Neurophotonics. 2022; 9(4):045009.
15. V. Kumar, K. Behrman, F. Speed, C.A. Saladrigas, O. Supekar, Z. Huang, V.M. Bright, C.G. Welle, D. Restrepo, J.T. Gopinath, **E.A. Gibson**, I. Kymissis, “MicroLED light source for optical sectioning structured illumination microscopy,” Opt Express. 2023 May 8;31(10):16709-16718.
16. T.A. Welton, N.M. George, B.N. Ozbay, A.Gentile Polese, G. Osborne, G.L. Futia, J.K. Kushner, B. Kleinschmidt-DeMasters, A.L. Alexander, A. Abosch, S. Ojemann, D. Restrepo, and **E.A. Gibson\***, "Two-photon microendoscope for label-free imaging in stereotactic neurosurgery," Biomed. Opt. Express 14, 3705-3725 (2023).
17. Ming Ma, Fabio Simoes de Souza, Gregory L. Futia, Sean R. Anderson, Jose Riguero, Daniel Tollin, Arianna Gentile-Polese, Jonathan P. Platt, Kira Steinke, Naoki Hiratani, **Emily A. Gibson** and Diego Restrepo\*, “Sequential activity of CA1 hippocampal cells constitutes a temporal memory map for associative learning in mice,” Current Biology (in press).
18. Michael A. Thornton, Gregory L. Futia, Michael E. Stockton, Samuel A. Budoff, Alexandra N Ramirez, Baris Ozbay, Omer Tzang, Karl Kilborn, Alon Poleg-Polsky, Diego Restrepo, **Emily A. Gibson**, Ethan G. Hughes\*, “Long-term in vivo three-photon imaging reveals region-specific differences in healthy and regenerative oligodendrogenesis,” Nature Neuroscience (accepted, in print)
19. Samuel D. Gilinsky, Diane N. Jung, Greg L. Futia, Mo Zohrabi, Tarah A. Welton, Omkar D. Supekar, **Emily A. Gibson**, Diego Restrepo, Victor M. Bright and Juliet T. Gopinath\*, “Tunable liquid lens for three-photon excitation microscopy,” Biomedical Optics Express (submitted).
20. Stephanie A. Pierce, Jordan Jacobelli, Katherine S. Given, Wendy B. Macklin, Juliet T. Gopinath, Mark E. Siemens, Diego Restrepo, **Emily A. Gibson\***, “OpenSTED: Open-Source DyMIN system for STED Microscopy,” Journal of Neurophotonics (submitted).

**Invited Review Articles and Book Chapters**

1. **E.A. Gibson**, X.S. Zhang, T. Popmintchev, A. Paul, N. Wagner, A. Lytle, I.P. Christov, M.M. Murnane, H.C. Kapteyn, “Extreme nonlinear optics: Attosecond photonics at short wavelengths,” IEEE Journal of Selected Topics in Quantum Electronics 2004; 10(6): 1339-1350.
2. **E.A. Gibson**, Ivan P. Christov, M.M. Murnane and H.C. Kapteyn, “Quantum control of high harmonic generation: Applied attosecond science,” in Femtosecond Optical Frequency Comb: Principle, Operation, and Applications (J. Ye and S. T. Cundiff, Eds., Kluwer, 2005), pp. 314-332.
3. A. Paul, **E.A. Gibson**, X.S. Zhang, A. Lytle, T. Popmintchev, X.B. Zhou, M.M. Murnane, I.P. Christov, H.C. Kapteyn, “Phase-matching techniques for coherent soft x-ray generation,” IEEE Journal of Quantum Electronics 2006; 42(1): 14-26.
4. B.N. Ozbay, G.L. Futia, M. Ma, C. McCullough, M.D. Young, D. Restrepo, **E.A. Gibson\***, “Miniature multiphoton microscopes for recording neural activity in freely moving animals,” In: Papagiakoumou E. (eds) All-optical methods to study neuronal function. Neuromethods Vol. 191, Humana Press, New York, NY (2023).

