

Curriculum Vitae: Steven R. Cranmer

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- EMPLOYMENT** 2015–present: Associate Professor, APS Dept., University of Colorado
- HISTORY** 2011–2014: Lecturer on Astronomy, Harvard University
1996–2014: Astrophysicist, Smithsonian Astrophysical Observatory
- EDUCATION** Ph.D. Physics and Astronomy, University of Delaware, 1992–1996.
M.S. Astronomy, Ohio State University, 1990–1991.
B.S. Physics, Drexel University, 1985–1990, *summa cum laude*.
- RESEARCH INTERESTS** ★ Heating of the solar corona and acceleration of the solar wind
★ Plasma physics and kinetic theory of waves and turbulence
★ Stellar astrophysics, radiative transfer, and spectroscopy
- HONORS** ★ 2016 CU Boulder Faculty Teaching Excellence Program course development award
★ 2006 Karen Harvey Prize, Solar Physics Division of the AAS
★ SAO Performance Awards: 9 annual awards between 1999 and 2013.
★ 1997 Theodore Wolf Dissertation Prize, University of Delaware
- TEACHING EXPERIENCE** ★ CU Astron. 1200: Stars & Galaxies (intro undergrad.): 2019
★ CU Astron. 2100: Concepts in Astrophysics (mid-level undergrad.): 2020, 2023
★ CU Astron. 3760: Solar & Space Physics (upper level undergrad.): 2015, 2017
★ CU Astron. 5120: Radiative & Dynamical Processes (graduate): 2016, 2018–2021
★ CU Astron. 5540: Mathematical Methods (graduate): 2022
★ CU Astron. 5700: Stellar Astrophysics (graduate): 2016, 2018, 2022, 2024
★ Taught 3 Harvard graduate-level Astron. courses (2012–2014)
★ Advised 8 grad. students (7 CU Boulder, 1 Harvard); 2 undergrad. students
- SOCIETIES & ACTIVITIES** ★ Member of AAS, AGU, APS. Assoc. Editor, *JGR Space Physics*, 2006–2009.
★ Daniel K. Inouye Solar Telescope (DKIST) Science Working Group, 2013–2018.
★ Head of Education Office: U. Colorado Space Weather Technology, Research, and Education Center (SWx TREC), 2017–present.
- SELECTED GRANTS** ★ PI, 15% support, NSF SHINE Program, 2023–2026: “*Testing theories of coronal heating and solar wind acceleration with multi-messenger data*”
★ PI, 15% support, NASA Heliophysics Supporting Research, 2020–2023: “*Winnowing in the wind: Testing theories of solar wind acceleration*”
★ PI, 15% support, NSF AAG Program, 2016–2021: “*Coronal turbulence driven from the photosphere: Preparing for the DKIST era*”
★ PI, 100% support, NASA Long-Term Space Astrophysics, 2004–2009: “*Waves and turbulence in stellar winds across the H–R diagram*”
★ Summary: brought in > \$4.3 million as PI from 2001 to present.
- MISSIONS** ★ Co-Investigator: SWEAP & FIELDS suites on *Parker Solar Probe*, 2010–present
★ Co-Investigator: UVCS instrument on *SOHO*, 1996–2013
- PUBLICATIONS** ★ 127 papers in refereed journals, 289 conference presentations (55 invited)
★ Chief editor for *SOHO–23* workshop proceedings (ASP Conf. Ser. 428, 2010)
★ Co-edited *Solar Wind 13* (2013) and *SOHO–7* (1999) conference proceedings

BIBLIOGRAPHY

More complete and up-to-date listings, including links to many of the papers and presentations, online data, and other technical notes, can be found at: <https://stevencranmer.bitbucket.io/>

Publications in Refereed Journals

- ★ Lattimer, A. S., and Cranmer, S. R. 2024, “A Self-Consistent Treatment of the Line-Driving Radiation Force for Active Galactic Nuclei Outflows: New Prescriptions for Simulations,” *Astrophys. J.*, submitted.
- ★ Van Kooten, S. J., and Cranmer, S. R. 2023, “Using Bright-Point Shapes to Constrain Wave Heating of the Solar Corona: Predictions for DKIST,” *Astrophys. J.*, in press.
- ★ Cranmer, S. R., Chhiber, R., Gilly, C. R., Cairns, I. H., Colaninno, R. C., McComas, D. J., Raouafi, N. E., Usmanov, A. V., Gibson, S. E., and DeForest, C. E. 2023, “The Sun’s Alfvén Surface: Recent Insights and Prospects for the Polarimeter to Unify the Corona and Heliosphere (PUNCH),” *Solar Physics*, **298**, 126. [\[ADS\]](#)
- ★ Shoda, M., Cranmer, S. R., and Toriumi, S. 2023, “Formulating Mass-Loss Rates for Sun-like Stars: A Hybrid Model Approach,” *Astrophys. J.*, **957**, 71. [\[ADS\]](#)
- ★ Cranmer, S. R., and Molnar, M. E. 2023, “Magnetohydrodynamic Mode Conversion in the Solar Corona: Insights from Fresnel-like Models of Waves at Sharp Interfaces,” *Astrophys. J.*, **955**, 68. [\[ADS\]](#)
- ★ Bandyopadhyay, R., Meyer, C. M., Matthaeus, W. H., McComas, D. J., Cranmer, S. R., Halekas, J. S., Huang, J., Larson, D. E., Livi, R., Rahmati, A., Whittlesey, P. L., Stevens, M. L., Kasper, J. C., and Bale, S. D. 2023, “Estimates of Proton and Electron Heating Rates Extended to the Near-Sun Environment,” *Astrophys. J. Letters*, **955**, L28. [\[ADS\]](#)
- ★ Molnar, M. E., Reardon, K. P., Cranmer, S. R., Kowalski, A. F., and Milić, I. 2023, “Constraining the Systematics of (Acoustic) Wave Heating Estimates in the Solar Chromosphere,” *Astrophys. J.*, **945**, 154. [\[ADS\]](#)
- ★ Krasnoselskikh, V., Tsurutani, B. T., Dudok de Wit, T., Walker, S., Balikhin, M., Balat-Pichelin, M., Velli, M., Bale, S. D., Maksimovic, M., Agapitov, O., Baumjohann, W., Berthomier, M., Bruno, R., Cranmer, S. R., de Pontieu, B., de Sousa Meneses, D., Eastwood, J., Erdelyi, R., Ergun, R., Fedun, V., Ganushkina, N., Greco, A., Harra, L., Henri, P., Horbury, T., Hudson, H., Kasper, J., Khotyaintsev, Y., Kretzschmar, M., Krucker, S., Kucharek, H., Langevin, Y., Lavraud, B., Lebreton, J.-P., Lepri, S., Liemohn, M., Louarn, P., Moebius, E., Mozer, F., Nemecek, Z., Panasenco, O., Retino, A., Safrankova, J., Scudder, J., Servidio, S., Sorriso-Valvo, L., Souček, J., Szabo, A., Vaivads, A., Vekstein, G., Vörös, Z., Zaqarashvili, T., Zimbardo, G., and Fedorov, A. 2023, “ICARUS: In-situ Studies of the Solar Corona Beyond Parker Solar Probe and Solar Orbiter,” *Experimental Astronomy*, **54**, 277. [\[ADS\]](#)
- ★ Rivera, Y. J., Higginson, A., Lepri, S. T., Viall, N. M., Alterman, B. L., Landi, E., Spitzer, S. A., Raines, J. M., Cranmer, S. R., Laming, J. M., Mason, E. I., Wallace, S., Raymond, J. C., Lynch, B. J., Gilly, C. R., Chen, T. Y., and Dewey, R. M. 2022, “Deciphering the Birth Region, Formation, and Evolution of Ambient and Transient Solar Wind Using Heavy Ion Observations,” *Frontiers Astron. Space Sci.*, **9**, 1056347. [\[ADS\]](#)
- ★ Howard, W. S., MacGregor, M. A., Osten, R., Forbrich, J., Cranmer, S. R., Tristan, I., Weinberger, A. J., Youngblood, A., Barclay, T., Loyd, R. O. P., Shkolnik, E. L., Zic, A., and Wilner, D. J. 2022, “The Mouse that Squeaked: A Small Flare from Proxima Cen Observed in the Millimeter, Optical, and Soft X-ray with Chandra and ALMA,” *Astrophys. J.*, **938**, 103. [\[ADS\]](#)

