REGINA F. ECKERT

https://reginaeckert.net/

EDUCATION

University of California, Berkeley — 3.961 GPA
Ph.D. Electrical Engineering and Computer Sciences
August 2021
M.S. Electrical Engineering and Computer Sciences
December 2019

University of New Mexico — 4.20 GPA
B.S. Electrical Engineering
May 2015, Summa Cum Laude

EMPLOYMENT & RESEARCH EXPERIENCE

1/2022 – *present* — Postdoctoral Fellow at NASA Jet Propulsion Laboratory

- Researching novel atmospheric correction algorithms for remote sensing imaging spectroscopy platforms, including AVIRIS Next Gen, AVIRIS-III, EMIT, and SBG
- Validation of remote retrievals through ground-based field spectroscopy
- Calibration for Earth-facing airborne instrument AVIRIS-III and the Mapping Imaging Spectrometer for Europa (MISE) on NASA's Europa Clipper

8/2015 – 8/2021 — Graduate Student Researcher at the University of California, Berkeley
Computational Imaging Lab, advised by Prof. Laura Waller

- Designed, built, and analyzed a novel 3D refractive index microscope that utilizes measurement diversity to decrease data requirements for expanded 3D phase imaging capabilities for biological researchers
- Optimized measurement schemes for 3D imaging using state-of-the-art end-to-end, physics-based machine learning to expand 3D phase imaging capabilities and understanding
- Increased robustness of Fourier ptychographic optical microscopes and algorithms for improved phase imaging by developing a novel image processing algorithm
- Analyzed models for light propagation through scattering media to uncover trade-offs between accuracy and computational feasibility

6/2018 – 8/2018 — Technical Intern at Apple Inc.

- Modeling of optical propagation for developing systems
- Analysis of data processing methodologies

8/2014 – 5/2015 Honors Research Student at the University of New Mexico's Center for High Technology Materials (CTHM) Mid-Infrared Imaging Characterization and Application (MICA) Laboratory

- Hardware implementation of compressive sensing algorithm for a sensor with pixel-specific bias-dependent responsivity

1/2012 – 7/2015 Technical Intern at Sandia National Laboratories: Monitoring Systems Center

Advanced Sensing Technologies (3/2014 – 7/2015)

- Created tests, models, and a tuning plan for next-generation satellite sensing technology

Ground-Based Monitoring (1/2012 – 8/2012, 3/2013 – 3/2014)

- Researched waveform correlation techniques relating to seismic signal processing for verification of the Comprehensive Nuclear Test Ban Treaty

LEADERSHIP EXPERIENCE

11/2016 – 8/2021 Co-founder, President, & Member of Bias Busters student organization, which promotes Diversity, Equity, and Inclusion (DEI) in STEM

- Created implicit bias and bystander intervention workshop with Bias Busters team based on social science research and focus groups with community members
- Co-taught 18 of 34 organization-sponsored bias workshops to faculty, staff, and students across UC Berkeley, including at the Western Electrical and Computer Engineering Department Chairs Meeting in 2019; Electrical Engineering and Computer Sciences (EECS) graduate student orientation; EECS graduate admissions reader orientation; and College of Engineering new faculty orientation
- Coordinated Reframing Tech Speaker Series, which brought speakers from diverse backgrounds to discuss actionable ways to improve STEM climate
- Organized discussion events around current issues
- Worked with faculty and staff around for structural changes in the EECS department to promote DEI
- Received 2019 EECS Demetri Angelakos Memorial Achievement Award in recognition of these efforts

6/2020 – 12/2020 Advisory Board Member for new EECS course on anti-racist engineering

- Helped form advisory board of experts in history, data science, and environmental engineering and EECS to assist in course development around integration of critical race theory and engineering practices

10/2019 – 8/2021 Member of Berkeley Science Policy Group

- Coordinated "AI & Facial Recognition: Policy for a new era of privacy" Public Forum and Policy Roundtable, fostering discussion between STEM scientists, social scientists, and the public

1/2019 – 5/2019 Head Content Graduate Student Instructor for Introductory Electrical Engineering course at University of California, Berkeley EECS

- Managed 11 student and faculty instructors in the creation of discussion material, homework, and exams for ~750 students
- Received Outstanding Graduate Student Instructor Award in recognition of these efforts

1/2017 – 6/2017 Sculpted Light in the Brain Conference Organizer

- Helped organize conference speakers and logistics, to foster collaboration between optical researchers and neuroscientists

