

SHANE W. DAVIS

Dept. of Astronomy, U. of Virginia, P.O. Box 400325, Charlottesville, VA 22904-4325, (434) 924-4898

EDUCATION

University of California, Santa Barbara, CA, Ph.D., Physics	2006
Carnegie Mellon, Pittsburgh, PA, B.S., Physics, with University Honors	2000

EMPLOYMENT

Associate Professor,	Sep. 2020 - present
Assistant Professor,	Aug. 2014 - Aug. 2020
Department of Astronomy, University of Virginia, Charlottesville, VA	
Senior Research Associate,	Sep. 2012 - July 2014
Postdoctoral Fellow,	Sep. 2010 - Aug. 2012
Canadian Institute of Theoretical Astrophysics, University of Toronto, Toronto, ON	
Postdoctoral Fellow,	Sep. 2006 - Aug. 2010
School of Natural Sciences, Institute for Advanced Study, Princeton, NJ	
Graduate Research and Teaching Assistant,	Sep. 2000 - Aug. 2006
Department of Physics, University of California, Santa Barbara, CA	
Undergraduate Research and Teaching Assistant,	Sep. 1998 - Aug. 2000
Department of Physics, Carnegie Mellon, Pittsburgh, PA	

HONORS AND AWARDS

All-University Teaching Award, U. of Virginia,	2019
Kavli Frontiers of Science Fellow, NAS,	2016, 2018
Mead Honored Faculty, U. of Virginia,	2016
Alfred P. Sloan Research Fellowship,	2015
Beatrice D. Tremaine Award, CITA,	2012
Chandra Fellowship, NASA,	2006
Phi Beta Kappa and Phi Kappa Phi Honor Societies,	2000
Barry M. Goldwater Scholarship,	1999

REFEREED PUBLICATIONS

A NASA ADS linked list is maintained at www.astro.virginia.edu/~swd8g under the publications link, h-index=37, total citations=4737, normalized citations=1253 (ADS, April 2021)

Publications at U. of Virginia

57. The black hole spin in GRS 1915+105, revisited
Mills, B. S., **Davis, S. W.** & Middleton, M. J., ApJ, in press
56. MHD Simulations of AGN Disk and Jets
Davis, S. W. & Tchekhovskoy, A., 2020, ARA&A, 58, 407
55. Time Dependent Radiation Hydrodynamics on a Moving Mesh
Chang, P., **Davis, S. W.**, & Jiang, Y.-F., MNRAS, 2020, MNRAS, 493, 5397
54. Dusty Cloud Acceleration with Multiband Radiation
Huang, X., **Davis, S. W.**, & Zhang, D., 2020, ApJ, 893, 50
53. Covariant Radiative Transfer for Black Hole Spacetimes
Davis, S. W. & Gammie, C. F., 2020, ApJ, 888, 94
52. Global Radiation Magneto-hydrodynamic Simulations of Sub-Eddington Accretion Disks around Supermassive Black Holes
Jiang, Y.-F., Blaes, O. M., Stone, J. M., & **Davis, S. W.**, 2019, ApJ, 885, 144
51. *Super-Eddington Accretion Disks around Supermassive black Holes*
Jiang, Y.-F., Stone, J. M., & **Davis, S. W.**, 2019, ApJ, 880, 67
50. Spectral Hardening in Black Hole Accretion: Giving Spectral Modelers an f
Davis, S. W. & El-Abd, S., 2019, ApJ, 874, 23
49. *Dusty Cloud Acceleration by Radiation Pressure in Rapidly Star-Forming Galaxies*
Zhang, D., & **Davis, S. W.**, Jiang, Y.-F., & Stone, J. M., 2018, ApJ, 854, 110
48. *Radiation Hydrodynamic Simulations of Dust-driven Winds*
Zhang, D., & **Davis, S. W.**, 2017, ApJ, 839, 54
47. *A Broadband X-Ray Spectral Study of the Intermediate-mass Black Hole Candidate M82 X-1 with NuSTAR, Chandra, and Swift*
Brightman, M., Harrison, F. A., Barret, D., **Davis, S. W.**, Furst, F., Madsen, K. K., Middleton, M., Miller, J. M., Stern, D., Tao, L., Walton, D. J., 2016, ApJ, 829, 28
46. *Iron Opacity Bump Changes the Stability and Structure of Accretion Disks in Active Galactic Nuclei*
Jiang, Y.-F., **Davis, S. W.**, & Stone, J. M., 2016, ApJ, 827, 10
45. *X-ray polarimetry with the Polarization Spectroscopic Telescope Array (PolSTAR)*
Krawczynski, H. S., Stern, D., Harrison, F. A., et al. (+52 authors, with **Davis, S. W.** listed alphabetically), 2016, Astroparticle Physics, 75, 8
44. *Radiation Feedback in ULIRGS: Are Photons Movers and Shakers?*
Davis, S. W., Jiang, Y.-F., Stone, J. M., & Murray, N., 2014, ApJ, 796, 107
43. *A Global Three Dimensional Radiation Magnetohydrodynamic Simulation of Super-Eddington Accretion Disks*
Jiang, Y.-F., Stone, J. M., & **Davis, S. W.**, 2014, ApJ, 796, 106
42. An Algorithm for Radiation Magnetohydrodynamics Based on Solving the Time-dependent Transfer Equation
Jiang, Y.-F., Stone, J. M., & **Davis, S. W.**, 2014, ApJS, 213, 7