- ★ Cranmer, S. R., and Schiff, A. J. 2021, “Electron Heat Flux in the Solar Wind: Generalized Approaches to Fluid Transport with a Variety of Skewed Velocity Distributions,” *J. Geophys. Res.*, **126**, e29666. [\[ADS\]](#)
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- ★ Molnar, M. E., Reardon, K. P., Cranmer, S. R., Kowalski, A. F., Chai, Y., and Gary, D. E. 2021, “High-frequency Wave Power Observed in the Chromosphere with IBIS and ALMA,” *Astrophys. J.*, **920**, 125. [\[ADS\]](#)
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- ★ Woolsey, L. N., & Cranmer, S. R. 2015, “Time-Dependent Turbulent Heating of Open Flux Tubes in the Chromosphere, Corona, and Solar Wind,” *Astrophys. J.*, **811**, 136, 13 pages. [\[ADS\]](#)
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- ★ Bandyopadhyay, R., Meyer, C., Matthaeus, W. H., McComas, D. J., Cranmer, S. R., Halekas, J. S., Whittlesey, P., Stevens, M. L., Kasper, J. C., and Bale, S. D. 2023, “Estimates of Proton and Electron Heating Rates Extended to the Near-Sun Environment,” *Eos Trans. AGU*, Fall 2023 AGU Meeting (December 11-15, 2023), abstract SH11A-07 (talk).
- ★ Shoda, M., Cranmer, S. R., and Toriumi, S. 2023, “Solar Wind Modeling Based on the Hybrid Scenario: Interplay Between Alfvén Wave and Interchange Reconnection,” *Eos Trans. AGU*, Fall 2023 AGU Meeting (December 11-15, 2023), abstract SH11G-02 (talk).
- ★ Chhiber, R., Cranmer, S. R., Matthaeus, W. H., Usmanov, A. V., Attie, R., Pecora, F., Roy, S., and Goldstein, M. L. 2023, “On the Properties of an Extended and Fragmented Alfvén Zone in the Young Solar Wind: Locations, Scales, and Flows,” *Eos Trans. AGU*, Fall 2023 AGU Meeting (December 11-15, 2023), abstract SH34B-3148 (poster).
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- ★ Matthaeus, W. H., Chhiber, R., Usmanov, A. V., Bandyopadhyay, R., Goldstein, M. L., and Cranmer, S. R. 2022, “A Fragmented and Extended Alfvén Critical Zone in the Young Solar Wind,” *Eos Trans. AGU*, Fall 2022 AGU Meeting (December 12-16, 2022), abstract SH53A-02 (talk). [[ADS](#)]
- ★ Miralles, M. P., and Cranmer, S. R. 2022, “Properties of the Corona and Inner Heliosphere with Multi-instrument Observations of Pseudostreamers and Helmet-Streamers,” *Eos Trans. AGU*, Fall 2022 AGU Meeting (December 12-16, 2022), abstract SH55C-1522 (poster). [[ADS](#)]

