

Samuel J. Van Kooten

Southwest Research Institute
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Curriculum Vitae

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Employment

Southwest Research Institute, Boulder, CO
Research Scientist, 2021–present

Education

University of Colorado, Boulder

Ph.D., Astrophysical and Planetary Sciences, 2021 [\[Dissertation\]](#)

M.S., Astrophysical and Planetary Sciences, 2016

Advisor: Steven R. Cranmer

Calvin College (now Calvin University)

B.S., Physics, 2014

Minors: Astronomy, Scientific Computation and Modeling

Research

Solar Wind Flow Speed Measurements

Southwest Research Institute, 2021–present

I am developing techniques to measure the radial flow speed of the solar wind in PSP/WISPR images, to provide a near-the-spacecraft measurement that complements the in-situ measurements. Along the way, I am developing techniques to carefully separate and remove the many different contributions to the overall image (e.g. debris streaks, stars, etc.).

Motion of Solar Photospheric Bright Points

University of Colorado, Boulder, 2016–present

I am developing new ways of tracking and quantifying bright points' shape and size changes as drivers of MHD waves which may contribute to coronal heating, in anticipation of high-resolution DKIST data. As part of this image processing and data analysis work, I have implemented automatic tracking routines and an algorithm for inferring internal plasma flows.

Stellar Granular Flicker

University of Colorado, Boulder, 2016–2021

I demonstrated a number of refinements to a physical model that predicts the stochastic flicker in Kepler light curves due to stellar granulation. This work improved the model's prediction accuracy from within a factor of 2.5 to within a factor of 2. I also explored possible causes for the remaining prediction errors.

Publications

Daniel B. Seaton et al. (incl. **Van Kooten, S. J.**), 2024, "Observations of the Polarized Solar Corona during the Annular Eclipse of October 14, 2023," Sol. Phys.[\[ADS\]](#)

Van Kooten, S. J. & Cranmer, S. R., 2024, "Using Bright Point Shapes to Constrain Wave Heating of the Solar Corona: Predictions for DKIST," ApJ, 964, 50. [\[ADS\]](#) [\[Code\]](#)

- West, Matthew J. et al. (incl. **Van Kooten, S. J.**), 2023, “Defining the Middle Corona,” *Sol. Phys.*, 298, 78. [\[ADS\]](#)
- Astropy Collaboration, et al. (incl. **Van Kooten, S. J.**), 2022, “The Astropy Project: Sustaining and Growing a Community-oriented Open-source Project and the Latest Major Release (v5.0) of the Core Package,” *ApJ*, 935, 167. [\[ADS\]](#)
- Van Kooten, S. J.**, Anders, E. H., & Cranmer, S. R., 2021, “A Refined Model of Convectively-Driven Flicker in Kepler Light Curves,” *ApJ*, 913, 69. [\[ADS\]](#) [\[Code\]](#)
- Van Kooten, S. J.** & Cranmer, S. R., 2017, “Characterizing the Motion of Solar Magnetic Bright Points at High Resolution,” *ApJ*, 850, 64. [\[ADS\]](#)
- Dykhuis, M. J., Molnar, L., **Van Kooten, S. J.**, & Greenberg, R., 2014, “Defining the Flora Family: Orbital properties, reflectance properties and age,” *Icarus*, 243, 111. [\[ADS\]](#)

White Papers

- Seaton, D. B., et al. (incl. **Van Kooten, S. J.**), 2022, “A Strategy to Close Key Questions about the Middle Solar Corona During this Decade,” *Decadal Survey for Solar and Space Physics*.

Invited Talks

- “Tracking Photospheric Bright Points,” 2nd NCSP DKIST Data Training Workshop, Jan. 15, 2020.
- “Dark Lines and Bright Points: A Close Look at the Surface of the Sun,” Calvin College Physics & Astronomy Department colloquium, November 27, 2018.