41. *Dynamics of warped accretion discs*
Tremaine, S. & **Davis, S. W.**, 2014, MNRAS, 441, 1408
40. *Radiation Magneto-hydrodynamic Simulations of the Formation of Hot Accretion Disk Coronae*
Jiang, Y.-F., Stone, J. M. & **Davis, S. W.**, 2014, ApJ, 784, 169
39. *Line Driven Winds and the UV Turnover in AGN Accretion Disks*
Laor, A. & **Davis, S. W.**, 2014, MNRAS, 438, 3024
38. *The Effects of Irradiation on the Cloud Evolution in Active Galactic Nuclei*
Proga, D., Jiang, Y.-F., **Davis, S. W.**, Stone, J. M., & Smith, D., 2014, ApJ, 780, 51
37. *On the Thermal Stability of Radiation Dominated Disks*
Jiang, Y.-F., Stone, J. M. & **Davis, S. W.**, 2013, ApJ, 778, 65
36. *Saturation of the MRI in Strongly Radiation Dominated Accretion Disks*
Jiang, Y.-F., Stone, J. M. & **Davis, S. W.**, 2013, ApJ, 767, 148
35. *Non-linear Evolution of Rayleigh-Taylor Instability in a Radiation Supported Atmosphere*
Jiang, Y.-F., **Davis, S. W.** & Stone, J. M., 2013, ApJ, 763, 102
34. *The Eye of the Storm: Light from the Inner Plunging Region of Black Hole Accretion Disks*
Zhu, Y., **Davis, S. W.**, Narayan, R., Kulkarni, A., Penna, R. A., & McClintock, J. E., 2012, MNRAS, 424, 2504
33. *Intrinsic Disc Emission and the Soft X-ray Excess in AGN*
Done, C., **Davis, S. W.**, Jin, C., Blaes, O. M., and Ward, M., 2012, MNRAS, 420, 1848
32. *A Godunov Method for Multidimensional Radiation Magnetohydrodynamics based on a variable Eddington tensor*
Jiang, Y.-F., Stone, J. M., & **Davis, S. W.**, 2012, ApJS, 199, 14
31. *A Radiation Transfer Solver for Athena using Short Characteristics*
Davis, S. W., Stone, J. M., & Jiang, Y.-F., 2012, ApJS, 199, 9
30. *The Extreme Spin of the Black Hole in Cygnus X-1*
Gou, L., McClintock, J. E., Reid, M. J., Orosz, J. A., Steiner, J. F., Narayan, R., Xian, J., Remillard, R. A., Arnaud, K. A., & **Davis, S. W.**, 2011, ApJ, 742, 85
29. *Cold Accretion Disks and Lineless Quasars*
Laor, A., & **Davis, S. W.**, 2011, MNRAS, 417, 681
28. *Measuring Black Hole Spin by the Continuum-Fitting Method: Effect of Deviations from the Novikov-Thorne Disc Model*
Kulkarni, A. K., Penna, R. F., Shcherbakov, R. V., Steiner, J. F., Narayan, R., McClintock, J. E., Sadowski, A., Zhu, Y., **Davis, S. W.**, & McKinney, J. C., 2011, MNRAS, 414, 1183
27. *Measuring the Spins of Accreting Black Holes*
McClintock, J. E., Narayan, R., **Davis, S. W.**, Gou, L., Kulkarni, A., Orosz, J. A., Penna, R. F., Remillard, R. A., Steiner, J. F. 2011, Classical and Quantum Gravity, 28, 114009
26. *The Cool Accretion Disk in ESO 243-49 HLX-1: Further Evidence of an Intermediate Mass Black Hole*
Davis, S. W., Narayan, R., Zhu, Y., Barret, D., Farrell, S. A., Godet, O., Servillat, M., & Webb, N. A., 2011, ApJ, 734, 111
25. *The X-Ray Polarization Signature of Quiescent Magnetars: Effect of Magnetospheric Scattering and Vacuum Polarization*
Fernández, R. & **Davis, S. W.**, 2011, ApJ, 730, 131