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- ★ Molnar, M., Cranmer, S., Reardon, K., and Milic, I. 2022, “Center-to-limb Variation of Chromospheric Wave Fluctuations: Comparison of Observations with IRIS and 3D Models,” *Hinode-15/IRIS-12: Multi-Messenger Physics of the Solar Atmosphere*, Prague, Czech Republic, September 19-23, 2022, poster.
- ★ Kolinski, D., DeForest, C. E., Gibson, S. E., Morrow, C., Colaninno, R., Laurent, G., Hanson, M., Cranmer, S. R., de Koning, C., Desai, M., Elliott, H., Malanushenko, A., Thompson, B., Viall, N., Webb, D., and the PUNCH Team 2022, “PUNCH: Polarimeter to UNify and Corona and Heliosphere,” *TESS 2022: Triennial Earth-Sun Summit*, Bellevue/Seattle, Washington, August 8-11, 2022, abstract 125.22. [[ADS](#)]
- ★ Molnar, M., Reardon, K., Cranmer, S., and Kowalski, A. 2022, “High-frequency Wave Power in the Chromosphere: Comparison of Observations with 3D Models,” *TESS 2022: Triennial Earth-Sun Summit*, Bellevue/Seattle, Washington, August 8-11, 2022, abstract 206.04. [[ADS](#)]
- ★ DeForest, C. E., Gibson, S. E., De Koning, C., Thompson, B. J., Malanushenko, A., Desai, M., Elliott, H., Viall, N. M., Cranmer, S. R., and the PUNCH Team, 2022, “Expected Results for the Cradle of the Solar Wind with the Polarimeter to UNify the Corona and Heliosphere (PUNCH),” *COSPAR 2022: 44th Scientific Assembly*, July 16-24, 2022, Athens, Greece, abstract D2.1-0009-22. [[ADS](#)]
- ★ DeForest, C. E., Gibson, S. E., Thompson, B. J., Malanushenko, A., Desai, M., Elliott, H., Viall, N. M., Cranmer, S. R., De Koning, C., and the PUNCH Team, 2022, “Exploring Structures and Flows with NASA’s Under-Construction PUNCH Mission,” *COSPAR 2022: 44th Scientific Assembly*, July 16-24, 2022, Athens, Greece, abstract D1.2-0001-22. [[ADS](#)]
- ★ Kolinski, D., DeForest, C. E., Gibson, S. E., Morrow, C., Colaninno, R., Laurent, G., Hanson, M., Cranmer, S. R., de Koning, C., Desai, M., Elliott, H., Malanushenko, A., Thompson, B., Viall, N., Webb, D., and the PUNCH Team 2022, “Polarimeter to UNify the Corona and Heliosphere (PUNCH),” *SHINE 2022 Workshop*, Waikiki, Hawaii, June 27 to July 1, 2022 (poster).
- ★ Miralles, M. P., and Cranmer, S. R. 2022, “Properties of the Corona and Solar Wind with Multi-Instrument Observations of Pseudostreamers and Helmet Streamers,” *SHINE 2022 Workshop*, Waikiki, Hawaii, June 27 to July 1, 2022 (poster).
- ★ Molnar, M., Reardon, K. P., Cranmer, S. R., Kowalski, A. F., and Milic, I. 2022, “Acoustic Wave Flux in the Solar Chromosphere Inferred from High Resolution Observations and 3D RMHD Simulations,” *SHINE 2022 Workshop*, Waikiki, Hawaii, June 27 to July 1, 2022 (poster).
- ★ Cranmer, S. R., DeForest, C. E., & Gibson, S. E. 2021, “Mapping the Sun’s Alfvén Zone with Inward-Flowing Plasma Parcels,” *IAGA-IASPEI 2021 Joint Scientific Assembly* (August 21–27, 2021, Hyderabad, India), Symposium 4.1: Advances and Upcoming Developments in Solar and Heliospheric Physics (invited talk).
- ★ Miralles, M. P., & Cranmer, S. R. 2021, “Coronal Pseudostreamers and Helmet Streamers: New Measurements of Plasma Properties near the Cusps,” *IAGA-IASPEI 2021 Joint Scientific Assembly* (August 21–27, 2021, Hyderabad, India), Symposium 4.1: Advances and Upcoming Developments in Solar and Heliospheric Physics.
- ★ Molnar, M. E., Cranmer, S. R., & Reardon, K. 2021, “Using IRIS, ALMA, and the Dunn Solar Telescope to Learn about (Acoustic-)wave Heating in the Chromosphere,” *IAGA-IASPEI 2021 Joint Scientific Assembly* (August 21–27, 2021, Hyderabad, India), Symposium 4.1: Advances and Upcoming Developments in Solar and Heliospheric Physics.

- ★ Shoda, M., Chandran, B. D. G., & Cranmer, S. R. 2021, “Turbulent Generation of Magnetic Switchbacks in the Alfvénic Solar Wind,” *Parker One Conference* (June 14–18, 2021), invited talk.
- ★ Cranmer, S. R., Aarnio, A., & Molnar, M. E. 2021, “Chromospheric and Coronal Heating in Cool Stars: Constraints on Physical Processes from X-ray and Lyman Alpha Observations,” *Bull. Am. Astr. Soc.*, AAS/SPD meeting 238 (June 7–9, 2021), iPoster abstract 131.02. [\[ADS\]](#)
- ★ Gilly, C. R., Cranmer, S. R., & Gibson, S. E. 2021, “STRIA: A new module within FORWARD towards modelling PUNCH datasets,” *Bull. Am. Astr. Soc.*, AAS/SPD meeting 238 (June 7–9, 2021), iPoster abstract 328.02. [\[ADS\]](#)
- ★ Molnar, M. E., Cranmer, S. R., Reardon, K. P., & Kowalski, A. F. 2021, “Spectroscopic Study Of Wave Propagation In The Quiet Solar Chromosphere with IRIS and IBIS,” *Bull. Am. Astr. Soc.*, AAS/SPD meeting 238 (June 7–9, 2021), iPoster abstract 113.03. [\[ADS\]](#)
- ★ Van Kooten, S. J., & Cranmer, S. R. 2021, “Proposing new ways to analyze the resolved shape changes of photospheric bright points as wave drivers,” *Bull. Am. Astr. Soc.*, AAS/SPD meeting 238 (June 7–9, 2021), iPoster abstract 328.16. [\[ADS\]](#)
- ★ Gibson, S. E., DeForest, C., Attie, R., Gallardo Lacourt, B., Gilly, C. R., Provornikova, E., Viall, N., Cranmer, S. R., Thompson, B. J., Malanushenko, A., Webb, D., de Koning, C., and Desai, M. 2021, “The PUNCH Associate Investigator (AI) Program,” *Heliophysics 2050 Workshop*, May 3–7, 2021, poster 2082.
- ★ Rivera, Y. J., Higginson, A., Lepri, S. T., Viall, N., Alterman, B. L., Landi, E., Spitzer, S. A., Raines, J. M., and Cranmer, S. R. 2021, “Connecting Heliospheric Phenomena with Their Solar Source Through Multi-Point Compositional Measurements,” *Heliophysics 2050 Workshop*, May 3–7, 2021, poster 2159.
- ★ Linsky, J., Wood, B. E., Youngblood, A., Brown, A., Froning, C. S., France, K., Buccino, A. P., Cranmer, S. R., Mauas, P., Miguel, Y., Pineda, J. S., Rugheimer, S., Vieytes, M., Wheatley, P. J., and Wilson, D. J. 2021, “The Relative Emission from Chromospheres and Coronae: Dependence on Spectral Type and Age,” *20.5th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun*, March 2–4, 2021, poster 257. [\[ADS\]](#)
- ★ MacGregor, M. A., Weinberger, A. J., Loyd, P., Shkolnik, E. L., Barclay, T., Howard, W. S., Zic, A., Osten, R., Cranmer, S. R., Kowalski, A. F., Lenc, E., Youngblood, A., Estes, A., Wilner, D. J., Forbrich, J., Hughes, A., Law, N., Murphy, T., Boley, A., and Matthews, J. 2021, “Discovery of an Extremely Short Duration ‘Building Block’ Flare from Proxima Centauri,” *Bull. Am. Astr. Soc.*, **53**, Habitable Worlds 2021 Workshop (February 22–26, 2021), abstract 2021n3i1249. [\[ADS\]](#)
- ★ Lattimer, A., and Cranmer, S. R. 2021, “An Updated Formalism for Line-Driven Outflows and Consequences for Mass Loss,” *Bull. Am. Astr. Soc.*, AAS meeting 237 (January 11–15, 2021), talk abstract 116.02. [\[ADS\]](#)
- ★ Linsky, J., Wood, B., Youngblood, A., Brown, A., France, K., Buccino, A., Froning, C., Cranmer, S. R., Mauas, P., Miguel, Y., Pineda, J., Rugheimer, S., Vieytes, M., Wheatley, P., and Wilson, D. 2021, “The Relative Emission from Chromospheres and Coronae: Dependence on Spectral Type and Age,” *Bull. Am. Astr. Soc.*, AAS meeting 237 (January 11–15, 2021), poster abstract 141.10. [\[ADS\]](#)
- ★ MacGregor, M. A., Weinberger, A. J., Loyd, P., Shkolnik, E. L., Barclay, T., Osten, R., Howard, W. S., Zic, A., Cranmer, S. R., Kowalski, A. F., Youngblood, A., Estes, A., Wilner, D. J., Forbrich, J., Murphy, T., Law, N., Hughes, A., Boley, A., Tristan, I. I., Fuson, J. F., and Matthews, J. 2021, “Discovery of an Extremely Short Duration ‘Building Block’ Flare from Proxima Cen Using Millimeter through FUV Observations,” *Bull. Am. Astr. Soc.*, AAS meeting 237 (January 11–15, 2021), talk abstract 515.02. [\[ADS\]](#)