**Peer-reviewed Published Conference Proceedings**

1. **E. A. Gibson**, T. Weinacht, S. Backus, M. M. Murnane, and H. C. Kapteyn, “Simple in-line EUV pulse characterization,” in X-Ray Lasers 2002: 8th International Conference on X-Ray Lasers (J. J. Rocca , Ed., AIP Conf. Proceedings Vol. 641, 2002), pp. 587-590.
2. S. Backus, R. Bartels, **E. Gibson**, A. Paul, H. C. Kapteyn, M. M. Murnane, Y. Liu, and D. Attwood, "“Laser Like” Spatial Coherence of a High-flux, Ultrashort-pulse, EUV Source," in *Conference on Lasers and Electro-Optics*, M. Fejer, F. Leonberger, J. Fujimoto, and S. Newton, eds., OSA Technical Digest (Optica Publishing Group, 2002), paper CWM4.
3. **E. Gibson**, A. Paul, N. Wagner, D. Gaudiosi, E. Gagnon, M. Murnane, H. Kapteyn, and I. P. Christov, “Multiphoton EUV photonics,” in Lasers and Electro-Optics Society, 16th Annual Meeting (IEEE, 2003), Vol. 1, 268-269.
4. **E. A. Gibson**, A. Paul, N. L. Wagner, R. Tobey, E. Gagnon, D. Gaudiosi, M. M. Murnane, H. C. Kapteyn, and I. P. Christov, “Quasi-phase-matching of high harmonic EUV generation at very high ionization levels,” in Ultrafast Optics IV (F. Krausz, G. Korn, P. Corkum, and I.A. Walmsley, Eds., Springer Series in Optical Sciences, 2003), p. 217-221.
5. **E.A. Gibson**, A. Paul, R. Tobey, N. Wagner, M. Murnane, H. Kapteyn, I.P. Christov, “High-order harmonic generation from argon ions up to 250 eV,” Conference on Lasers and Electro-Optics/International Quantum Electronics Conference and Photonic Applications Systems Technologies (CLEO/IQEC/PhAST) 2004, San Francisco, CA, May 2004. Paper JME4.
6. **E. A. Gibson**, N. Wagner, T. Popmintchev, M. M. Murnane, H. C. Kapteyn, and I. P. Christov, "Temporal self-compression of intense femtosecond pulses in argon-filled waveguides," in Conference on Lasers and Electro-Optics/International Quantum Electronics Conference and Photonic Applications Systems Technologies, Technical Digest (CD) (Optica Publishing Group, 2004), paper CPDC5.
7. **E. A. Gibson**, A. Paul, S. Backus, R. Tobey, M. M. Murnane, H. C. Kapteyn, and I. P. Christov, “Quasi-phase matching of high harmonic generation in the “water window” soft x-ray region,” in Ultrafast Phenomena XIV (T. Kobayashi, T. Okada, T. Kobayashi, K. A. Nelson, and S. D. Silvestri, Eds., Springer Series in Chemical Physics, 2005), pp. 192-194.
8. R. Tobey, D. Raymondson, **E. A. Gibson**, C.-F. Lei, A. Paul, S. Backus, M. Siemens, X. Zhang, M. M. Murnane, and H. C. Kapteyn, “Ultrashort-pulse EUV and soft x-ray sources based on high-harmonic generation – principles and applications,” in 26th International Congress on High Speed Photography and Photonics (D. L. Paisley, Ed., SPIE Vol. 5580, 2005), pp. 12-17.
9. **E. A. Gibson**, A. Paul, N. Wagner, S. Backus, M. M. Murnane, H. C. Kapteyn, and I. P. Christov, “High-order harmonic generation from argon ions up to 250 eV,” in Ultrafast Phenomena XIV (T. Kobayashi, T. Okada, T. Kobayashi, K. A. Nelson, and S. D. Silvestri, Eds., Springer Series in Chemical Physics, 2005), pp. 192-194.
10. **E. A. Gibson**, D. Schafer, R. Chadwick, R. Applegate Jr., W. Amir, T. Vestad, J. Oakey, M. Brown, D. W. Marr, J. Squier, and R. Jimenez, "Two-Photon Absorption Fluorescence Imaging to Characterize Microfluidic Device Performance," CLEO/QELS/PhAST 2006, Baltimore, MD, June 2006. Paper CMH4.
11. S. Kane, R. Huff, J. Squier, **E. Gibson**, R. Jimenez, C. Durfee, F. Tortajada, H. Dinger, B. Touzet, “Design and Fabrication of Efficient Reflection Grisms for Pulse Compression and Dispersion Compensation,” CLEO/QELS/PhAST 2006, Baltimore, MD, June 2006. Paper CThA5. http://www.opticsinfobase.org/abstract.cfm?URI=CLEO-2006-CThA5
12. **E. A. Gibson**, S. Kane, R. Huff, D. Gaudiosi, H. C. Kapteyn, C. Durfee, J. Squier, and R. Jimenez, "Grism Based Stretcher/Compressor System for Amplified, Femtosecond Kilohertz Lasers," in Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference and Photonic Applications Systems Technologies (CLEO/QELS/PhAST) 2006, Baltimore, MD, June 2006. Paper CThA3.
13. D. Schafer, R. Chadwick, W. Amir, R. Applegate, J. Squier, **E. Gibson**, R. Jimenez, T. Vestad, D. Marr, “Two Photon Absorption Fluorescence Imaging to Characterize Microfluidic Device Performance,” Biomedical Optics Topical Meeting (BIOMED) 2006, Ft. Lauderdale, FL, March 2006. Paper TuI73.
14. **E. A. Gibson**, D. Schafer, W. Amir, D.W.M. Marr, J. Squier, R. Jimenez, “A novel fast-mixing microfluidic device for studying nonequilibrium systems using femtosecond spectroscopies,” in Ultrafast Phenomena XV (P. Corkum, D. Jonas, D. Miller, A.M. Weiner, Eds., Springer Series in Chemical Physics, Vol. 88, 2007) pp.172-174.
15. D. Gaudiosi, **E. Gibson**, S. Kane, R. Huff, M. Murnane, H. Kapteyn, C. Durfee III, J. Squier, and R. Jimenez, “Grism based stretcher/compressor system for amplified, femtosecond kilohertz lasers,” in Ultrafast Phenomena XV (P. Corkum, D. Jonas, D. Miller, A.M. Weiner, Eds., Springer Series in Chemical Physics, Vol. 88, 2007) pp. 95-97.
16. S. Kane, F. Tortajada, H. Dinger, B. Touzet, R. Huff, J. Squier, C. Durfee, **E. Gibson**, R. Jimenez, D. Gaudiosi, H. Kapteyn, “Design and fabrication of efficient reflection grisms for pulse compression and dispersion compensation,” in Ultrafast Phenomena XV (P. Corkum, D. Jonas, D. Miller, A.M. Weiner, Eds., Springer Series in Chemical Physics, Vol. 88, 2007) pp. 169-171.
17. D. Gaudiosi, **E. Gibson**, S. Kane, R. Huff, M. Murnane, H. Kapteyn, C. Durfee III, J. Squier, and R. Jimenez, “Grism based stretcher/compressor system for amplified, femtosecond kilohertz lasers,” in Ultrafast Phenomena XV (P. Corkum, D. Jonas, D. Miller, A.M. Weiner, Eds., Springer Series in Chemical Physics, Vol. 88, 2007) pp. 95-97.
18. D. Schafer, W. Amir, C.G. Durfee, J. Squier, **E.A. Gibson**, L. Kost, R. Jimenez, “Linear, Spatio-Temporal Characterization of UV Microscope Objectives for Nonlinear Imaging and Spectroscopy,” Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference and Photonic Applications Systems Technologies (CLEO/QELS/PhAST) 2007, Baltimore, MD, May 2007. Paper JTuA54.
19. J. Squier, D. Schafer, R. Applegate, R. Carriles, Ramon, W. Amir, D. Marr, R. Jimenez, **E. Gibson**, M. Muller, “Nonlinear Optical Microscopy: From Imaging Molecular Dynamics to Blood Flow in Living Systems,” Nonlinear Optics: Materials, Fundamentals and Applications (NLO) 2007, Kona, Hawaii, July 2007. Paper FA6.
20. D. Schafer, **E.A. Gibson**, E.A. Salim, A.E. Palmer, R. Jimenez, J. Squier, “An Optically Integrated Microfluidic Cell Counter Fabricated by Femtosecond Laser Ablation and Anodic Bonding,” Conference on Lasers and Electro-Optics/International Quantum Electronics Conference (CLEO/IQEC) 2009, Baltimore, MD, May 2009. Paper CMMM1.
21. **E. A. Gibson** and R. Jimenez, “Three-pulse photon echo spectroscopy as a probe of flexibility and conformational heterogeneity in protein folding,” in Ultrafast Phenomena XVI (P. Corkum, S. D. Silvestri, K. A. Nelson, E. Riedle, R. Schoenlein, Eds., Springer Series in Chemical Physics Vol. 92, 2010), pp. 562-564.
22. Z. Shen, **E. Gibson**, and R. Jimenez, "Distinguishing between Two and Three-State Equilibrium Folding with Three-Pulse Photon Echo Peak Shift (3PEPS) Spectroscopy," International Conference on Ultrafast Phenomena 2010, Snowmass Village, CO, July 2010. Paper TuG4.
