SARAH STEIGER

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My work focuses on improving high-contrast imaging performance through the development of new techniques and instrumentation.

PROFESSIONAL APPOINTMENTS

Space Telescope Science Institute August 2023 - present
STScI Postdoctoral Fellow

EDUCATION

University of California, Santa Barbara June 2023
Ph.D., Physics – Astrophysics Emphasis
Department of Physics

Boston College May 2017
Bachelor of Science (B.S.), Physics Cum Laude
Minor in Mathematics

RESEARCH EXPERIENCE

University of California, Santa Barbara Department of Physics July 2017 - Present
Graduate Research
High-Contrast Imaging with the MKID Exoplanet Camera (MEC) *Santa Barbara, CA*

- Lead MEC operator for 20+ engineering and science nights behind SCExAO at the Subaru Telescope.
- Wrote a Stochastic Speckle Discrimination (SSD) module to leverage the timing ability of MKID detectors to separate starlight and companion signals using only photon arrival time statistics.
- Discovered a low mass stellar companion to the nearby A star HIP109427 with SCExAO/MEC and SSD.
- Developed The MKID Pipeline, an open-source data reduction and analysis pipeline for current and future UVOIR MKID instruments.

Boston College Department of Physics August 2016 - May 2017
Undergraduate Research
Nanoscale Synthesis of Topological Materials using Molecular Beam Epitaxy *Chestnut Hill, MA*

- Prepared samples on which to grow topological insulators using Molecular Beam Epitaxy (MBE).
- Characterized material growth using Reflection High-Energy Electron Diffraction (RHEED).
- Utilized the Boston College Clean Room and NanoFabrication Facility to perform photolithography of nano-structures on porous alumina.
- Performed Scanning Electron Microscopy (SEM) to characterize samples of nanocoax sensors.

TEACHING EXPERIENCE

Adjunct Faculty August 2022 - June 2023
Santa Barbara City College Department of Earth and Planetary Sciences

- ERTH 103A: Observational Astronomy Lab.
- Utilized the Santa Barbara Museum of Natural History planetarium to illustrate key concepts in observational astronomy such as celestial motion, astronomical coordinate systems, and seasonal constellations.
- Led students in the use of their own Celestron 5SE 5-inch telescopes and performed demonstrations using the 20-inch RCOS Ritchey-Chrétien Telescope for on-sky observations of planets, stars, and deep sky objects.

Teaching Assistant September 2017 - June 2018
University of California, Santa Barbara

- PHYS 3L. Introductory Physics Laboratory.
- PHYS 134L: Observational Astrophysics.
- PHYS 128L. Advanced Experimental Physics

AWARDS AND HONORS

STScI Postdoctoral Fellowship, Winter 2023

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Mananya Tantiwiwat Fellowship, Fall 2020

Worster Fellowship, Summer 2019

UCSB Physics Department Service Award, Spring 2019

UCSB Physics Chair's Outstanding Service Award, Spring 2018

UCSB Physics Outstanding Teaching Assistant Award, Spring 2018

Boston College George J. Goldsmith Award, Spring 2017

OUTREACH AND MENTORSHIP

Astronomy Programming Volunteer July 2021 - June 2023
Santa Barbara Museum of Natural History

- Perform docent duties in the Space Sciences Hall that include providing scientific background for exhibits and answering guest questions.
- Twice a month give solar observing demonstrations at the on-site Palmer Observatory.
- Host six public planetarium shows per month.

Worster Summer Fellowship Graduate Student Mentor June 2019 - October 2019
University of California, Santa Barbara

- Mentored an undergraduate student (now a Ph.D. student in the Stanford University Physics Department) in the use of the UCSB NanoFabrication Facility and our own AJA Sputter system to test the effects various substrate cleaning methods on deposited superconducting film quality.

· Assisted mentee with the preparation of an end of year public presentation on the research project.

Osterbrock Sierra Conference Local Organizing Committee July 2019 - July 2021
University of California, Santa Barbara

· Organizing committee member for a 20-50 person (year depending) graduate student run conference located in the California Sierra Mountains.
· Coordinated food, lodging, activities, and transportation for the 5-10 UCSB conference attendees.

UCSB Physics GradLife President/Communications Officer June 2018 - January 2020
University of California, Santa Barbara

· Served as a Physics Department representative at monthly UCSB Graduate Student Association meetings.
· Organized graduate student lunches with visiting colloquium speakers.
· Designed and distributed a monthly graduate student newsletter highlighting campus and department events of interest.
· Instituted a seminar for incoming physics graduate students on the mental health resources available on campus

UCSB Women and Gender Minorities in Physics Officer October 2018 - January 2022
University of California, Santa Barbara

· Served as club liaison with the UCSB Physics Department Climate Task Force attending bimonthly meetings and representing Women and Gender Minorities in Physics (WaGMiP) issues.
· Organized a day of WaGMiP events as part of the broader UCSB prospective graduate student visit day.

PROFESSIONAL PRESENTATIONS

SPIE Astronomical Telescopes and Instrumentation June 2024
Yokohama, Japan

· Contributed Talk: Simulated performance of energy-resolving detectors towards exoplanet imaging with the Habitable Worlds Observatory.

In the Spirit of Lyot 2022 June 2022
Leiden, Netherlands

· Contributed Talk: The MKID Exoplanet Camera (MEC) for Subaru SCExAO: Using Stochastic Speckle Discrimination for High-Contrast Imaging with The MKID Pipeline.