- ★ Van Kooten, S. J., and Cranmer, S. R. 2021, “A New Model of Granulation-Driven Flicker in Kepler Light Curves,” *Bull. Am. Astr. Soc.*, AAS meeting 237 (January 11–15, 2021), talk abstract 515.06. [\[ADS\]](#)
- ★ Molnar, M., Reardon, K., Cranmer, S. R., and Kowalski, A. F. 2020, “Constraining Wave Propagation Throughout the Solar Atmosphere with IBIS, ALMA and IRIS,” *Eos Trans. AGU*, Fall 2020 AGU Meeting (December 1–17, 2020), abstract SH001–0003 (poster). [\[ADS\]](#)
- ★ Van Kooten, S., and Cranmer, S. R. 2020, “Measuring Complex Bright-point Motion and Wave Excitation in High-resolution Solar Observations,” *Eos Trans. AGU*, Fall 2020 AGU Meeting (December 1–17, 2020), abstract SH001–0012 (poster). [\[ADS\]](#)
- ★ Miralles, M. P., and Cranmer, S. R. 2020, “New Measurements of Plasma Properties near the Cusps of Pseudostreamers and Helmet Streamers,” *Eos Trans. AGU*, Fall 2020 AGU Meeting (December 1–17, 2020), abstract SH028–0020 (poster). [\[ADS\]](#)
- ★ Gilly, C. R., and Cranmer, S. R. 2020, “Forward Models of Coronal Nonthermal Line-Widths,” *Eos Trans. AGU*, Fall 2020 AGU Meeting (December 1–17, 2020), abstract SH030–0003 (poster). [\[ADS\]](#)
- ★ Thompson, B. J., Attie, R., Chhiber, R., Cranmer, S. R., DeForest, C., Gallardo-Lacourt, B., Gibson, S. E., Jones, S. I., Moraes Filho, V., Reginald, N. L., Uritsky, V. M., and Viall, N. M. 2020, “Contemporary Analysis Methods for Coronagraph and Heliospheric Imager Data,” *Eos Trans. AGU*, Fall 2020 AGU Meeting (December 1–17, 2020), abstract SH031–05 (invited talk). [\[ADS\]](#)
- ★ Molnar, M. E., Reardon, K. P., Cranmer, S. R., and Kowalski, A. 2020, “High-frequency Wave Power Observed in the Chromosphere with IBIS and ALMA,” *Bull. Am. Astr. Soc.*, 2020 AAS/SPD meeting (August 18–19, 2020), iPoster 201.06. [\[ADS\]](#)
- ★ Gilly, C. R., and Cranmer, S. R. 2020, “Solar Wind and Line-of-sight Effects Broaden Coronal Spectral Lines,” *Bull. Am. Astr. Soc.*, 2020 AAS/SPD meeting (August 18–19, 2020), iPoster 210.10. [\[ADS\]](#)
- ★ Cranmer, S. R. 2020, “Alfvén Waves in the Solar Corona and Solar Wind: An Updated Energy Budget,” *Bull. Am. Astr. Soc.*, AAS meeting 235 (January 5–8, 2020), talk abstract 149.08. [\[ADS\]](#)
- ★ Lattimer, A., and Cranmer, S. R. 2020, “A New Atomic Database for Line-Driven Outflows in a Variety of Astrophysical Environments,” *Bull. Am. Astr. Soc.*, AAS meeting 235 (January 5–8, 2020), poster abstract 110.27. [\[ADS\]](#)
- ★ Van Kooten, S. J., and Cranmer, S. R. 2020, “Toward a Better Understanding of Convectively-Driven Flicker in Kepler Light Curves,” *Bull. Am. Astr. Soc.*, AAS meeting 235 (January 5–8, 2020), talk abstract 352.05. [\[ADS\]](#)
- ★ Gilbert, C., and Cranmer, S. R. 2019, “The Effect of Non-Equilibrium Ionization, Resonant Scattering, and the Solar Wind on the Broadening of Coronal Emission Lines,” *Eos Trans. AGU*, Fall 2019 Meeting Suppl., abstract SH11C–3406 (poster). [\[ADS\]](#)
- ★ Solomon, S. C., Burkepile, J., Cranmer, S. R., Gross, N. A., Hughes, W. J., Knipp, D. J., Lynds, S. E., Miesch, M. S., Singer, H. J., and Wiltberger, M. J. 2019, “Twenty Years of Space Weather Summer School,” *Eos Trans. AGU*, Fall 2019 Meeting Suppl., abstract ED43C–1109 (poster). [\[ADS\]](#)
- ★ Baltzer, T., Berger, T. E., Cranmer, S. R., Knipp, D. J., Clark, R. D., Knuth, J., Pankratz, C. K., and the LASP Web Team 2019, “The Space Weather TREC Space Weather Portal: A Tool for Enabling Research and Education,” *Eos Trans. AGU*, Fall 2019 Meeting Suppl., abstract ED43C–1115 (poster). [\[ADS\]](#)