23. O. Masihzadeh, D.A. Ammar, M.Y. Kahook, **E.A. Gibson**, T.C. Lei, “Multiphoton gonioscopy to image the trabecular meshwork of porcine eyes,” Ophthalmic Technologies XXIII, edited by F. Manns, P.G. Soderberg, and A. Ho, Proc. Of SPIE Vol. 8567, 85671E-1-8 (2013).
24. S. A. Meyer, B. Ozbay, D. Restrepo, **E.A. Gibson**, “Super-resolution imaging of ciliary microdomains in isolated olfactory sensory neurons using a custom STED microscope,” Single Molecule Spectroscopy and Superresolution Imaging VII, edited by Jorg Enderlein, et al., Proc. of SPIE Vol. 8950, 89500W1-8 (2014).
25. M. Potcoava, G.L. Futia, J. Aughenbaugh, I.R. Schlaepfer, **E.A. Gibson**, “Micro-Raman spectroscopy studies of changes in lipid composition in breast and prostate cancer cells treated with MPA and R1881 hormones,” Biomedical Vibrational Spectroscopy VI: Advances in Research and Industry, edited by Anita Mahadevan-Jansen, Wolfgang Petrich, Proc. Of SPIE Vol. 8939, 893901-7 (2014).
26. G. L. Futia, L. Qamar, K. Behbakht, **E. A. Gibson**, “Quantitative image cytometry measurements of lipids, DNA, CD45 and cytokeratin for circulating tumor cell identification in a model system,” Proc. SPIE 9711, Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues IX, 97111U (6 April 2016).
27. B. N. Ozbay, G. Futia, D. Restrepo, and **E. A. Gibson**, "3D multiphoton fiber-coupled microscopy using adaptable optics for brain imaging," in Conference on Lasers and Electro-Optics, OSA Technical Digest (2016) (Optical Society of America, 2016), paper STh4G.2.
28. Robert D. Niederriter, Baris N. Ozbay, Gregory L. Futia, **Emily A. Gibson**, and Juliet T. Gopinath, "Compact diode laser source for multiphoton biological imaging," Biomed. Opt. Express 8, 315-322 (2017).
29. Mo Zohrabi, Robert H. Cormack, Connor Mccullough, Omkar D. Supekar, **Emily A. Gibson**, Victor M. Bright, and Juliet T. Gopinath, "Numerical analysis of wavefront aberration correction using multielectrode electrowetting-based devices," Opt. Express 25, 31451-31461 (2017).
30. George NM, Polese AG, Futia G, Ozbay B, Macklin W, **Gibson E**, Abosch A, Restrepo D, Moore BE, 2507 A novel multi-photon microscopy method for neuronavigation in deep brain stimulation surgery. Journal of Clinical and Translational Science. 2018;2(S1):2-3. doi:10.1017/cts.2018.40
31. G. L. Futia, A. Fontaine, C. McCullough, B. N. Ozbay, N. M. George, J. Caldwell, D. Restrepo, R. Weir, **E. A. Gibson**, "Measurement of wavefront aberrations in cortex and peripheral nerve using a two-photon excitation guidestar", Proc. SPIE 10502, Adaptive Optics and Wavefront Control for Biological Systems IV, 105020J (23 February 2018).
32. A. K. Fontaine, M. S. Kirchner, J. H. Caldwell, R. F. Weir, **E. A. Gibson**, "Deep-tissue two-photon imaging in brain and peripheral nerve with a compact high-pulse energy ytterbium fiber laser", Proc. SPIE 10492, Optical Interactions with Tissue and Cells XXIX, 1049217 (13 February 2018).
33. B. M. Heffernan, S. A. Meyer, D. Restrepo, M. E. Siemens, **E. A. Gibson**, and J. T. Gopinath, "Stimulated emission depletion microscopy with polarization-maintaining fiber," in Conference on Lasers and Electro-Optics, OSA Technical Digest (online) (Optical Society of America, 2018), paper SW4J.3.
34. O. D. Supekar, B. N. Ozbay, M. Zohrabi, P. D. Nystrom, G. L. Futia, D. Restrepo, **E. A. Gibson**, J. T. Gopinath, and V. M. Bright, "Electrowetting prism for scanning in two-photon microscopy," in Conference on Lasers and Electro-Optics, OSA Technical Digest (online) (Optical Society of America, 2018), paper SW4J.7.
35. Gregory L. Futia, Arjun K. Fontaine, Samuel Littich, Connor McCullough, Diego Restrepo, Richard F. Weir, John H. Caldwell, and **Emily A. Gibson** "In vivo holographic photo-stimulation and two photon GCaMP6 imaging of vagus nerve axons using a GRIN lens integrated nerve cuff", Proc. SPIE 10866, Optogenetics and Optical Manipulation 2019, 108660K (22 February 2019)
36. B. M. Heffernan, S. A. Meyer, D. Restrepo, M. E. Siemens, **E. A. Gibson**, and J. T. Gopinath, "Bend-Insensitive Through-Fiber Stimulated Emission Depletion (STED) Imaging of HeLa Cells," in Conference on Lasers and Electro-Optics, OSA Technical Digest (Optica Publishing Group, 2019), paper STu3H.3.
37. J. T. Gopinath, M. Zohrabi, O. D. Supekar, W. Y. Lim, B. N. Ozbay, G. L. Futia, D. Restrepo, **E. A. Gibson**, and V. M. Bright, "Electrowetting adaptive optical devices for LIDAR," in Applied Industrial Optics 2019, OSA Technical Digest (Optica Publishing Group, 2019), paper T2A.4.
38. Y. L. Simmons, K. J. Underwood, B. M. Heffernan, O. D. Supekar, **E. A. Gibson**, and J. T. Gopinath, "Near-infrared Femtosecond Time Lens Diode Laser with kW Peak Powers for Two-Photon Microscopy," in Conference on Lasers and Electro-Optics, OSA Technical Digest (Optica Publishing Group, 2020), paper SW4P.5.
39. G. M. Sanchez, O. D. Supekar, G. L. Futia, B. N. Ozbay, C. Welle, V. M. Bright, J. T. Gopinath, D. Restrepo, D. Shepherd, and **E. A. Gibson**, "Widefield fluorescence optical sectioning microscopy in a miniature fiber-coupled microscope with active axial scanning," in Conference on Lasers and Electro-Optics, OSA Technical Digest (Optica Publishing Group, 2020), paper SW4P.4.
40. B. M. Heffernan, P. Riley, O. D. Supekar, S. A. Meyer, N. M. George, D. Restrepo, M. E. Siemens, **E. A. Gibson**, and J. T. Gopinath, "Two-photon Fiber STED Microscope Using Polarization Maintaining Fiber," in Conference on Lasers and Electro-Optics, J. Kang, S. Tomasulo, I. Ilev, D. Müller, N. Litchinitser, S. Polyakov, V. Podolskiy, J. Nunn, C. Dorrer, T. Fortier, Q. Gan, and C. Saraceno, eds., OSA Technical Digest (Optica Publishing Group, 2021), paper SW2D.2.
41. S. A. Meyer, M. E. Siemens, J. T. Gopinath, D. Restrepo, and **E. A. Gibson**, "OpenSTED: Inexpensive and open-source implementation of Dynamic Intensity Minimum (DyMIN) for Stimulated Emission Depletion (STED) microscopy," in *Biophotonics Congress 2021*, C. Boudoux, K. Maitland, C. Hendon, M. Wojtkowski, K. Quinn, M. Schanne-Klein, N. Durr, D. Elson, F. Cichos, L. Oddershede, V. Emiliani, O. Maragò, S. Nic Chormaic, N. Pégard, S. Gibbs, S. Vinogradov, M. Niedre, K. Samkoe, A. Devor, D. Peterka, P. Blinder, and E. Buckley, eds., OSA Technical Digest (Optica Publishing Group, 2021), paper NW4C.3.
42. O. D. Supekar, A. Sias, S. R. Hansen, G. Martinez, G. C. Peet, X. Peng, V. M. Bright, E. G. Hughes, D. Restrepo, D. P. Shepherd, C. G. Welle, J. T. Gopinath, and **E. A. Gibson**, "SIMscope3D: A structured illumination miniature microscope for high resolution brain imaging," in Biophotonics Congress: Biomedical Optics 2022 (Translational, Microscopy, OCT, OTS, BRAIN), Technical Digest Series (Optica Publishing Group, 2022), paper BS4C.3.
43. S. D. Gilinsky, D.N. Jung, G.L. Futia, M. Zohrabi, T.A. Welton, **E.A. Gibson**, D. Restrepo, V.M. Bright, J.T. Gopinath, "Electrowetting lens for focus-tunable three-photon excitation microscopy," 2023 IEEE Photonics Conference (IPC), Orlando, FL, USA, 2023, pp. 1-2, doi: 10.1109/IPC57732.2023.10360526.