24. *The Radiative Efficiency of Accretion Flows in Individual AGN*
Davis, S. W. & Laor, A., 2011, ApJ, 728, 98
23. *Erratum: Precise Measurement of the Spin Parameter of the Stellar-Mass Black Hole M33 X-7*
Liu, J., McClintock, J. E., Narayan, R., **Davis, S. W.**, & Orosz, J. A. 2010, ApJ, 719, 109
22. *Testing Accretion Disk Structure with Suzaku Data of LMC X-3*
Kubota, A., Done, C., **Davis, S. W.**, Dotani, T., Mizuno, T., & Ueda, Y., 2010, ApJ, 714, 860
21. *Sustained Magnetorotational Turbulence in Local Simulations of Stratified Disks with Zero Net Magnetic Flux*
Davis, S. W., Stone, J. M., & Pessah, M. E. 2010, ApJ, 713, 52
20. *The Effects of Magnetic Fields and Inhomogeneities on Accretion Disk Spectra and Polarization*
Davis, S. W., Blaes, O. M., Hirose, S., & Krolik, J. H. 2009, 703, 569
19. *A Determination of the Spin of the Black Hole Primary in LMC X-1*
Gou, L., McClintock, J. E., Liu, J., Narayan, R., Steiner, J. F., Remillard, R. A., Orosz, J. A., **Davis, S. W.**, Ebisawa, K., & Schlegel, E. M. 2009, ApJ, 701, 1076
18. *The Eddington Limit in Cosmic Rays: An Explanation for the Observed Faintness of Starbursting Galaxies*
Socrates, A., **Davis, S. W.**, & Ramirez-Ruiz, E. 2008, ApJ, 687, 202
17. *Angular Momentum Transport in Accretion Disks and its Implications for Spin Estimates in Black Hole Binaries*
Done, C. & **Davis, S. W.** 2008, ApJ, 683, 389
16. *Precise Measurement of the Spin Parameter of the Stellar-Mass Black Hole M33 X-7*
Liu, J., McClintock, J. E., Narayan, R., **Davis, S. W.**, & Orosz, J. A. 2008, ApJL, 679, 37
15. *The UV Continuum of Quasars: Models and SDSS Spectral Slopes*
Davis, S. W., Woo, J.-H., & Blaes, O., M. 2007, ApJ, 668, 682
14. *Black Hole Spin in GRS 1915+105*
Middleton, M., Done, C., Gierlinski, M., & **Davis, S. W.** 2006, MNRAS, 373, 1004
13. *The Spin of the Near-Extreme Kerr Black Hole GRS 1915+105*
McClintock, J. E., Shafee, R., Narayan, R., Remillard, R. A., **Davis, S. W.**, & Li, L.-X. 2006, ApJ, 652, 518
12. *Ultraluminous X-ray Sources Powered by Radiatively Efficient Two-Phase Super-Eddington Accretion onto Stellar Mass Black holes*
Socrates, A., & **Davis, S. W.** 2006, ApJ, 651, 1049
11. *Testing Accretion Disk Theory in Black Hole X-ray Binaries*
Davis, S. W., Done, C. & Blaes, O. M. 2006, ApJ, 647, 525
10. *Magnetic pressure support and accretion disk spectra*
Blaes, O. M., **Davis, S. W.**, Hirose, S., Krolik, J. H., & Stone, J. M. 2006, ApJ, 645, 1402
9. *A Grid of Relativistic, non-LTE Accretion Disk Models for Spectral Fitting of Black Hole Binaries*
Davis, S. W., & Hubeny, I. 2006, ApJS, 164, 530
8. *Estimating the Spin of Stellar-Mass Black Holes via Spectral Fitting of the X-ray Continuum*
Shafee, R., McClintock, J. E., Narayan, R., **Davis, S. W.**, Li, L.-X., & Remillard, R. A. 2005, ApJ, 636, 113
7. *The Effects of Photon Bubble Instability in Radiation-Dominated Accretion Disks*
Turner, N. J., Blaes, O. M., Socrates, A., Begelman, M. C., & **Davis, S. W.** 2005, ApJ, 624, 267