- ★ Berger, T. E., Thayer, J. P., Baker, D. N., Knipp, D. J., Pankratz, C. K., Cranmer, S. R., Sutton, E. K., Baltzer, T., Lucas, G., Craft, J., Bosanac, N., and Smith, T. R. 2019, “University of Colorado Space Weather Technology, Research, and Education Center (SWx TREC): An Academic Center of Excellence to Accelerate Research to Operations and Operations to Research Transitions,” *Eos Trans. AGU*, Fall 2019 Meeting Suppl., abstract SA13A–06 (talk). [\[ADS\]](#)
- ★ Cranmer, S. R. 2019, “Solar Wind Origins: A Survey of Proposed Physical Processes,” *SHINE 2019 Workshop*, Boulder, Colorado, August 5–9, 2019 (invited scene-setting talk). [\[ADS\]](#)
- ★ Cranmer, S. R. 2019, “Element Abundances and Solar Wind Acceleration,” *SHINE 2019 Workshop*, Boulder, Colorado, August 5–9, 2019 (invited scene-setting talk). [\[ADS\]](#)
- ★ Gilbert, C., and Cranmer, S. R. 2019, “Interpreting Off-Limb Emission Lines from Polar Coronal Holes,” *SHINE 2019 Workshop*, Boulder, Colorado, August 5–9, 2019, poster. [\[ADS\]](#)
- ★ Molnar, M., Reardon, K., and Cranmer, S. R. 2019, “High frequency chromospheric observations with IBIS and ALMA,” *SHINE 2019 Workshop*, Boulder, Colorado, August 5–9, 2019, poster. [\[ADS\]](#)
- ★ Schiff, A., and Cranmer, S. R. 2019, “Thermal conduction throughout the solar wind: the eight-moment approximation,” *SHINE 2019 Workshop*, Boulder, Colorado, August 5–9, 2019, poster. [\[ADS\]](#)
- ★ Van Kooten, S. J., and Cranmer, S. R. 2019, “Coronal Turbulence Driven from the Photosphere: Opportunities for DKIST,” *SHINE 2019 Workshop*, Boulder, Colorado, August 5–9, 2019, poster. [\[ADS\]](#)
- ★ Caspi, A., Seaton, D. B., Case, T., Cheung, M., Cranmer, S. R., DeForest, C. E., de Toma, G., Downs, C., Elliott, H., Gold, A. U., Longcope, D., Savage, S. L., Sullivan, S., Viall, N., Vourlidis, A., and West, M. J. 2019, “COHERENT: Studying the Corona as a Holistic Environment,” *SHINE 2019 Workshop*, Boulder, Colorado, August 5–9, 2019, poster. [\[ADS\]](#)
- ★ Cranmer, S. R. 2019, “Simulations of Stellar Winds and Exoplanet Magnetospheres: Hidden Assumptions in the Boundary Conditions,” *Bull. Am. Astr. Soc.*, AAS meeting 234 (June 10–13, 2019), talk abstract 215.01. [\[ADS\]](#)
- ★ Gilbert, C., and Cranmer, S. R. 2019, “Forward Models of Off-Limb Emission Lines in Solar Coronal Holes,” *Bull. Am. Astr. Soc.*, AAS meeting 234 (June 10–13, 2019), poster abstract 106.06. [\[ADS\]](#)
- ★ Van Kooten, S. J., and Cranmer, S. R. 2019, “Preparing for DKIST: Connecting the High-Resolution Sun to the Turbulent Corona,” *Bull. Am. Astr. Soc.*, AAS meeting 234 (June 10–13, 2019), poster abstract 302.04. [\[ADS\]](#)
- ★ Cranmer, S. R., Berger, T. E., Raftery, C. L., and Thayer, J. P. 2019, “Graduate, Undergraduate, and Professional Education in Space Weather at the University of Colorado Boulder,” *99th Annual AMS Meeting*, 16th Conference on Space Weather, January 6-10, 2019, talk abstract 1.5.
- ★ Cranmer, S. R. 2018, “Unsolved Problems in the Middle Corona,” *Eos Trans. AGU*, Fall 2018 Meeting Suppl., abstract SH34A-01 (invited talk).
- ★ Gilbert, C., and Cranmer, S. R. 2018, “Refinement of a Semi-Empirical Model to Understand Spectroscopic Indications of Alfvén Waves in the Solar Corona,” *Eos Trans. AGU*, Fall 2018 Meeting Suppl., abstract SH33H-3729, poster.
- ★ Van Kooten, S. J., and Cranmer, S. R. 2018, “Investigating the Complex Motions of Photospheric Bright Points as a Lower Boundary Condition for Coronal Magnetism,” *Eos Trans. AGU*, Fall 2018 Meeting Suppl., abstract SH23C-3318, poster.