10/2016 – 5/2017 Photobears (UC Berkeley's combined student organization for the International Society for Optics and Photonics (SPIE), Optical Society of America (OSA), & IEEE Photonics Society) Outreach Coordinator

- Led volunteer efforts to create and teach a lesson about optics and light at an under-served elementary school in Oakland, CA

8/2016 – 5/2017 Women in Computer Science and Engineering Social Chair

- Coordinated social events to build community and enhance professional development for women graduate students in the EECS department

8/2014 – 5/2015 Tau Beta Pi Engineering Honor Society New Mexico Beta President

- Worked to build up struggling Tau Beta Pi chapter with focus on including community service events

JOURNAL PUBLICATIONS

R. Eckert, S. Mauceri, P. G. Brodrick, J. Fahlen, D. R. Thompson, "Spatially Constrained Retrieval for Imaging Spectroscopy." *(in preparation)*

D. R. Thompson, N. Bohn, P. G. Brodrick, N. Carmon, M. L. Eastwood, **R. Eckert**, C. Fichot, J. P. Harringmeyer, H. M. Nguyen, M. Simard, A. K. Thorpe, "Atmospheric Lengthscales for Global VSWIR Imaging Spectroscopy," *Journal of Geophysical Research: Biogeosciences*, 127, e2021JG006711 (2022). https://doi.org/10.1029/2021JG006711

R. Eckert, "Robust 3D Quantitative Phase Imaging," PhD Thesis, EECS Department, University of California, Berkeley, Tech. Rep. UCB/EECS-2022-29, May 2022. https://www2.eecs.berkeley.edu/Pubs/TechRpts/2022/EECS-2022-29.html

R. Eckert, R. Cao, D. Ren, S. Chowdhury, M. Ziemczonok, and L. Waller, "Measurement diversity for improved 3D refractive index microscopy." *(in preparation)*

R. Cao, M. Kellman, D. Ren, **R. Eckert**, and L. Waller, "Self-calibrated 3D differential phase contrast microscopy with optimized illumination," *Biomed. Opt. Express* 13, 1671-1684 (2022). https://doi.org/10.1364/BOE.450838

S. Chowdhury, M. Chen, **R. Eckert**, D. Ren, F. Wu, N. Repina, and L. Waller, "High-resolution 3D refractive index microscopy of multiple-scattering samples from intensity images," *Optica* 6, 1211-1219 (2019). https://doi.org/10.1364/OPTICA.6.001211

T. Aidukas, **R. Eckert**, A. R. Harvey, L. Waller, P. C. Konda. "Low-cost, sub-micron resolution, wide-field computational microscopy using opensource hardware." *Nature Scientific Reports* Volume 9, Article number: 7457 (2019). https://www.nature.com/articles/s41598-019-43845-9

R. Eckert, Z. F. Phillips, L. Waller, "Efficient illumination angle self-calibration in Fourier ptychography." *Applied Optics* 57, 5434-5442 (2018). https://doi.org/10.1364/AO.57.005434

CONFERENCE PUBLICATIONS

R. Eckert, D. Ren, M. Chen, E. Bostan, and L. Waller, "Pupil coding for increased measurement diversity in 3D Fourier ptychography," *Imaging and Applied Optics 2019,* OSA Technical Digest (Optical Society of America, 2019), paper CW3A.1. https://doi.org/10.1364/COSI.2019.CW3A.1

S. Chowdhury, **R. Eckert**, M. Chen, and L. Waller, "High-resolution 3D Phase Microscopy from Intensity," in *Biophotonics Congress: Biomedical Optics Congress 2018,* OSA Technical Digest (Optical Society of America, 2018), paper MF3A.5. https://doi.org/10.1364/MICROSCOPY.2018.MF3A.5

R. Eckert, N. Repina, M. Chen, Y. Liang, R. Ng, L. Waller, "Modeling Light Propagation in 3D Phase Objects," in *Imaging and Applied Optics 2017*, OSA Technical Digest (Optical Society of America, 2017), paper DW2F.2. https://doi.org/10.1364/3D.2017.DW2F.2

Z. F. Phillips, **R. Eckert**, and L. Waller, "Quasi-Dome: A Self-Calibrated High-NA LED Illuminator for Fourier Ptychography," in *Imaging and Applied Optics 2017,* OSA Technical Digest (Optical Society of America, 2017), paper IW4E.5. https://doi.org/10.1364/ISA.2017.IW4E.5