6. *Relativistic Accretion Disk Models of High State Black Hole X-ray Binary Spectra*
Davis, S. W., Blaes, O. M., Hubeny, I., & Turner, N. J., 2005, ApJ, 621, 327
5. *Multiwavelength Observations of Radio Galaxy 3C 120 with XMM-Newton*
Ogle, P. M., **Davis, S. W.**, Antonucci, R. R. J., Colbert, J. W., Malkan, M. A., Page, M. J., Sasseen, T. P., & Tornikoski, M. 2005 ApJ, 618, 139
4. *Turbulent Comptonization in Black Hole Accretion Disks*
Socrates, A., **Davis, S. W.**, & Blaes O. 2004, ApJ, 601, 405
3. *The origin of the Fe K features in Markarian 205 and Markarian 209*
Page, M. J., **Davis, S. W.**, & Salvi, N. J. 2003, MNRAS, 343, 1241-1247
2. *The X-ray spectrum of the Seyfert 1 galaxy Mrk 766: Dusty Warm Absorber or Relativistic Emission Lines?*
Mason, K. O., Branduardi-Raymont, G., Ogle, P. M., Page, M. J., Puchnarewicz, E. M., Behar, E., Cordova, F. A., **Davis, S.**, Maraschi, L., McHardy, I. M., O'Brien, P. T., Friedhorsky, W. C., & Sasseen, T. P. 2003, ApJ 582, 95
1. *Cluster-based Monte Carlo Simulation of Ferrofluids*
Davis, S. W., McCausland, W., McGahagan, H. C., Tanaka, C. T., & Widom, M. 1999, Phys. Rev. E, 59, 2424

GRANTS AND RESEARCH SUPPORT

co-PI, NASA Theoretical and Computational Astrophysics Networks, \$448K (UVa subaward) “Global models of accretion and outflows in astrophysical disks: A new DAWN” (1 June 2021 - 31 May 2024)

co-I, NASA LISA Preparatory Science, \$9K (UVa subaward) “Electromagnetic and Gravitational Wave Signatures of LISA Massive Black Hole Binaries” (15 May 2019 - 14 May 2022)

co-I, NASA LISA Preparatory Science, \$9K (UVa subaward) “Electromagnetic and Gravitational Wave Signatures of LISA Massive Black Hole Binaries” (15 May 2019 - 14 May 2022)

PI, NASA ATP, \$334K, “Spectral Models of X-ray Binaries and Ultraluminous X-ray Sources from Radiation Magnetohydrodynamics Simulations” (1 Jun 2018 - 31 May 2021)

PI, NSF AAG, \$359K, “The Physics of Star Formation Feedback and Molecular Cloud Destruction” (1 Sep 2016 - 31 Aug 2019)

co-I, NASA ATP, \$426K, “Coupled hydrodynamic and chemical/spectral modeling of high-mass star-forming cores” (1 Feb 2018 - 31 Jan 2021)

co-I, NASA ATP, \$386K “Exoplanetary MHD Outflows Driven by EUV Heating, Lyman alpha Radiation Forces and Stellar Tides” (1 Jun 2018 - 31 May 2021)

PI, \$50K, Alfred P. Sloan Research Fellowship (Sep. 1, 2015 - Aug. 31, 2017)

PI, \$20K, Virginia Space Grant Consortium, New Investigator Award (1 Jun 2016 - 31 May 2017)

COLLOQUIA, INVITED TALKS, AND SEMINARS (U. OF VIRGINIA)

Physics Colloquium, Technion, Haifa, Israel, Jan. 27, 2021

Center for Computational Relativity and Gravitation Seminar, Rochester Institute of Technology, Rochester, NY, Feb. 28, 2020

Astronomy Colloquium, U. of Michigan, Ann Arbor, MI, Nov. 21, 2019

Astrophysics Seminar, Michigan State U., East Lansing, MI, Nov. 20 2019

Invited talk and SOC member, Accretion Signatures of the Earliest Black Holes in the Universe, Princeton, NJ, Apr. 4, 2019

Center for Relativistic Astrophysics Seminar, Georgia Tech, Atlanta, GA, Mar. 14, 2019

Invited review, Radiative signatures from the cosmos, Paris, France, Oct. 27, 2018