- ★ Gibson, S. E., DeForest, C., Cranmer, S. R., de Koning, C. A., Desai, M. I., Thompson, B. J., Viall, N. M., and Webb, D. F. 2018, “Mysteries of the Young Solar Wind,” *Eos Trans. AGU*, Fall 2018 Meeting Suppl., talk abstract SH43A-05.
- ★ Berger, T. E., Duncan, N. A., Baker, D. N., Thayer, J. P., Cranmer, S. R., Pankratz, C. K., Hurlburt, N. E., and Bosanac, N. 2018, “The Solar Polar Constellation (SPOC) Mission: Combining Operational Full-Sun Magnetic Field Measurements with Polar Exploration,” *Eos Trans. AGU*, Fall 2018 Meeting Suppl., abstract SH41E-3688, poster.
- ★ Cranmer, S. R. 2018, “Corotating Streams in Solar and Stellar Winds,” *Waves, Turbulence, and Large-scale Structures in Rotating Magnetic Fluids: Above and Beyond Geophysical Fluid Dynamics*, National Center for Atmospheric Research (NCAR) Geophysical Turbulence Program (GTP) Workshop, Boulder, Colorado, September 10–14, 2018 (invited talk).
- ★ MacGregor, M., Weinberger, A., Wilner, D., Kowalski, A., and Cranmer, S. 2018, “Detection of a Millimeter Flare from Proxima Centauri,” *20th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun*, Boston, Massachusetts, July 30–August 3, 2018, talk.
- ★ Gilbert, C., and Cranmer, S. R. 2018, “Modeling Spectroscopy to Understand Alfvén Waves and Turbulence in the Solar Corona,” *SHINE 2018 Workshop*, Cocoa Beach, Florida, July 30–Aug 3, 2018, poster. [\[ADS\]](#)
- ★ Molnar, M., Reardon, K., Chai, Y., and Cranmer, S. R. 2018, “Probing the Turbulent Quiet Chromosphere with ALMA, IRIS, and IBIS,” *IRIS–9 Workshop*, Göttingen, Germany, June 25–29, 2018, talk.
- ★ Cranmer, S. R. 2018, “Waves and Turbulence in the Solar Corona: A Surplus of Sources and Sinks,” *Bull. Am. Astr. Soc.*, AAS meeting 232, June 4–7, 2018, talk abstract 405.02. [\[ADS\]](#)
- ★ Cranmer, S. R. 2017, “Waves and Turbulence in the Solar Wind: Disputed Origins and Predicted PSP Spectra,” *Parker Solar Probe Science Working Group (SWG) Meeting*, Johns Hopkins Applied Physics Laboratory, Laurel, Maryland, October 2–6, 2017 (invited talk).
- ★ Cranmer, S. R. 2017, “Kinetic Effects in Coronal Holes and High-Speed Streams: A Roundup of Observational Constraints,” *SHINE 2017 Workshop*, Saint-Sauveur, Quebec, July 24–28, 2017, poster.
- ★ Gilbert, C., and Cranmer, S. R. 2017, “Relating Spectroscopic Measurements of the Solar Corona to Alfvén Waves and Turbulence,” *SHINE 2017 Workshop*, Saint-Sauveur, Quebec, July 24–28, 2017, poster.
- ★ Schiff, A. J., and Cranmer, S. R. 2017, “Exploring the Role of Nonlinear Mode Conversion in the Solar Corona,” *SHINE 2017 Workshop*, Saint-Sauveur, Quebec, July 24–28, 2017, poster.
- ★ Van Kooten, S. J., and Cranmer, S. R. 2017, “Characterizing the Motion of Photospheric Magnetic Bright Points at High Resolution,” *SHINE 2017 Workshop*, Saint-Sauveur, Quebec, July 24–28, 2017, poster.
- ★ Cranmer, S. R. 2017, “What Can Coronal Holes Tell Us About Ion Energization?” *16th RHESSI Workshop / 1st MinXSS Workshop*, Boulder, Colorado, June 19–24, 2017, poster.
- ★ DeForest, C. E., Matthaeus, W. H., Viall, N. M., and Cranmer, S. R. 2016, “Imaging the Top of the Solar Corona and the Young Solar Wind,” *Eos Trans. AGU*, Fall 2016 Meeting Suppl., abstract SH53A-05. [\[ADS\]](#)
- ★ Cranmer, S. R. 2016, “Leaves in the Wind: On the Variety of Radiative and MHD fluctuations in Rotating Solar/Stellar Outflows,” *Turbulence and Waves in Flows Dominated by Rotation*, National Center for Atmospheric Research (NCAR) Geophysical Turbulence Program (GTP) Workshop, Boulder, Colorado, August 15–19, 2016 (invited talk). [\[video link\]](#)