Presentations

- Van Kooten, S. J.**, DeForest, C., and Kenny, “Estimations of Solar Wind Speeds with the PSP/WISPR Imager,” TESS, Dallas, TX, April 11, 2024.
- Van Kooten, S. J.**, DeForest, C., and Kenny, “Measuring Solar Wind Speeds Up-close with the PSP/WISPR Imager,” AGU, San Francisco, CA, December 12, 2023.
- Van Kooten, S. J.**, DeForest, C., and Kenny, “Estimations of Solar Wind Speeds with the PSP/WISPR Imager,” PSP SWG, Laurel, MD, November 7, 2023.
- Van Kooten, S. J.**, DeForest, C., and Kenny, “Measuring solar wind speeds with WISPR via apparent motion,” SPD 54, Minneapolis, MN, August 14, 2023.
- Van Kooten, S. J.**, DeForest, C., and Kenny, “Measuring solar wind speeds with WISPR via apparent motion,” SHINE, Stowe, VT, August 7, 2023, poster.
- Van Kooten, S. J.**, DeForest, C., and Kenny, “Measuring solar wind speeds with WISPR via the stationary point,” Solar Wind 16, Monterey, CA, June 12, 2023, poster.
- Van Kooten, S. J.**, DeForest, C., and Kenny, “Measuring Solar Wind Velocities Near PSP with WISPR Image Sequences,” Abstract SH32E-1804, AGU, Chicago, IL, December 14, 2022, poster. [\[ADS\]](#)
- Van Kooten, S. J.**, DeForest, C., and Kenny, “Determining solar wind flow speeds from stationary-point measurements with WISPR,” TESS, Bellevue, WA, August 8, 2022. [\[ADS\]](#)
- Van Kooten, S. J.**, DeForest, C., and Kenny, “Determining solar wind flow speeds from stationary-point measurements with WISPR,” Parker Two, Laurel, MD, June 21, 2022.
- Van Kooten, S. J.**, Cranmer, S. R., “Looking to the photosphere to help constrain the evolution of heliospheric oscillations,” PUNCH 2 Science Meeting, August 9, 2021.

- Van Kooten, S. J.**, Cranmer, S. R., “Proposing new ways to analyze the resolved shape changes of photospheric bright points as wave drivers,” Abstract 328.16, SPD/AAS Joint Meeting, June 9, 2021, poster. [\[ADS\]](#)
- Van Kooten, S. J.**, Cranmer, S. R., “A New Model of Granulation-Driven Flicker in Kepler Light Curves,” Abstract 515.06, AAS Meeting 237, January 15, 2021. [\[ADS\]](#)
- Van Kooten, S. J.**, Cranmer, S. R., “Measuring complex bright-point motion and wave excitation in high-resolution solar observations,” Abstract SH001-0012, AGU, December 7, 2020, poster. [\[ADS\]](#)
- Van Kooten, S. J.**, Cranmer, S. R., “Toward a Better Understanding of Convectively-Driven Flicker in Kepler Light Curves,” Abstract 352.05, AAS Meeting 235, Honolulu, HI, January 7, 2020. [\[ADS\]](#)
- Van Kooten, S. J.**, Cranmer, S. R., “Coronal Turbulence Driven from the Photosphere: Opportunities for DKIST,” SHINE 2019 Workshop, Boulder, CO, August 5-9, 2019, poster. [\[ADS\]](#)
- Van Kooten, S. J.**, Cranmer, S. R., “Why Is the Corona Hotter Than It Has Any Right to Be?” SHINE 2019 Student Day, Boulder, CO, August 4, 2019.
- Van Kooten, S. J.**, Cranmer, S. R., “Preparing for DKIST: Connecting the High-Resolution Sun to the Turbulent Corona,” Abstract 302.04, SPD/AAS Joint Meeting, St. Louis, MO, June 10-13, 2019, poster. [\[ADS\]](#)
- Van Kooten, S. J.**, Cranmer, S. R., “Investigating the Complex Motions of Photospheric Bright Points as a Lower Boundary Condition for Coronal Magnetism,” Abstract SH23C-3318, AGU Fall 2018 meeting, Washington, D.C., December 10-14, 2018, poster. [\[ADS\]](#)
- Van Kooten, S. J.**, Cranmer, S. R., “Characterizing the Motion of Photospheric Magnetic Bright Points at High Resolution,” 30th NSO Workshop, Sunspot, NM, August 7–11, 2017.
- Van Kooten, S. J.**, Cranmer, S. R., Rempel, M., “Characterizing the Motion of Photospheric Magnetic Bright Points at High Resolution,” SHINE 2017 Workshop, Saint-Sauveur, QC, July 24–28, 2017, poster. [\[ADS\]](#)
- Van Kooten, S. J.**, Putzig, N., O’Shea, P., Fenton, L., “Investigating the Poleward Trend of Southern Dune Field Stabilization on Mars Using Thermophysical Observations,” Abstract 2528, 47th Lunar and Planetary Science Conference, The Woodlands, TX, March 21-25, 2016, poster. [\[ADS\]](#)
- Van Kooten, S. J.**, Putzig, N., Fenton, L., “Investigating the Poleward Trend of Southern Dune Field Stabilization on Mars Using Thermophysical Observations,” Abstract 8052, Fourth Annual International Planetary Dunes Workshop, Boise, Idaho, May 19-22, 2015, poster. [\[ADS\]](#)
- Lamb, D., DeForest, C., **Van Kooten, S. J.**, “Magnetic Feature Tracking in the SDO Era: Past Sacrifices, Recent Advances, and Future Possibilities,” Abstract SH34A-01, AGU Fall 2014 meeting, December 15-19, 2014. [\[ADS\]](#)
- Dykhuis, M. J., Molnar, L. A., **Van Kooten, S. J.**, Greenberg, R. J., “Defining the Flora Family: Reflectance Properties and Age,” 45th Meeting of the American Astronomical Society Division on Dynamical Astronomy, April 28, 2014. [\[ADS\]](#)
- Van Kooten, S. J.** and Molnar, L. A., “Refining Asteroid Collisional Timescales,” Michigan Space Grant Consortium Conference, Ann Arbor, MI, November 2, 2013.
- Dykhuis, M. J., Molnar, L. A., **Van Kooten, S. J.**, *et al.*, “Reflectance Properties and Age of the Baptistina Family,” 45th Meeting of the American Astronomical Society Division for Planetary Sciences, October 8, 2013. [\[ADS\]](#)
- Van Kooten, S. J.**, Pagel, H. J., and Molnar, L. A., “Family Membership of Koronis Zone Asteroids,” Michigan Space Grant Consortium Conference, Ann Arbor, MI, October 6, 2012.