SPIE Optics and Photonics August 2021
San Diego, CA

· Contributed Talk: On-sky demonstration of stochastic speckle discrimination for companion detection with the MKID Exoplanet Camera (MEC).

19th International Workshop on Low Temperature Detectors (LTD-19) July 2021
Virtual

· Contributed Talk: Discovery of a Low Mass Stellar Companion to HIP 109427 Using Stochastic Speckle Discrimination with The MKID Exoplanet Camera.

University of California, Santa Cruz PLunch April 2021
Virtual

· Invited Talk: Using Stochastic Speckle Discrimination to Uncover Directly Imaged Companions with SCExAO and the MKID Exoplanet Camera.

Subaru Users Meeting March 2021
Virtual

· Poster: SCExAO/MEC and CHARIS Discovery of a Low Mass 6 au Separation Companion using Stochastic Speckle Discrimination and High Contrast Spectroscopy.

Exoplanets in Southern California September 2020
Virtual

· Contributed Talk: High Contrast Imaging with the MKID Exoplanet Camera (MEC).

18th International Workshop on Low Temperature Detectors (LTD-18) July 2019
Milan, Italy

· Poster: Anti-reflection Coatings to Improve the Optical Quantum Efficiency of MKID Arrays.

PEER-REVIEWED PUBLICATIONS

NASA ADS Library Link

Mennesson, B., Belikov, R., Por, E.H., [and 34 others inlcluding **Steiger, S.**] (2024). Current laboratory performance of starlight suppression systems, and potential pathways to desired Habitable Worlds Observatory exoplanet science capabilities. Journal of Astronomical Telescopes, Instruments, and Systems (submitted). doi: 10.48550/arXiv.2404.18036

Steiger, S., Brandt, T., Guyon, O., et. al. (2022). Probing Photon Statistics in Adaptive Optics Images with SCExAO/MEC. AJ. 164(5), 186. doi: 10.3847/1538-3881/ac922f

Swimmer, N., Currie, T., **Steiger, S.**, et. al. (2022). SCExAO and Keck Direct Imaging Discovery of a Low-Mass Companion Around the Accelerating F5 Star HIP 5319. AJ, 164(4), 152. doi: 10.3847/1538-3881/ac85a8

Steiger, S., Bailey, J., Zobrist, N., et. al. (2022). The MKID Pipeline: A Data Reduction and Analysis Pipeline for UVOIR MKID Data. AJ, 163(5), 193. doi: 10.3847/1538-3881/ac5833

Steiger, S., Currie, T., Brandt, T., et. al. (2021). SCExAO/MEC and CHARIS Discovery of a Low-mass, 6 au Separation Companion to HIP 109427 Using Stochastic Speckle Discrimination and High-contrast Spectroscopy. AJ, 162(2), 44. doi: 10.3847/1538-3881/ac02cc

Zobrist, N., Klimovich, N., Ho Eom, B., Coiffard, G., Daal, M., Swimmer, N., **Steiger, S.**, et. al. (2021). Improving the dynamic range of single photon counting kinetic inductance detectors. Journal of Astronomical Telescopes, Instruments, and Systems, 7, 010501. doi: 10.1117/1.JATIS.7.1.010501

Smith, J., Mazin, B., Walter, A., Daal, M., Bailey, I., Bockstiegel, C., Zobrist, N., Swimmer, N., **Steiger, S.**, and Fruitwala, N. (2021). Flexible Coaxial Ribbon Cable for High-Density Superconducting Microwave Device Arrays. IEEE Transactions on Applied Superconductivity, 31(1), 3008591. doi: 10.1109/TASC.2020.3008591

Lozi, J., Guyon, O., Vievard, S., [and 49 others, including **Steiger, S.**] (2020). Status of the SCExAO instrument: recent technology upgrades and path to a system-level demonstrator for PSI. In Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series (pp. 114480N). doi: 10.1117/12.2562832

Swimmer, N., Mazin, B., Bockstiegel, C., [and 14 others, including **Steiger, S.**] (2020). The PICTURE-C MKID camera. In Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series (pp. 114479B). doi: 10.1117/12.2561770

Walter, A., Fruitwala, N., **Steiger, S.**, et. al. (2020). The MKID Exoplanet Camera for Subaru SCExAO. PASP, 132(1018), 125005. doi: 10.1088/1538-3873/abc60f

Coiffard, G., Daal, M., Zobrist, N., Swimmer, N., **Steiger, S.**, Bumble, B., and Mazin, B. (2020). Characterization of sputtered hafnium thin films for high quality factor microwave kinetic inductance detectors. Superconductor Science Technology, 33(7), 07LT02. doi: 10.1088/1361-6668/ab8d99

Zobrist, N., Coiffard, G., Bumble, B., Swimmer, N., **Steiger, S.**, Daal, M., Collura, G., Walter, A., Bockstiegel, C., Fruitwala, N., Lipartito, I., and Mazin, B. (2019). Design and performance

of hafnium optical and near-IR kinetic inductance detectors. Applied Physics Letters, 115(21), 213503. doi: 10.1063/1.5127768

Mazin, B., Bailey, J., Bartlett, J., [and 22 others, including **Steiger, S.**] (2019). MKIDs in the 2020s. In Bulletin of the American Astronomical Society (pp. 17).