- ★ Cranmer, S. R. 2016, “How Important is Alfvén Wave Heating?” *SHINE 2016 Workshop*, Santa Fe, New Mexico, July 11–15, 2016 (invited scene-setting talk).
- ★ Cranmer, S. R. 2016, “The Origin and Variability of the Slow Solar Wind,” *The Scientific Foundations of Space Weather*, Workshop of the International Space Science Institute (ISSI), Bern, Switzerland, June 27 to July 1, 2016 (invited talk).
- ★ Cranmer, S. R. 2016, “Coronagraphs on the Frontier: Connecting Astronomy, Space Physics, and Plasma Physics,” *Exploring the Geospace Frontier: Quo Vadis?* NCAR Foothills Lab, Boulder, Colorado, May 25–27, 2016 (invited talk).
- ★ Cranmer, S. R. 2016, “Predictions for Dusty Mass Loss from Asteroids during Close Encounters with Solar Probe Plus,” *Dusty Visions Workshop 2016*, Boulder, Colorado, July 22–24, 2016, poster.
- ★ Cranmer, S. R. 2016, “Stirring Coronal Spaghetti: Exploring Multiple Interactions Between MHD Waves and Density Fluctuations,” *Bull. Am. Astr. Soc.*, 2016 SPD meeting, Boulder, Colorado, talk abstract 201.04. [\[ADS\]](#)
- ★ Cranmer, S. R. 2015, “The Role(s) of Electrons in the Turbulent Corona and Solar Wind,” *SHINE 2015 Workshop*, Stowe, Vermont, July 6–10, 2015 (invited scene-setting talk).
- ★ Cranmer, S. R. 2015, “Driving Jets and Spicules with Alfvén Waves: The Idea That Won’t Go Away,” *IRIS–4 Workshop*, Boulder, Colorado, May 18–22, 2015, contributed talk. [\[video link\]](#)
- ★ Cranmer, S. R. 2014, “Waves and Turbulence in the Corona and Solar Wind,” *SHINE 2014 Workshop*, Telluride, Colorado, June 23–27, 2014 (invited scene-setting talk).
- ★ Cranmer, S. R. 2014, “Turbulence-Driven Solar Wind Models in 2014: Filling in the Gaps,” *SHINE 2014 Workshop*, Telluride, Colorado, June 23–27, 2014 (Poster).
- ★ Cranmer, S. R. 2014, “Solar/Stellar Granulation as the Key Lower Boundary Condition for Coronal Heating and Wind Acceleration,” *Bull. Am. Astr. Soc.*, AAS meeting 224, Talk 211.06. [\[ADS\]](#)
- ★ Cranmer, S. R., and Woolsey, L. N. 2013, “Turbulent Dissipation and Kinetic Heating in the Solar Wind: Benefits of an Ensemble Simulation Approach,” *Eos Trans. AGU*, Fall 2013 Meeting Suppl., abstract SH41F-04 (invited talk). [\[ADS\]](#)
- ★ Miralles, M. P., Landi, E., Cranmer, S. R., Raymond, J. C., Cohen, O., and Oran, R. 2013, “Determining the Coronal Origin of the Slow Solar Wind Using Remote Sensing and In Situ Observations,” *Eos Trans. AGU*, Fall 2013 Meeting Suppl., abstract SH32A-05. [\[ADS\]](#)
- ★ Woolsey, L. N., and Cranmer, S. R. 2013, “Turbulent Heating and Wave Pressure in Solar Wind Acceleration Modeling: New Insights to Empirical Forecasting of the Solar Wind,” *Eos Trans. AGU*, Fall 2013 Meeting Suppl., abstract SH43A-03. [\[ADS\]](#)
- ★ Miralles, M. P., Landi, E., Cranmer, S. R., Raymond, J. C., Cohen, O., and Oran, R. 2013, “Comparison of Coronal Streamer Properties to Solar Wind Models For The Last Two Solar Cycle Minima,” *Bull. Am. Astr. Soc.*, 2013 AAS/SPD meeting, Bozeman, Montana, poster 100.28. [\[ADS\]](#)
- ★ Asgari-Targhi, M., van Ballegoijen, A. A., Cranmer, S. R., and DeLuca, E. E. 2013, “The Spatial and Temporal Dependence of Coronal Heating by Alfvén Wave Turbulence,” *Bull. Am. Astr. Soc.*, 2013 AAS/SPD meeting, Bozeman, Montana, poster 305.01. [\[ADS\]](#)
- ★ Woolsey, L. N., and Cranmer, S. R. 2013, “Turbulence-Driven Coronal Heating Models: New Insights and Improvements to Empirical Forecasting of the Solar Wind,” *SHINE 2013 Workshop*, Buford, Georgia, June 24–28, 2013 (poster).

- ★ Cranmer, S. R. 2013, “Turbulence as a Unifying Principle in Coronal Heating and Solar Wind Acceleration,” *2013 LWS/SDO Science Workshop*, Cambridge, Maryland, March 3–8, 2013 (invited talk).
- ★ Brickhouse, N. S., Cranmer, S. R., Dupree, A. K., Wolk, S. J., and Guenther, H. M. 2013, “X-ray Measurements of Variable Accretion onto the Young Star TW Hydrae,” *Bull. Am. Astr. Soc.*, AAS meeting 222, talk abstract 310.04. [\[ADS\]](#)

Colloquia, Seminars, and Outreach Presentations (most recent 10 year period)

- ★ Cranmer, S. R. “Hidden Plasma Physics in the Sun’s Coronal Heating Problem,” October 7, 2023, *Colorado Plasma Retreat 2023*, Center for Integrated Plasma Studies, Boulder, Colorado.
- ★ Cranmer, S. R., “Into the Fire: Plasma Physics of the Turbulent Solar Corona,” March 28, 2023, *Joint Princeton–CCA Heliophysics Seminar*, Flatiron Institute, New York City.
- ★ Cranmer, S. R., two lectures for the 2022 Boulder Space Weather Summer School: (1) “Numerical Methods for Simulating Space Plasmas,” and (2) “The Solar Atmosphere.” July 18–29, 2022, Boulder, Colorado.
- ★ Cranmer, S. R. “Solar Wind Origin and Acceleration: Unraveling the Multi-Scale Physics,” December 20, 2021, *Solar Orbiter Remote Sensing Working Group (RSWG)* invited seminar.
- ★ Cranmer, S. R. “Working Group 1C Introduction and Overview,” August 10, 2021, Second PUNCH Science Meeting, Boulder, Colorado.
- ★ Cranmer, S. R. “Working Group 1C Overview: How will PUNCH map the Sun’s Alfvén surface/zone/region?” December 3, 2020, Second PUNCH Science Team Meeting, Boulder, Colorado.
- ★ Cranmer, S. R. “Two Line-of-Sight Effects to Keep in Mind when Flow-Mapping,” November 19, 2020, PUNCH Flow Mapping Workshop (virtual).
- ★ Cranmer, S. R. “Working Group 1C Overview: How will PUNCH map the Sun’s Alfvén surface/zone/region?” June 3, 2020, First PUNCH Science Team Meeting, Boulder, Colorado.
- ★ Cranmer, S. R., “Plasma Unbound: New Insights into Heating the Solar Corona and Accelerating the Solar Wind,” October 7, 2019, University of Colorado Boulder, Department of Astrophysical & Planetary Sciences Colloquium.
- ★ Cranmer, S. R., two lectures for the 2019 Boulder Space Weather Summer School: (1) “Numerical Methods for Simulating Space Plasmas,” and (2) “The Solar Atmosphere.” July 8–19, 2019, High Altitude Observatory, Boulder, Colorado.
- ★ Cranmer, S. R., “TREC Educational Efforts: Across Campus and Beyond,” April 1, 2019, Space Weather TREC Science Advisory Board (SAB) Meeting, University of Colorado Boulder.
- ★ Cranmer, S. R., DeForest, C. E., Gibson, S. E., de Koning, C., Pizzo, V., and the PUNCH Science Team, 2019, “Imaging the Corona and Young Solar Wind in 3D with PUNCH,” March 12, 2019, poster presented at Boulder Solar Day, High Altitude Observatory.
- ★ Cranmer, S. R., “Turbulent Origins of Solar and Stellar Winds,” November 28, 2018, Colloquium, Columbia University Department of Astronomy, New York City.
- ★ Cranmer, S. R., three lectures for the 2018 Boulder Space Weather Summer School: (1) “Introduction and Overview,” (2) “The Solar Atmosphere,” and (3) “Modeling the Solar Wind and IMF with WSA-ENLIL.” July 9–20, 2018, High Altitude Observatory.

