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EDUCATION & WORK

- **Princeton University: Postdoc in observational cosmology** Princeton, NJ
Department of Astrophysical Sciences Sept 2024 - present
- **Stanford University** Palo Alto, CA
Ph.D. & M.S. in Physics Aug 2018 - Aug 2024
- **University of Texas at Austin** Austin, TX
Bachelor of Aerospace Engineering / Astronomy Minor with highest honors Aug 2014 - May 2018
- **Research assistant in weak lensing and cosmology:** Stanford University, 2018-2024
- **Field engineering intern in RF, communications, systems engineering:** USG, 2016-2018
- **Research assistant in orbital mechanics and image simulation:** University of Texas, 2016-2018

RESEARCH HIGHLIGHTS

The Dark Energy Survey (DES) Year 3 Analysis

- Led redshift calibration for survey image simulations and characterized uncertainty across tomographic bin variations, measuring shear bias with redshift dependence to interpret state-of-the-art weak lensing cosmology results (see [MacCrann, Becker, McCullough+ 2022](#)).
- Piloting a cosmology analysis demonstrating proof of concept for *blue galaxy* cosmic shear, which reduces impact of intrinsic alignment as well as tension with early universe probes (see [McCullough, Amon, Legnani+ 2024](#)).

The Dark Energy Spectroscopic Instrument (DESI)

- Advising a student to lead the direct measurement of intrinsic alignment in the DESI-Y1 spectroscopic galaxies with lensing shape measurements (KiDS+HSC+DES) (Siegel & McCullough, in prep).
- Pioneered a secondary survey of galaxy spectroscopic redshift measurements to optimize weak lensing photometric redshifts (distance estimation) and cosmology (see [McCullough+ 2023](#)).
- Co-leading the photo-z topical group (~30 people) in the DESI Clustering, Clusters, and Cross-Correlations working group to organize and enable the creation of an unbiased, high confidence catalog for photometric redshift calibration in weak lensing surveys (e.g., Ratajczak+, in prep) and drive DESI-II proposal efforts.

The 4-metre Multi-Object Spectroscopic Telescope (4MOST)

- Co-Principal Investigator for an accepted community survey that aims to calibrate the complete color-redshift relation for future surveys down to $z < 1.55$ with high multiplicity of spectra (see 4C3R2, [Gruen & McCullough+ 2023](#), McCullough+, in prep).
- Project office member planning and selecting targets for an ambitious galaxy evolution survey that will fully describe galaxy populations in the nearby universe ($z < 0.2$) (see [WAVES](#)).

The Legacy Survey of Space and Time (LSST)

- Spearheading a novel approach for intrinsic alignment modeling that is driven by color-magnitude-redshift dependent priors from direct observations (McCullough+, in prep).

TALKS

Given dozens of talks on topics spanning cosmology, weak lensing, machine learning, spectroscopic surveys, and photometric redshifts. Listed here are a subset of notable presentations and their audiences.

Selected conference talks

- *(Invited) Designing a redshift calibration sample for future WL* DESI conf., 7/24
- *(Invited) Cosmic shear and intrinsic alignment in color* DES conf., 10/23
- *(Invited) Plenary: Photometric redshift topical group report* DESI conf., Durham, 07/23
- *(Invited) DESI-II: Training on visual inspection of spectra* DESI conf., Durham, 07/23
- *Color-redshift relationship calibration needs for Euclid and LSST* WST conf., Vienna, 05/23
- *(Invited) 4MOST complete calibration of the color-redshift relation* DESC conf., 03/23
- *(Invited) Spectroscopic follow-up for mapping structure* Cambridge, 07/22
- *(Invited) The role of DESI in photo-z inference for stage IV cosmology* APS conf., 04/22
- *(Invited) Plenary: DESI calibration of the color-redshift relation* DESI conf., 12/21

Selected seminars/colloquia

- *Cosmic shear with blue DES galaxies* DESC WL-LSS, 10/24
- *Astrophysical seminar: Scientific communication* Princeton, 10/24
- *Charting cosmic structure* Stanford, 07/24
- *4MOST and weak lensing with stage IV cosmology* Photo-z WG, DESC, 07/23
- *Spectroscopic searches and weak lensing cosmology* USM, 06/23
- *4MOST complete calibration of the color-redshift relation* Euclid collab., 02/22
- *The redshift distribution: In the context of DES, DESI, & future surveys* LMU Munich, 11/21
- *Needs of future weak lensing surveys: Blending, redshifts and their intersection* JPL, 08/21
- *Dark energy survey year 3: Large scale structure & weak lensing results* SLAC, 06/21

LEADERSHIP, AWARDS, AND TELESCOPE TIME

- **Co-PI:** successful proposals for 980k+ fiber-hours on ground-based spectroscopic instruments
- **Co-lead:** for the photometric redshift topical group in DESI, 2023-
- **Mentor & co-advisor:** to graduate students studying survey science & cosmology, 2021-
- **Early Career Scientist Liason:** to the Diversity, Equity, and Inclusion committee in DESI, 2024-
- **Deutscher Akademischer Austauschdienst (DAAD) Fellow:** LMU/USM Munich, 2021-2022
- **Stanford EDGE Fellow:** Stanford University, 2018-2024
- **T.W. Whaley Scholar:** Full-ride award, University of Texas, 2014-2018
- **Distinguished College Scholar:** University of Texas, Cockrell School of Engineering, 2014-2018
- **National Merit Scholar:** 2014

PUBLICATION RECORD (SEE [ADS](#))

Authored/coauthored >50 papers in peer-reviewed journals with ~3000 citations (h-index of 25). See the attached list of major publications.

TEACHING AND MENTORING EXPERIENCE

- Mentor for Jared Siegel, graduate student *Princeton, 2024-present*
- Mentor for Moritz Gammel, B.S. and M.S. *LMU/USM, 2021-present*
- Mentored Tom Liu, rotation project *Stanford, 2020*
- Guest Lecturer, Seminar in Astrophysics (graduate) *Princeton, 2024*
- TA, Observational and instrumental astrophysical lab (graduate) *LMU/USM, 2023*
- TA, Essentials of advanced astrophysics (graduate) *LMU/USM, 2021*
- TA, Physics 16: Origin and development of the cosmos (undergraduate) *Stanford, 2020*
- TA, Physics 100: Introduction to observational astronomy (undergraduate) *Stanford, 2019*

SCIENCE OUTREACH & SERVICE

- **Peer Reviewer:** *Astronomy & Astrophysics*, DESI Collaboration
- **Convener:** Princeton Survey Science Seminar, 2024-present
- **Member:** Early Career Science Committee in DESI, 2024-present
- **Princeton Public Observing:** Volunteer for outreach, 2024-present
- **KIPAC:** Volunteer for outreach, Stanford, 2023
- **SAGE-S:** Camp volunteer, observatory guide, star party emcee and speaker to high-school girls interested in STEM careers, summers 2020-2022
- **Stanford Physics Identity and Equity (PIE):** Mentor and resource to assist undergraduates across the country with their graduate school applications, 2021-2023
- **GSAPP:** Mentor for incoming graduate students in applied physics and physics, Stanford, 2021-2024
- **EDGE:** Mentor for incoming doctoral students from diverse backgrounds, Stanford, 2021-2023
- **Women in Aerospace for Leadership and Development (WIALD):** Mentor and project team lead, University of Texas, 2014-2018
- **Tour Guide:** NASA Johnson Space Center (JSC), 2015