**Invited External Seminars, Symposia, and Workshops**

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| 2010 | Invited Speaker, Colorado Photonics Industry Association Meeting, Boulder CO.  *“Biophotonics research at University of Colorado Denver”* |
| 2011 | Invited Seminar Speaker, Department of Physics, Colorado School of Mines, Golden CO.  *“Applications of Optics in the Biomedical Sciences”* |
| 2013 | Invited Speaker, Rocky Mountain Chapter of the Optical Society of America (RMOSA) meeting, Boulder CO.  *“Non-invasive Bioimaging with Raman and Multiphoton Microscopy”* |
| 2015 | Invited Speaker, Advances in Analytical Real-Time Microscopy and Imaging Symposium, NIH Research Initiative for Scientific Enhancement (RISE) Program, New Mexico State University, Las Cruces NM.  *“A miniature confocal microscope for 3-D imaging in the brain”* |
| 2015 | Invited Speaker, Butcher Symposium, Biofrontiers Institute, University of Colorado Boulder CO.  *“A miniature confocal microscope for 3-D imaging in the brain”* |
| 2015 | Invited Seminar Speaker, Department of Chemical and Biomedical Engineering, University of South Florida, Tampa FL  *“Non-invasive multiphoton imaging of the eye”* |
| 2016 | Invited Seminar Speaker, Department of Physics, University of Denver, Denver CO.  *“A miniature confocal microscope for 3-D imaging in the brain”* |
| 2018 | Invited Seminar Speaker, Feinstein Institute for Medical Research, New York NY.  *“Applying optogenetic techniques to the vagus nerve”* |
| 2018 | Invited Seminar Speaker, Department of Physics, University of Denver, Denver, CO  *“Bringing the microscope to the mouse”* |
| 2018 | Faculty Membership Seminar, Neuroscience Program, University of Colorado Anschutz Medical Campus, *“Development of adaptable miniature microscopes for recording and modulating neural activity”* |
| 2019 | Invited Workshop Speaker, 2019 Nemonic Workshop, University of California Santa Barbara, Feb. 25-27, 2019, *”Three dimensional two-photon miniature fiber-coupled microscopy for imaging neural activity in freely moving mice”* |
| 2019 | Invited Seminar Speaker, Department of Biomedical Engineering, University of Utah, Mar. 1, 2019, *“Extending multiphoton microscopy to 3D brain imaging in freely moving mice”* |
| 2019 | Invited Workshop Speaker, Sculpted Light in the Brain 2019, London, UK, June 21, 2019, *“Three-dimensional multiphoton imaging in freely moving animals: Bringing the microscope to the mouse”* |
| 2019 | Invited Workshop Speaker, Cornell Neuronex Workshop, Cornell University, Ithaca NY. August 14-15, 2019. *“Shedding light on the neural basis of behavior with a fiber coupled miniature multiphoton microscope”* |
| 2020 | Invited Workshop Speaker, 2020 Nemonic Workshop, University of California Santa Barbara, Feb. 24-26, 2020, *”Three dimensional two-photon miniature fiber-coupled microscopy for imaging neural activity in freely moving mice”* |
| 2020 | Invited Seminar Speaker, Department of Physics, Colorado School of Mines, Golden, CO, Virtual, Oct. 6, 2020. *“Understanding the brain with adaptive optics”* |
| 2021 | Invited Workshop Speaker, 2021 Nemonic Workshop, University of California Santa Barbara, Virtual, Feb. 22-24, 2021. “*Extending multiphoton microscopy to 3D brain imaging in freely moving mice”* |
| 2021 | Invited Seminar Speaker, Department of Biomedical Engineering, University of Texas at Dallas, Virtual, Jan. 19, 2021. *“Development of miniature microscopes for neural imaging using adaptive optics”* |
| 2021 | Invited Seminar Speaker, Department of Biomedical Engineering, Boston University, Boston MA, Virtual, August 13, 2021. *“Understanding the brain with adaptive optics”* |
| 2022 | Invited Workshop Speaker, 2021 Nemonic Workshop, University of California Santa Barbara, Virtual, Feb. 23-25, 2022. “*Extending multiphoton microscopy to 3D brain imaging in freely moving mice”* |
| 2022 | Invited Workshop Speaker, 2022 Big Brain Imaging Workshop, Boston MA. April 7-8, 2022. *“Miniature Head-Attached Microscopes for Imaging Deeper into the Brain”* |
| 2022 | Invited Panelist, Colorado Photonics Industry Association Meeting, Speaker Panel: Photonics at our Colorado Universities, Boulder, CO, Oct. 20, 2022. |
| 2023 | Invited Workshop Speaker, 2023 Nemonic Workshop, University of California, Santa Barbara, Feb. 21-23, 2023. *“Miniature head-mounted microscopes for two-photon and structured illumination microscopy”* |
| 2023 | Faculty Membership Seminar, Integrated Physiology Program, University of Colorado Anschutz Medical Campus, April 17, 2023, *“Advances in deep tissue multiphoton brain imaging”*. |
| 2023 | Invited Workshop Speaker, 2023 Neurotechnology Symposium, University of Colorado Anschutz Medical Campus, Oct. 13, 2023, *“Bringing the microscope to the mouse: Development of miniature head-attached microscopes”*. |

**Conference Oral Presentations**

(Presenter is underlined)