Molnar, L. A. and **Van Kooten, S. J.**, “Size and Age Dependence of Koronis Family Colors,” Joint Mtg. of the European Planetary Science Congress and the American Astronomical Society Division for Planetary Sciences, Nantes, France, October 6, 2011.

Van Kooten, S. J. and Molnar, L. A., “Asteroid Collisions,” Michigan Space Grant Consortium Conference, Ann Arbor, MI, November 12, 2011, poster.

Molnar, L. A. and **Van Kooten, S. J.**, “Testing Asteroid Collision Models,” Michigan Space Grant Consortium Conference, Ann Arbor, MI, November 12, 2011.

Teaching

University of Colorado, Boulder

Instructor of record, Introduction to Scientific Programming, 2018

Tutor, physics and astronomy classes, 2015–2019

Teaching assistant, Introductory Astronomy Lab, 2014

Professional Development Program, ISEE, UC Santa Cruz

In 2018 I participated in seven days of workshops and, as part of a small team, developed and ran a full-day inquiry activity which taught the motions of the Sun and Moon to ~45 incoming undergraduates.

Calvin College

Tutor, physics and astronomy classes, 2013–2014

Lab assistant and grader, physics and astronomy classes, 2011–2014

Grants, Awards and Honors

NSF AAG, starting 2023, 3 years at 40% time

NASA FINESST, AY 2020–2021

Carl Hansen Fellowship, CU Astrophysical & Planetary Sciences Dept. Prize Fellowship, 2020

Student Poster Contest Honorable Mention, Solar Physics Division Meeting, 2019

Undergraduate Fellowship, Michigan Space Grant Consortium, \$2500, 2013

Undergraduate Fellowship, Michigan Space Grant Consortium, \$2500, 2012

NSF Scientific Computing Scholarship, Calvin College Integrated Sci. Research Inst., 2010–14

Service

Standing Committee on Research Misconduct, CU Boulder, 2017–2021

Department Webmaster, CU Boulder, 2017–2021

Graduate Admissions Set-up Committee, CU Boulder, AY 2019–2020

Graduate Representative to Faculty Meetings, CU Boulder, AY 2019–2020

APS/LASP Faculty Search Committee, CU Boulder, 2019

Graduate Admissions Committee, CU Boulder, AY 2018–2019

Summer APS Lunch Talks Coordinator, CU Boulder, 2017

CU/NSO Joint Faculty Search Committee, CU Boulder, 2017

Course Fees Committee, CU Boulder, AY 2016–2017

Outreach

Fiske Planetarium Show, “Who is Roy G. Biv?” authored and presented in 2019

Astronomy Day, Sommers-Bausch Observatory, 2015–2019

Observatory Open House, Sommers-Bausch Observatory, 2014–2019

Sci/Tech Writer, *Calvin College Chimes*, 2011–2012

Observatory Open House, Calvin College, 2010–2012

Memberships

American Astronomical Society, 2016–present

AAS Solar Physics Division, 2016–present

American Geophysical Union, 2018–present