R. Eckert, L. Tian, L. Waller, "Algorithmic Self-calibration of Illumination Angles in Fourier Ptychographic Microscopy," in *Imaging and Applied Optics 2016*, OSA Technical Digest (Optical Society of America, 2016), paper CT2D.3. https://doi.org/10.1364/COSI.2016.CT2D.3

CONFERENCE PRESENTATIONS

R. Eckert, P. Brodrick, S. Mauceri, J. Fahlen, R. O. Green, M. L. Eastwood, M. Helmlinger, D. R. Thompson, "Spatially Constrained Imaging Spectroscopy Retrievals," 12th EARSeL Workshop on Imaging Spectroscopy (2022). https://is.earsel.org/workshop/12-IS-Potsdam2022/programme/final-programme/

R. Eckert (invited talk), "Measurement diversity for 3D refractive index microscopy," CVPR Computational Cameras and Displays (CCD) Workshop (2021).

R. Eckert, M. R. Kellman, L. Waller, "Physics-based learning for measurement diversity in 3D refractive index microscopy," *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXVII*. Vol. 11245. International Society for Optics and Photonics (2020). https://doi.org/10.1117/12.2543402

R. Eckert, M. Chen, L. H. Yeh, L. Waller, "3D phase imaging for thick biological samples," *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXVI*. Vol. 10883. International Society for Optics and Photonics (2019). https://doi.org/10.1117/12.2516567

R. Eckert, Y. Daghighi, H. Taylor, L. Waller, "3D Fourier pytchography in scattering media." *Focus on Microscopy* (2018). http://www.focusonmicroscopy.org/2018/PDF/1127_Eckert.pdf

R. Eckert, K. Monakhova, Z.F. Phillips, Y. Zhang, L. Tian, L. Waller. "Advances in 3D Fourier Ptychography." *International Conference on Computational Photography* (2017). http://iccp2017.stanford.edu/index.php/posters-and-demos/

POLICY WHITE PAPERS

C. Jackson, M. Livingston, V. Velan, E. Lee, K. Huynh, & **R. Eckert**. "Establishing Privacy Advisory Commissions for the Regulation of Facial Recognition Systems at the Municipal Level." *UC Berkeley: Science Policy Group*. (2020). https://escholarship.org/uc/item/7qp0w9rn

PROGRAMMING LANGUAGES

Python, MATLAB, C++

AWARDS & HONORS

2022	EARSeL Young Scientist Second Place Best Speaker
2020	Rising Stars in EECS 2020 Participant
2020	UC Berkeley Nominee for the Schmidt Science Fellows Program
2020	Outstanding Graduate Student Instructor Award
2019	Imaging and Applied Optics COSI Outstanding Student Paper Award
2019	Demetri Angelakos Memorial Achievement EECS Student Award
2016	National Science Foundation Graduate Research Fellowship Recipient
2015	Berkeley Graduate Fellowship Recipient
2015	George E. Breece Memorial Prize for Highest GPA of the School of Engineering Graduating Class the of Spring 2015
2015	New Mexico Society of Professional Engineers UNM Outstanding Student in Electrical Engineering
2015	UNM Nominee for the Rhodes and Marshall Scholarships
2013-15	UNM Outstanding Student in Electrical & Computer Engineering
2011	National Merit Scholarship Finalist
2011	Sandia High School Valedictorian

ORGANIZATIONS & COMMUNITY INVOLVEMENT

2019-21	Berkeley Science Policy Group Member

2016-21	Bias Busters Co-founder, President, Vice President, & Member
2018	Computing Research Association Grad Cohort for Women Attendee
2017	Richard Tapia Celebration of Diversity in Computing Presenter
2017	Sculpted Light in the Brain Conference Organizer
2016-17	Women in Computer Science and Engineering Social Chair
2016-17	Photobears (SPIE, OSA, IEEE Photonics Society) Outreach Coordinator
2016-17, 2019	Richard Tapia Celebration of Diversity in Computing Attendee
2015-19	Electrical Engineering Graduate Student Association Outreach Volunteer
2015-19	SPIE, OSA, IEEE Photonics Society Member
2014-15	Tau Beta Pi Engineering Honor Society NM Beta President
2014-19	Eta Kappa Nu Honor Society Member
2013-19	Institute of Electrical and Electronics Engineers Member