1. **E. A. Gibson**, A.J. Paul, I.P. Christov, E. Gagnon, D. Gaudiosi, M.M. Murnane, H.C. Kapteyn, “Generation of coherent “water window” soft x-rays using quasi-phase-matching,” Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science (CLEO/QELS) 2003, Baltimore, MD, June 2003. Paper QThPDA2.
2. **E. A. Gibson**, N. Wagner, T. Popmintchev, M.M. Murnane, H.C. Kapteyn, I.P. Christov, “Temporal self-compression of intense femtosecond pulses in argon-filled waveguides,” CLEO/IQEC/PhAST 2004, San Francisco, CA, May 2004. Paper CPDC5.
3. **E. A. Gibson**, A. Paul, R. Tobey, N. Wagner, M. Murnane, H. Kapteyn, and I. P. Christov, “High-order harmonic generation from argon ions up to 250 eV,” Conference on Lasers and Electro-Optics/International Quantum Electronics Conference and Photonic Applications Systems Technologies (CLEO/IQEC/PhAST), San Francisco, CA, May 2004. Paper JME4.
4. Invited presentation, DAMOP Thesis Award Finalist, **Emily A. Gibson**, “Quasi-Phase Matching of Soft X-Ray Light from High-Order Harmonic Generation Using Waveguide Structures,” 36nd Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics (DAMOP), Lincoln, NE, May 2005. Paper G1.3
5. **E. A. Gibson** and R. Jimenez, “Femtosecond time-resolved spectroscopy in microfluidic devices,” the 230th ACS National Meeting, in Washington, DC, Aug 28-Sept 1, 2005. 153, Oral.
6. **E. A. Gibson**, D. Schafer, W. Amir, D.W.M. Marr, J. Squier, R. Jimenez, “A novel fast-mixing microfluidic device for studying nonequilibrium systems using femtosecond spectroscopies,” 15th International Conference on Ultrafast Phenomena, Pacific Grove, CA, July 2006.
7. **Emily A. Gibson**, Steve Kane, Rachael Huff, David Gaudiosi, Henry C. Kapteyn, Charles Durfee, Jeff Squier, and Ralph Jimenez, “Grism based stretcher/compressor system for amplified, femtosecond kilohertz lasers,” OSA Conference on Lasers and Electro-optics/Quantum Electronics and Laser Science (CLEO/QELS), Long Beach, CA, May 2006. Paper CThA3.
8. **Emily A. Gibson**, Philip J. Dittmer, Kevin Dean, Ralph Jimenez, Amy E. Palmer, “A Microfluidic Platform For High-Throughput Screening And Sorting Of Cells Based Upon FRET Response,” Biophysical Society 53rd Annual Meeting, Boston, MA, Feb 2009. Abstract 2797-Plat.
9. Mariana Potcoava, Gregory Futia, Jessica Aughenbaugh, Isabel Schlaepfer, **Emily A. Gibson**, “Micro-Raman spectroscopy studies of changes in lipid composition in breast and prostate cancer cells treated with MPA and R1881 hormones,” BIOS SPIE Photonics West, San Francisco, CA, Feb 2014. Paper 8939-18.
10. Invited presentation, Stephanie Meyer, Baris Ozbay, Diego Restrepo, **Emily A. Gibson**, “Super resolution imaging of ciliary microdomains in isolated olfactory sensory neurons using a custom STED microscope,” BIOS SPIE Photonics West, San Francisco, CA, Feb 2014. Paper 8950-30.
11. Stephanie Meyer, Kevin Woolfrey, Baris Ozbay, Diego Restrepo, Mark Dell’Acqua, **Emily Gibson**, “Two-color super-resolution imaging of dendritic spines of hippocampal neurons using a custom STED microscope,” American Physical Society (APS) March Meeting 2014, Denver, CO. Paper Y10.1.
12. G. L. Futia, L. Qamar, K. Behbakht, **E. A. Gibson**, “Quantitative image cytometry measurements of lipids, DNA, CD45 and cytokeratin for circulating tumor cell identification in a model system,” SPIE Photonics West BIOS, San Francisco, CA, Feb 2016.
13. G. L. Futia, A. Fontaine, C. McCullough, B. N. Ozbay, N. M. George, J. Caldwell, D. Restrepo, R. Weir, **E. A. Gibson**, "Measurement of wavefront aberrations in cortex and peripheral nerve using a two-photon excitation guidestar", SPIE Photonics West BIOS, San Francisco, CA, Feb 2018. Paper 10502-58.
14. **E. A. Gibson**, B. N. Ozbay, G. L. Futia, M. Ma, E. G. Hughes, D. Restrepo, "Three-dimensional multiphoton imaging of brain activity in freely-moving mice using a miniature microscope with variable focus lens", SPIE Photonics West BIOS, San Francisco, CA, Feb 2018. Paper 10499-70.
15. Invited presentation, J. T. Gopinath, R. H. Cormack, G. L. Futia, C. McCullough, P. D. Nystrom, B. N. Ozbay, W. Y. Lim, O. D. Supekar, M. Zohrabi, **E. A. Gibson**, D. Restrepo, V. M. Bright, “Adaptive electrowetting optical devices for imaging,” OSA Imaging and Applied Optics Congress, Orlando, FL, June 2018. Paper IM3B.5
16. Invited presentation, Neurotechnologies Plenary Session, **Emily Gibson**, “Extending multiphoton microscopy to 3D brain imaging in freely moving mice”, SPIE Photonics West BIOS, San Francisco CA, 3 February 2019.
17. Gregory L. Futia, Arjun K. Fontaine, Samuel Littich, Connor McCullough, Diego Restrepo, Richard F. Weir, John H. Caldwell, and **Emily A. Gibson** "In vivo holographic photo-stimulation and two photon GCaMP6 imaging of vagus nerve axons using a GRIN lens integrated nerve cuff", SPIE Photonics West BIOS, San Francisco CA, February 2-7, 2019.
18. Invited presentation, Gregory L. Futia, Isabel R. Schlaepfer, Lubna Qamar, Kian Behbakht, and **Emily A. Gibson** "Statistical multivariate analysis of biomarkers for circulating tumor cell detection", SPIE Photonics West BIOS, San Francisco CA, Feb 2-7, 2019. Paper 108890A.
19. Highlight Talk, Gregory L. Futia, Arjun Fontaine, Samuel Littich, Connor McCullough, Diego Restrepo, Richard Weir, John Caldwell, and **Emily A. Gibson**, “In vivo holographic photo-stimulation and two photon GCaMP6 imaging of vagus nerve axons using a GRIN lens integrated nerve cuff,” 2019 Colorado Neuroscience Symposium, Aurora CO, April 26, 2019.
20. Gregory Futia, Arjun Fontaine, Sam Littich, Connor McCullough, Diego Restrepo, **Emily Gibson**, John Caldwell, Richard Weir, “Bidirectional minimally invasive optogenetic peripheral nerve interface, 11th Congress of the International Society for Autonomic Neuroscience,” Los Angeles, CA, July 25-27, 2019.
21. Gabriel Martinez, Omkar Supekar, Gregory L. Futia, Baris N. Ozbay, Cristin Welle, Victor M. Bright, Juliet T. Gopinath, Diego Restrepo, Douglas Shepherd, and **Emily A. Gibson**. “Widefield Fluorescence Optical Sectioning Microscopy in a Miniaturized Fiber- Coupled Microscope with Active Axial Scanning.” The 6th Annual Brain Initiative Investigators Meeting, Virtual, June 1, 2020. \*Winner of the trainee award
22. Connor McCullough, Daniel Ramirez-Gordillo, Gregory Futia, Diego Restrepo, and **Emily A. Gibson**, “Simultaneous Two-Photon Imaging of Neural Activity and Extracellular Electrophysiology in Freely Moving Mice.” Optica Biophotonics Congress, Ft. Lauderdale, FL, April 24-27, 2022.
23. O. D. Supekar, A. Sias, S. R. Hansen, G. Martinez, G. C. Peet, X. Peng, V. M. Bright, E. G. Hughes, D. Restrepo, D. P. Shepherd, C. G. Welle, J. T. Gopinath, and **E. A. Gibson**, "SIMscope3D: A structured illumination miniature microscope for high resolution brain imaging," Optica Biophotonics Congress, Ft. Lauderdale, FL, April 24-27, 2022, Paper BS4C.3.
24. Invited Presentation, **Emily A. Gibson**, “Brain Funded Grant Example I: Development of 3D-FAST Optical Interface for Rapid Volumetric Neural Sensing and Modulation,” in Session on Demystifying the BRAIN Initiative Program: Guidance to Potential NIDCD Applicants, 45th Annual Meeting of the Association for Chemoreception Sciences, Bonita Springs, FL, April 19-22, 2023.
25. Invited Presentation, **Emily A. Gibson**, Baris Ozbay, Omkar Supekar, Gregory Futia, Connor McCullough, Diego Restrepo, Juliet T. Gopinath, Victor M. Bright, Douglas P. Shepherd, Ethan G. Hughes, Cristin G. Welle, “Miniature head-mounted microscopes for two-photon and structured illumination microscopy,” 8th International Workshop on Technologies for Optogenetics and Neurophotonics - OPTOGEN2023, Lecce, Italy, May 10-12, 2023.
26. Invited Presentation, Diego Restrepo, **Emily Gibson**, “Multiphoton Microscopy,” CLEO: Science and Innovations 2023, San Jose, CA, 7–12 May 2023.

**Conference Poster Presentations**

1. Poster presentation, D. Schafer, W. Amir, **E.A. Gibson**, D.W.M. Marr, R. Jimenez, J. Squier, “Multiphoton imaging for three-dimensional characterization of mixing dynamics in a microfluidic device,” Biophysical Society 51st Annual Meeting, Baltimore, MD, Jan 2007.