Session organizer, Kavli Frontiers Meeting, Nanjing, China, Oct. 18, 2018

Invited talk, Chandra Workshop on Accretion in Stellar Systems, Boston, MA, Aug. 10, 2018

Invited talk, COSPAR Session: The Extreme Physics of Eddington and Super Eddington Accretion onto Compact Objects, Pasadena, CA, July, 20, 2018

Astronomy Colloquium, Durham U., Durham, UK, Jan. 24, 2018

Astronomy Seminar, U. of Southampton, Southampton, UK, Jan. 22, 2018

Anton Pannekoek Institute Colloquium, U. of Amsterdam, Amsterdam, Netherlands, Jan. 17, 2018

DARK Seminar, Niels Bohr Institute, Copenhagen, Denmark, Jan. 16, 2018

Niels Bohr International Academy Astropartical Seminar, Niels Bohr Institute, Copenhagen, Denmark, Jan. 15, 2018

Astronomy Seminar, U. of Waterloo, Waterloo, Canada, Sep. 14, 2017

Cosmology Seminar, Perimeter Institute, Waterloo, Canada, Sep. 13, 2017

Invited Talk, EWASS 2017, Prague, Czech Republic, June 29, 2017

Invited Talk, AGN Driven Winds, Haifa, Israel, May 24, 2017

Physics Colloquium, James Madison, U., Harrisonburg, VA, Mar. 23, 2017

Physics Colloquium, U. of Wisconsin-Milwaukee, Milwaukee, WI, Mar. 9, 2017

Astrophysics Seminar, Johns Hopkins U., Baltimore, MD, Sep. 8, 2016

Invited Talk, Simulations and Modelling of Relativistic MHD Accretion Disks, Oxford, UK, July, 11, 2016

Invited Talk, Stellar Remnants at the Junction: Comparing Accreting White Dwarfs, Neutron Stars, and Black Holes, Junction, TX, USA, May 5, 2016

Special Seminar, U. of Bern, Bern, Switzerland, Feb. 29, 2016

Informal Seminar, Institute for Advanced Study, Princeton, NJ, USA, Nov. 19, 2015

Invited Talk, The Physics of Supermassive Black Hole Formation and Feedback, Annapolis, MD, USA, Oct. 13, 2015

Astronomy Colloquium, U. of California, Los Angeles, CA, USA, Mar. 11, 2015

Invited Talk, Compact Objects as Astrophysical and Gravitational Probes, Leiden, Netherlands, Feb. 2, 2015

Astronomy Colloquium, Caltech, Pasadena, CA, USA, Oct. 8, 2015

High Energy Seminar, Max Planck Institute for Astrophysics, Garching, Germany, Aug. 29, 2014

Cosmology Seminar, Max Planck Institute for Astrophysics, Garching, Germany, Aug. 26, 2014

NATIONAL/INTERNATIONAL SERVICE

Peer Reviewer for A&A, ApJ, ApJL, CQGra, Nature, MNRAS, PASP, Gemini TAC, National Science Center Poland, South Carolina Established Program to Stimulate Competitive Research, US-Israel Binational Science Foundation

Panel Reviewer for NASA (3 times) and National Science Foundation (5 times)

External Thesis Committee Member: Yucong Zhu (Harvard), Edwin Chan (Johns Hopkins), Benny Tsang (U. of Texas)

TEACHING AND SERVICE (U. OF VIRGINIA)

UVa personnel supervised: 1 postdoctoral associate, 3 graduate students, 13 graduate research commit-tees, and 18 undergraduate researchers

Courses Taught: High Energy Astrophysics (3); Intro to Astrophysics I; Intro. to Stars, Galaxies, and the Universe; Black Holes (4)

Committee Assignments: Colloquium committee, Computing Committee, Plan for the Future Com-mittee, BA Majors Advisor, and Astronomy Minors Advisor

OUTREACH AND DIVERSITY PROMOTION (U. OF VIRGINIA)

Research Mentor (4 students to date) in UVa-Spelman Collaboration and VA-NC Alliance Summer Research Program

Public Talk, Cocktails and Conversations, Vitae Distillery, Charlottesville, June 2019

Speaker, Girls Exploring the Universe, Charlottesville, July 2017

Speaker, Building Leaders for Advancing Science and Technology (BLAST), Charlottesville, 2018, 2019

Public Talks, Charlottesville Astronomical Society, Apr. 2017, Feb. 2020

Public Talks, McCormick Observatory Public Night 2014-present (annually)