- ★ Cranmer, S. R., “Turbulent Origins of Solar-type Coronae and Winds: Current Thoughts,” May 31, 2018, ISSI Team Meeting on the Solar and Stellar Wind Connection: Heating Processes and Angular Momentum Loss (Skype talk).
- ★ Cranmer, S. R. “What do we know about the Physics of Energy Transport in Solar/Stellar Coronae and Winds?” April 3, 2018, talk at NSO’s monthly Solar Focus Meeting, Boulder.
- ★ Cranmer, S. R. “Parker Solar Probe: Will it Revolutionize Our Understanding of the Sun (and Exoplanets?),” March 15, 2018, invited presentation at Boulder Solar Day, High Altitude Observatory.
- ★ Cranmer, S. R., “Ripples in the Solar Wind,” December 4, 2017, University of Colorado Boulder, APS Department Undergraduate Research Symposium.
- ★ Cranmer, S. R., “Did Coronal Mass Ejections Contribute to the Young Sun’s Mass Loss?” February 15, 2017, talk at the CU/NSO Solar-Stellar Connections Workshop, Boulder.
- ★ Cranmer, S. R., “How Will DKIST Help Validate or Falsify Models of Coronal Heating From Waves/Turbulence?” February 14, 2017, talk at NSO’s monthly Solar Focus Meeting, Boulder.
- ★ Cranmer, S. R., “Circumstellar Turbulence: Is There Anything It Can’t Do?” October 13, 2016, Colloquium, High Altitude Observatory (HAO).
- ★ Cranmer, S. R., “Predictions for Dusty Mass Loss from Asteroids during Close Encounters with Solar Probe Plus,” October 7, 2016, science talk presented at the Solar Probe Plus (SPP) Science Working Group (SWG) teleconference.
- ★ Cranmer, S. R., “Turbulent Origins of Solar and Stellar Winds,” September 23, 2016, University of Colorado Boulder, Faculty Research Talk.
- ★ Cranmer, S. R., “Solar Wind Acceleration: Puzzles, Progress, and (DKIST) Prospects,” August 3, 2016, National Solar Observatory Brown Bag Lunch Talk, Boulder.
- ★ Cranmer, S. R., “Hale Collaborative Graduate Education (COLLAGE) Program Update,” May 11, 2016, National Solar Observatory Users’ Committee Meeting, Boulder.
- ★ Cranmer, S. R., “Turbulent Origins of Solar and Stellar Winds,” October 20, 2015, University of Colorado Boulder, Faculty Research Talk.
- ★ Cranmer, S. R., “Coronal Science: Preparing for the DKIST Era,” October 15, 2015, DKIST 2015 Science Working Group Meeting, Boulder, Colorado.
- ★ Cranmer, S. R., “Solar Magnetism and Activity: Progress, Puzzles, and Prospects,” September 2, 2015, *HAO: Past, Present, and Future: Three-day celebration of the 75th anniversary of the High Altitude Observatory*, Boulder, Colorado. [[video link](#)]
- ★ Cranmer, S. R., “Turbulent Origins of Solar and Stellar Winds,” May 7, 2015, Canadian Institute for Theoretical Astrophysics (CITA) Seminar, Toronto, Canada. [[video link](#)]
- ★ Cranmer, S. R., “Solar Wind Turbulent Dissipation: A Collisionless Zoo,” April 28, 2015, University of Colorado Boulder, LASP Friends of the Magnetosphere (FOM) Seminar.
- ★ Cranmer, S. R., “Solar and Stellar Winds: Progress, Puzzles, and Prospects,” March 5, 2015, University of Colorado Boulder, LASP Science Seminar.
- ★ Cranmer, S. R., “Turbulent Origins of Solar and Stellar Winds,” January 27, 2015, University of Colorado Boulder, Faculty Research Talk.

- ★ Cranmer, S. R., “Stellar Winds Across the H-R Diagram,” July 3, 2014, Harvard-Smithsonian CfA Summer Colloquium.
- ★ Cranmer, S. R., “Sweeping Overview of Plasma Diagnostics in Solar Physics and Astrophysics,” May 5, 2014, New England Space Science Consortium (NESSC) meeting on *Diagnostics in Laboratory, Heliospheric, and Astrophysical Plasmas*, Massachusetts Institute of Technology.
- ★ Cranmer, S. R., “Turbulent Origins of Solar and Stellar Winds,” November 20, 2013, Colloquium, High Altitude Observatory (HAO). [\[video link\]](#)
- ★ Cranmer, S. R., “Turbulent Origins of Coronal Heating and the Solar Wind,” October 29, 2013, New England Space Science Consortium (NESSC) meeting on *Turbulence in Laboratory, Heliospheric, and Astrophysical Plasmas*, Harvard-Smithsonian CfA.
- ★ Cranmer, S. R. “Studying the Sun: Why and How?” October 17, 2013, Solar BigData Video Conference, Harvard-Smithsonian CfA.
- ★ Cranmer, S. R. “Turbulence as a Unifying Principle in Coronal Heating and Solar/Stellar Wind Acceleration,” April 29, 2013, Harvard-Smithsonian CfA Solar, Stellar, and Planetary Sciences Division Seminar.
- ★ Cranmer, S. R. “How Stars Gain Mass,” April 15, 2013, Overview talk given to visiting students and faculty from Phillips Academy, Andover, Massachusetts.
- ★ Cranmer, S. R. “Turbulent Origins of the Solar Wind,” April 3, 2013, Brown University Astrophysics Seminar Series (‘BASS’), Providence, Rhode Island.
- ★ Cranmer, S. R., “Turbulent Origins of the Solar Wind,” July 27, 2012, Tutorial talk for solar REU (Research Experiences for Undergraduates) summer students.