1. Poster presentation, **Emily A. Gibson**, Zhaochuan Shen, Ralph Jimenez, “Probe of flexibility and conformational heterogeneity in Zn-cytochrome c (Zn-cyt c) folding by Three-Pulse Photon Echo Peak Shift (3PEPS) Spectroscopy,” Biophysical Society 53rd Annual Meeting, Boston, MA, Feb 2009. Abstract 2207-Pos.
2. Poster Presentation, Russell Deitrick, Hamid Razzaghi, **Emily A. Gibson**, “Application of fluorescence correlation spectroscopy to measure high-density lipoprotein (HDL) metabolism,” Biophysical Society 54th Annual Meeting, San Francisco, CA, Feb 2010. Abstract 3902-Pos.
3. Poster presentation, H. Ma, **E. A. Gibson**, P.J. Dittmer, K. Dean, A. E. Palmer, R. Jimenez, “Heterogeneity and Kinetics of FRET-Based Ca2+ and Zn2+ Sensors in HeLa Cells,” Biophysical Society 56th Annual Meeting, San Diego, CA, Feb 2012. Abstract 1052-Pos.
4. Poster presentation, Student Travel Award Winner, Gregory L. Futia, Allison G. Caster, Omid Masihzadeh, Kian Bahbakht, **Emily A. Gibson**, “Micro-Raman of Cancer Cells: Toward Label-Free Sorting of Circulating Tumor Cells from Whole Blood,” Biophysical Society 56th Annual Meeting, San Diego, CA, Feb 2012. Abstract 2999-Pos.
5. Poster presentation, B. Ozbay, J. T. Losacco, **E. A. Gibson**, D. Restrepo, “Development of a portable optical system for in vivo deep-brain neuronal imaging,” Society for Neuroscience Annual Meeting, Session 270 – Optical Methods II, Poster TT71. \*Selected for dynamic poster DP03.09/DP9
6. Poster presentation, Baris N. Ozbay, Greg L. Futia, Ming Ma, Justin T. Losacco, Diego Restrepo, **Emily A. Gibson** “An implantable two-photon fiber-coupled microscope with electrically-tunable focus for applications to awake behaving mouse brain imaging,” Society for Neuroscience Annual Meeting, San Diego, CA, Nov 2016. Session 270 – Optical Methods Development, Poster KKK65.
7. Poster presentation, R. D. Niederriter, B. N. Ozbay, G. L. Futia, D. Restrepo, **E. A. Gibson**, and J. T. Gopinath. "Miniature picosecond diode laser system for two-photon fluorescence imaging of the mouse brain," Society for Neuroscience Annual Meeting, San Diego, CA, Nov 2016. Session 365 - Anatomical Techniques: Circuit Tracing and Staining, Poster MMM37.
8. Poster presentation, Baris N. Ozbay, Greg L. Futia, Ming Ma, Ethan G. Hughes, Diego Restrepo, **Emily A. Gibson** “Three-dimensional imaging of neural activity in freely-behaving mice by a head-mounted two-photon fiber-coupled microscope with electrically tunable focus,” Society for Neuroscience Annual Meeting, Washington, DC, Nov 2017. Session 344 – Large-Scale, Deep, and High-Speed Functional Light Microscopy, Poster VV76.
9. Poster presentation, A. K. Fontaine, M. S. Kirchner, J. H. Caldwell, R. F. Weir, **E. A. Gibson**, "Deep-tissue two-photon imaging in brain and peripheral nerve with a compact high-pulse energy ytterbium fiber laser", SPIE Photonics West BIOS, San Francisco, CA, Feb 2018. Paper 10492-45.
10. Poster presentation, B. N. Ozbay, G. L. Futia, M. Ma, D. Restrepo, **E. A. Gibson**, “Multi-plane two-photon imaging of the piriform cortex in freely-behaving mice,” Society for Neuroscience Annual Meeting, San Diego, CA, Nov 2018. Session 338 - Physiological Methods: Optical Methodology: Development I, Poster LLL9.
11. Poster presentation, Samuel F. Littich, Arjun K. Fontaine, Gregory L. Futia, Nicole L. Arevalo, John H. Caldwell, **Emily A. Gibson**, Diego Restrepo, Richard. F. Weir, “Next Generation Neural Interfaces for Biophotonic Medicine,” Association for Chemoreception Sciences (AChemS), Bonita Springs FL, April 14-17, 2019. Poster PD402.
12. Poster presentation, C. McCullough, M. Ma, D. Ramirez-Gordillo, G. Futia, B. Ozbay, N. Arevalo, D. Restrepo, **E. Gibson**, “Imaging odor associated neural activity in piriform cortex and hippocampus using gradient index lenses,” Society for Neuroscience Annual Meeting, Chicago IL, October 19-23, 2019, Optical Methods: Applications, Poster 703.
13. Poster presentation, Welton, Tarah, Baris Ozbay, Steven Ojemann, Aviva Abosch, Diego Restrepo, and **Emily A. Gibson**. “Initial Development of a GRIN Endoscopic Probe for Neurosurgery.” Society for Neuroscience Annual Meeting, November 11, 2021.
14. Poster presentation, Ramirez-Gordillo, Daniel, Jose Riguero, Ernesto Salcedo, Sondra Bland, Barbara Lyons, **Emily A. Gibson**, Abigail Person, and Diego Restrepo. “Diversity Initiatives by the Odor Plume Neurophotonics (OPeN) Team.” The 7th Annual Brain Initiative Investigators Meeting, Virtual, June 21, 2021.
15. Poster presentation, Fabio Simoes de Souza, Ming Ma, Jose Riguero, Gregory Futia, **Emily A. Gibson**, and Diego Restrepo. “Striking Differences in Decoding Odorant Identity from Ensemble Activity in Dorsal CA1 between Naïve Mice and Mice Undergoing Associative Learning.” The 8th Annual Brain Initiative Investigators Meeting, Virtual, June 21, 2022.
16. Poster presentation, C. McCullough, D. Ramirez-Gordillo, G. Futia, M. Hall, A. K. Moran, **E. Gibson**, D. Restrepo, “Grintrode: a neural implant for simultaneous two-photon imaging and extracellular electrophysiology in head-fixed or freely moving mice,” Neuroscience 2022, San Diego, CA, November 12-16, 2022. Session 496 Poster YY34.
17. Poster presentation, T.A. Welton, A. Fontaine, J.H. Caldwell, S. F. Littich, R. F. Weir, D. Restrepo, **E.A. Gibson**, “Drumbeat Optogenetics: Improving the firing frequency of channelrhodopsin-2,” Neuroscience 2022, San Diego, CA, November 12-16, 2022. Session 331 Poster ZZ17.
18. Poster presentation, Connor McCullough, Gregory Futia, Diego Restrepo, **Emily Gibson**, “Simultaneous fiber-coupled two-photon calcium imaging and extracellular electrophysiology in a freely moving animal,” 9th Annual BRAIN Initiative Meeting, Rockville, MD, June 11-13, 2023.
19. Poster presentation, Vikrant Kumar, Forest Speed, Catherine Saladrigas, Sean Vieau, Omkar Supekar, Victor Bright, Diego Restrepo, Cristin Welle, Juliet Gopinath, **Emily Gibson**, Ioannis Kymissis, “Progress toward a structured illumination miniscope for voltage imaging in freely moving mice,” 9th Annual BRAIN Initiative Meeting, Rockville, MD, June 11-13, 2023.
20. Poster presentation, F. Simoes de Souza, M. Ma, G. Futia, J.P. Crimaldi, A.C. True, **E. Gibson**, D. Restrepo, “Decoding odor plume navigation from neuronal ensemble calcium transients in mouse hippocampal CA1,” 9th Annual BRAIN Initiative Meeting, Rockville, MD, June 11-13, 2023.
21. Poster presentation, T. Welton, S. A. Suarez, N. M. George, B. Ozbay, A. Gentile Polese, G. Osborne, G. L. Futia, J. Kuschner, B. Kleinschmidt-Demasters, A. L. Alexander, A. Abosch, S. Ojemann, D. Restrepo, **E. Gibson**, “Two-photon GRIN microendoscope for stereotactic neurosurgery,” Neuroscience 2023, Washington D.C., November 11-15, 2023.

**Intellectual Property**

Patent # US10634899B2/EP3581983B1 “Optical Imaging Devices and Variable-Focus Lens Elements, and Methods for Using Them,” invented by Juliet T. Gopinath, **Emily A. Gibson**, Victor M. Bright, Richard Weir, Diego Restrepo, Baris Ozbay. (Under license by Intelligent Imaging Innovations, Inc.)

US provisional patent 62/567636, filed 10/6/17, “Methods and systems for imaging with aberration correction,” invented by Juliet Gopinath, Robert Cormack, Mo Zohrabi, **Emily Gibson**, Victor Bright, Omkar Supekar, and Connor McCullough.

US provisional patent 62/637375 and 62/639438, filed March 2018, “Methods and Systems for Stimulated Emission Depletion Microscopy,” invented by Juliet T. Gopinath, Brendan M. Hefferman, Robert Niederriter, Stephanie A. Meyer, Diego Restrepo, **Emily A. Gibson**, Mark Siemens.

US provisional patent 62/724,793, filed August 30, 2018, “Optical Interface For Rapid Volumetric Neural Sensing And Modulation, “ invented by **Emily A. Gibson**, Cristin Welle, Diego Restrepo, Douglas Shepherd, Ioannis Kymissis, Juliet T. Gopinath, Victor M. Bright, Robert H. Cormack.

**RESEARCH ACCOMPLISHMENTS: FUNDING**

**Current Funding (Extramural)**

ECCS-2319406 (Gibson, Restrepo)

09/01/2023-08/31/2026

NSF

*Collaborative Research: NCS-FO: Modified two-photon microscope with high-speed electrowetting array for imaging voltage transients in cerebellar molecular layer interneurons*

Total Costs: $525,000

R01 NS123665 (Gibson, Welle)

09/01/2021-06/30/2024

NIH/NINDS

*Development of 3D-FAST Optical Interface for Rapid Volumetric Neural Sensing and Modulation*

Total Costs: $2,665,761

R01 NS118188 (Caldwell, Gibson and Weir)

09/30/2020 – 07/31/2025

NIH/NINDS

*Optimization of a Minimally-Invasive Bidirectional Optogenetic Peripheral Nerve Interface with Single Axon Read-in & Read-out Specificity*

Total Costs: $2,977,123

DBI1919361 (Gibson, Restrepo)

10/01/2019 – 9/30/2024

NSF

*Collaborative Research: MRI Consortium: Development of Fiber-Coupled Stimulated Emission Depletion Microscopy (STED)*

Total Costs: $401,170

UF1 NS116241 (Restrepo, Gibson)

05/01/2020 – 04/30/2024

NIH/NINDS

*Shedding light on brain circuits mediating navigation of the odor plume in a natural environment*

Total Costs: $2,990,152

BCS1926676 (Restrepo, Gibson, Person)

09/01/2019 – 08/31/2024

NSF

*Collaborative Research: NCS-FR: Shedding light on brain circuits mediating navigation of the odor plume in a natural environment*

Total Costs: $1,550,323

R01DC000566 (Restrepo)

05/01/2018 – 04/30/2024

NIH/NIDCD

*Complex Odor Recognition of the Main Olfactory Bulb*

Role: co-investigator

Total Costs: $3,204,051

R01NS132859 (Hughes)

07/2023 – 06/2028

NIH/NINDS

*In vivo three-photon microscopy of the cortical gray and white matter*

Role: co-investigator

Total Costs: $2,708,549

APP-404113 (Gibson, Restrepo, Welle, Ojemann)

01/19/2021 – 12/31/2023

Advanced Industry Accelerator Program, OEDIT, State of Colorado

*Miniature multiphoton fiber-coupled microscope for non-invasive neuronavigation in deep brain surgeries*

Total Costs: $150,000

**Current Funding (Intramural)**

ABNexus Grant (Gibson, Gopinath)

University of Colorado Anschutz and Boulder

01/01/2023 – 12/31/2023

Total Costs: $125,000

**Previous Funding (Extramural)**

U01NS099577 (Restrepo, Gibson)

09/30/2017-08/31/2022

NIH/NINDS

*Controlled neuronal firing in vivo using two photon spatially shaped optogenetics*

Total Costs: $1,473,966

R21 EY029458 (Welle, Gibson)

09/01/2018-08/31/2021

NIH/NEI

*3D-Fast Optical Interface for Rapid Volumetric Neural Sensing and Modulation*

Total Costs: $476,538

R43MH119879 (Kilborn, Gibson)

04/01/2019 – 03/31/2021

NIH/NIMH

*A compact, modular two-photon fiber-coupled microscope for in vivo all-optical electrophysiology*

Total Costs: $394,260

OT2 OD023852 (Weir, Gibson, Caldwell)

9/24/2016-2/28/2020

NIH/OD SPARC program

*Development of a Bidirectional Optogenetic Minimally Invasive Peripheral Nerve Interface with single axon read-in & read-out specificity*

Total Costs: $2,147,989

CBET-1631912 (Gibson, Restrepo)

08/01/2016-07/31/2020

*NCS-FO: Collaborative Research: Rebuilding neural pathway function using miniature integrated optics for neuron-level readout and feedback*

Total Costs: $600,000

DBI-1337573 (Gibson, Restrepo)

09/01/2013 – 08/31/2018

NSF

*MRI Development of a Fast P3D-STED Microscope*

Total Costs: $1,050,000

IIP-1602128 (Gibson, Restrepo, Bright, Gopinath)

06/01/2016-12/31/2018

NSF

*Proof-of-concept fiber-based miniature multiphoton microscope using adaptable optics*

Total Award Amount: $200,000

DBI-1353757 (Gopinath, Bright, Gibson, Restrepo)

04/01/2014 - 03/31/2018

NSF

*IDBR Type A: Miniaturized Two-photon Microscopy for Deep Brain Imaging: an Integrated Circuit Design Using Electrowetting Optics*

Total Costs: $945,874

Colorado Bioscience Discovery Evaluation Grant (Gibson, Lei, Kahook, Ammar)

01/01/2011 – 07/01/2012

*In vivo imaging of the eye using multi-photon optics for diagnosis and monitoring of disease*

Total Costs: $174,707

S10 RR023381-01A2 (Restrepo)

NIH

7/1/2010-6/30/2013

*Acquisition of tunable wavelength STimulated Emission Depletion (STED) microscope*

Role: Co-Investigator

Total Costs: $467,942

N66001-10-1-4035 (Gibson)

7/1/2010 - 6/30/2013

Defense Advanced Research Projects Agency (DARPA) Young Faculty Award

*Integration of Microfluidic Devices with Nonlinear Spectroscopy for Flow Cytometry and Bioagent Detection*

Total Costs: $297,117

Colorado Bioscience Discovery Evaluation Grant (Gibson, Lei)

01/01/2009 – 08/20/2012

*A microfluidic cell sorter integrated with Coherent Anti-Stokes Raman Spectroscopy for medical diagnostics*

Total Costs: $190,000

**Previous Funding (Intramural)**

CU Denver Faculty Development Grant (Gibson)

06/01/2013 – 05/31/2014

*Non-invasive multiphoton imaging of the eye*

Total Costs: $10,000

**TEACHING**

**Undergraduate Courses**

*Department of Physics, University of Colorado Denver*

* Thermal Physics, PHYS 3411, 3 credits
* General Physics II: Calculus based, PHYS 2331, 3 credits
* Biophysics of the Cell, PHYS 3451, 3 credits elective

*Department of Bioengineering, University of Colorado Denver, Anschutz Medical Campus*

* Biostatistics, BIOE3060, 3 credits

**Graduate Courses**

*Department of Bioengineering, University of Colorado Denver, Anschutz Medical Campus*

* Technology for Bioengineers I, BIOE 5030, 3 credits, co-taught
* Technology for Bioengineers II, BIOE 5031, 3 credits, co-taught
* Quantitative Methods, BIOE 5020, 3 credits, co-taught
* Numerical Methods, BIOE 5021, 3 credits
* Optics and Microscopy, BIOE 4053/5053, 3 credits

**Courses Developed**

* Biostatistics, BIOE 3060
* Technology for Bioengineers I, BIOE 5030, co-taught
* Technology for Bioengineers II, BIOE 5031, co-taught
* Quantitative Methods, BIOE 5020, co-taught

**Courses Significantly Modified**

* Optics and Microscopy, BIOE 4053/5053
* Biophysics of the Cell, PHYS 3451
* Thermal Physics, PHYS 3411

**MENTORING**

**Postdoctoral fellows**

2010-2012 Allison Caster, *currently Teaching Assoc. Professor, Dept. of Chemistry, Colorado School of Mines, Golden CO*

2010-2013 Omid Masihzadeh, *currently Optical Scientist, Apple, Boulder CO*

2013-2016 Mariana Potcoava, *currently Research Professor, University of Illinois Chicago*

**Ph.D. students**

2011-2017 Gregory Futia

Thesis: “Circulating Tumor Cells: Mathematical Theory of Detectability with

Simulations and Experimental Results in a Model System”

*Awarded an NIH TL1 predoctoral training fellowship by the Colorado Clinical and Translational Sciences Institute*

Current Position: Senior Research Associate, University of Colorado Anschutz Medical Campus, Aurora, CO

2010-2017 Baris Ozbay (co-mentor Diego Restrepo)

Thesis: “Fiber-coupled Microscopy for 3D Neuronal Imaging”

*Winner of the Graduate School Outstanding Dissertation Award*

Current Position: Research Scientist, Intelligent Imaging Innovations, Inc., Denver, CO

2016-2022 Connor McCullough (co-mentor Diego Restrepo)

Thesis: “Simultaneous electrophysiology and optical recording of neuronal activity”

*Winner of the Outstanding Graduate Student Award, College of Engineering, Design, and Computing*

Current Position: Post-doc, University of Colorado Anschutz Medical Campus

2020-present Tarah Welton (co-mentor Diego Restrepo)

Research project: Theoretical models of opsin photocycles and spatially selective photoactivation for enhancing firing rates for action potentials in peripheral nerves

2022-present Forest Speed (co-mentor Diego Restrepo)

Research project: Design of custom structured illumination microscope for improved voltage imaging *in vivo* and studies of neural activity in the hippocampus.

2022-present Skylar Suarez (co-mentor Diego Restrepo)

Research project: Multiphoton imaging of brain tissue for guided neurosurgery

2023-present Kira Steinke (co-mentor Diego Restrepo)

Research project: Hippocampal engrams associated with odor discrimination.

**M.S. students**

2015-2017 Andrew Challinor

Thesis: “Optical Coherence Tomography for Brain Tissue Analysis”

2018-2020 Gabriel Martinez (co-mentor Douglas Shepherd)

Thesis: “Widefield Fluorescence Optical Sectioning Microscopy in a Miniature Fiber-Coupled Microscope with Active Axial Scanning”

2019-2020 Tarah Welton (co-mentor Diego Restrepo)

Thesis title: “Development of a GRIN Endoscope Probe for Neurosurgery”

2020-2023 Carly Meador

Thesis title: “Development of a miniature portable confocal microscope”

**Undergraduate Students**

|  |  |
| --- | --- |
| Summer 2011 | Justin Brantley, Department of Mechanical Engineering, New Mexico State University, *BRAiN\* program* |
| Summer 2013 | Jessica Aughenbaugh, Department of Chemical Engineering, New Mexico State University, *BRAiN program* |
| 2015-2016 | Thomas Fox, Department of Bioengineering, CU Denver, *funded by UROP\*\* program and NSF Veterans Supplemental Award, winner of the Outstanding Bioengineering Undergraduate Student Award* |
| Summer 2016 | Katie Novotny, Department of Applied Physics, Stanford University |
| Summer 2016 | Josi Gabaldon, New Mexico State University, *BRAiN program* |
| Summer 2016 | Melissa Kallander, Department of Biomedical Engineering, Northwestern University |
| Summer 2017 | Emma Franz, Department of Physics, Colorado School of Mines, *funded by an NSF research experience for undergraduates (REU) award* |
| Summer 2018 | Gabriel Martinez, Department of Bioengineering, CU Denver, *BRAiN program* |
| Summer 2022 | Ryan Suckow, Department of Biology, CU Denver, *SRTP# student* |
| Summer 2022 | Gabriela Paredes, University of Denver, *SRTP# student* |
| Summer 2023 | Masha Osovskaya, Department of Bioengineering, Rice University |

*Department of Physics, Univ. of Colorado Denver*

|  |  |
| --- | --- |
| 2009-2010 | Russell Deittrick, Department of Physics, CU Denver |
| 2009-2010 | Baris Ozbay, Department of Electrical Engineering, CU Denver, *winner of the Outstanding Undergraduate Student Award in Electrical Engineering* |
| Fall 2009 | Nick Sanchez, Department of Physics, CU Denver, Senior Design Project Advisor |
| 2009-2010 | Alex Jones, Department of Physics, CU Denver, *funded by UROP* |
| Spring 2010 | Basel Attiya, Department of Physics, CU Denver, *undergraduate internship program* |

**High School Students**

Summer 2012 Chloe Vasilakis (Denver STaRS\*\*\* program)

Summer/Fall 2014 Nathan Lepore (Denver STaRS program)

Spring 2016 Abtin Molavi (Denver STaRS program)

Fall 2016 Luis Macias-Flores (Denver STaRS program)

Spring/Summer 2018 Landon Menuey (Denver STaRS program)

\*Building Research Achievement in Neuroscience (BRAiN), a blueprint ENDURE program (NIH award R25NS080685, PI D. Restrepo).

\*\*CU Denver Undergraduate research opportunity program (UROP).

\*\*\*Student Training in Research Science (STaRS) Program, a partnership between the University of Colorado, Colorado Clinical and Translational Sciences Institute (CCTSI) and the Office of Inclusion and Outreach at the Anschutz Medical Campus. CCTSI is supported in part by Colorado CTSA Grant UL1 TR001082 from NCATS/NIH.

#Summer Research Training Program (SRTP), initiated by graduate and MD/PhD students aimed at creating opportunities for undergraduate students who have been historically underrepresented in science.

**Thesis Committees**

**Ph.D. Candidates**

*Department of Bioengineering, CU Denver*

2013 - 2017 Arjun Fontaine (Advisor: Richard Weir)

2013 - 2017 Matthew Westacott (Advisor: Richard Benninger), *committee chair*

2016 – 2020 David Ramirez (Advisor: Richard Benninger)

2016 – 2020 Cecilia Clark (Advisor: Cathy Bodine), *committee chair*

2017 - 2022 Jaeann Dwulet (Advisor: Richard Benninger)

2022 – present Claire Levitt (Advisor: Richard Benninger)

2022 – present Michael O’Donnell (Advisor: Richard Weir)

2022 - present Erin Radcliffe (Advisor: John Thompson)

2023 – present Mikala Mueller (Advisor: Chelsea Magin)

**Ph.D. Candidates**

*Neuroscience Program, CU Anschutz Medical Campus*

2016 – 2020 Justin Losacco (Advisor: Diego Restrepo)

2021 - 2023 Michael Thornton (Advisor: Ethan Hughes)

2021 - present Michael Stockton (Advisor: Ethan Hughes)

**Ph.D. Candidates**

*Department of Mechanical Engineering, CU Boulder*

2018 – 2019 Omkar Supekar (Advisor: Victor Bright)

**M.S. Candidates**

*Department of Bioengineering, CU Denver*

2013 – 2014 Christopher Wood (Advisor: Richard Benninger)

2015 – 2016 Rachel Kolb (Advisor: John Thompson)

2016 - 2017 Nurin Ludin (Advisor: Richard Benninger)

2018 - 2020 Sam Littich (Advisor: Richard Weir)

2020 - 2021 Sam Henehan (Advisor: Natalie Serkova)

2020 - 2022 Sean Hansen (Advisor: Cristin Welle)

2021 - 2022 Miguel Parra (Advisor: John Thompson)

2022 - 2023 Jonathan Platt (Advisor: John Thompson)

2022 – 2023 Jannika Machnik (Advisor: John Thompson)