

Scott W. Randall – Vita

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CURRENT POSITION:

2021 - present Astrophysicist, Team Leader, Chandra Science Operations Mission Planning Team,
Chandra X-ray Center, High Energy Astrophysics Division, Harvard-Smithsonian Center for
Astrophysics, Cambridge, MA

PREVIOUS POSITIONS:

2010 - 2021 Astrophysicist, *Chandra X-ray Center*, High Energy Astrophysics Division, Harvard-
Smithsonian Center for Astrophysics, Cambridge, MA
2007 - 2010 Mission Planner, *Chandra X-ray Observatory* Science Operations Team, Harvard-
Smithsonian Center for Astrophysics, Cambridge, MA
2004 - 2007 Postdoctoral Research Associate, Harvard-Smithsonian Center for Astrophysics, Cam-
bridge, MA
1998 - 2004 Graduate Research Assistant, University of Virginia, Charlottesville, VA
1997 - 1998 Programmer/CIAO Developer, *Chandra X-ray Center*, Cambridge, MA

EDUCATION:

2005 Ph.D., Astronomy, University of Virginia, Charlottesville, VA
2000 M.S., Astronomy, University of Virginia, Charlottesville, VA
1997 B.A., Physics & Astronomy (with honors), Wesleyan University, Middletown, CT

RESEARCH INTERESTS:

- X-ray and High-Energy Astrophysics
- Clusters of Galaxies
- AGN Feedback
- Large Scale Structure and Cosmology
- Dark Matter

PROFESSIONAL ACTIVITIES:

2022, Co-chair, *Swift* Cycle 19 Proposal Review Panel
2022, SAO Predoctoral Thesis Committee Member, Wonki Lee
2022 PhD Thesis Committee Member, Arnab Sakar (University of Kentucky)
2022 PhD Thesis Committee Member, Gabriella Alvarez (Vanderbilt University)
2022 Member, AXIS Science Working Group: Galaxy Evolution
2022 Member, LEM Science Working Group: The IGM
2022 Member, Missions Panel, HEAD 10-year Strategic Plan Working Group, SAO
2020 Qualifying Exam Committee Member, Arnab Sakar (University of Kentucky)
Council Member, SAO Council, 2017 - 2020
SOC Member, *Chandra Science for the Next Decade*, Cambridge, MA, 2016
Co-Leader, X-ray Surveyor Science Working Group: Physics of Feedback: Feedback in Clusters
Member, X-ray Surveyor Science Working Group: Physics of Feedback
Member, X-ray Surveyor Science Working Group: Cycles of Baryons in and Out of Galaxies

Member, X-ray Surveyor Science Working Group: Physics of Plasmas
Member, Athena Science Working Group 1.2: The Astrophysics of Galaxy Groups and Clusters
Member, Athena Ground System Working Group 5.1: Scientific Ground Segment
Reviewer, *The Royal Society*, Royal Society Scientific Meeting Proposal, 2017
Reviewer, *Chilean National Science and Technology Commission*, FONDECYT grant proposal, 2016
Reviewer, NASA Postdoctoral Program, 2015
Member, *NuSTAR* Cycle 1 Proposal Review Panel, 2015
Reviewer, *Netherlands Organisation for Scientific Research* TOP-grant proposal, 2013
Member, *XMM-Newton* Cycle 13 Proposal Review Panel, 2013
Member, *XMM-Newton* Cycle 12 Proposal Review Panel, 2012
Member, *Suzaku* Cycle 7 Proposal Review Panel, 2012
Member, *Suzaku* Cycle 5 Proposal Review Panel, 2010
Referee, *Publications of the Astronomical Society of Japan* ('22)
Referee, *Astronomy & Astrophysics* ('13, '15, '18)
Referee, *Science* ('14)
Referee, *Publications of the Astronomical Society of the Pacific* ('14)
Referee, *Monthly Notices of the Royal Astronomical Society* ('09, '11, '12, '13, '14, '15, '16, '17, '19, '20, '21, '22)
Referee, *Astrophysical Journal* and *Astrophysical Journal Letters* ('08, '11, '12, '13)
Referee, *Advances in Space Research* ('06)

PROFESSIONAL SOCIETIES:

American Astronomical Society
American Astronomical Society High Energy Astrophysics Division
International Astronomical Union

HONORS AND AWARDS:

Special Act Award (award for outstanding performance in mission planning), Smithsonian Astrophysical Observatory, 2020
Special Act Award (award for outstanding performance in mission planning), Smithsonian Astrophysical Observatory, 2008 - 2011
Virginia Space Grant Consortium, Aerospace Graduate Research Fellowship, Consortium, 2003
Third Place, Third Annual Robert J. Huskey Graduate Research Exhibition, University of Virginia, March 2002
Outstanding Graduate Teaching Assistant Award in Astronomy, University of Virginia, March 2000
Special Act Award (award for outstanding performance in software development), Smithsonian Astrophysical Observatory, September 1998
Departmental Honors in Astronomy for undergraduate thesis, Wesleyan University, May 1997

PI GRANTS & ALLOCATED OBSERVING TIME:

ESA, XMM-Newton Cycle 20, GO, *Exploring the Virialization Region of the Massive, Binary Merging Cluster Abell 401*, 2021, 90 ksec, \$81,623
NASA, Chandra Cycle 21, GO, *A Search for a Pre-Merger Shock in the Abell 399-Abell 401 Intercluster Filament*, 2020, 45 ksec (grant PI; led by graduate student G. Alvarez) \$50,191
ESA, XMM-Newton Cycle 17, GO, *Understanding the Nature and Environment of Ultra-Steep Spectrum Radio Relics*, 2019, 28 ksec, \$51,386

NASA, Chandra Cycle 20, GO, *Probing Dark Matter and ICM Physics with Observations of the Dissociative Merging Cluster CIZA J0107.7+5408*, 2019, 140 ks, \$73,240, 20 hr joint EVLA, 6 orbits joint HST, \$60,000

NASA, Chandra Cycle 20, GO, *Deep Chandra Observations of the Shock Front and Faint Filament in the Pre-Merger Cluster Abell 98*, 2019, 200 ksec, \$83,639

NASA, ADAP, *Probing Large Scale Structure and the Effects of Mergers on Cluster Outskirts with Deep Observations of Binary Merging Clusters*, 2018, \$56,640

ALMA Cycle 4, GO, *Mapping the Molecular Gas in NGC 5813: Feedback in Action*, 2016, 2.3 hr

ALMA Cycle 3, GO, *Mapping the Molecular Gas in NGC 5813*, 2015, 2 hr priority C

SAO, MMT 2015C, *Measuring the Dynamics of the Merging Cluster CIZA J0107.7+5408*, 2015, 1 night

NASA, Suzaku Cycle 9, GO, *Exploring the Extended Atmosphere of the Strongly Merging Cluster Abell 98*, 2014, 360 ksec

NASA, Chandra Cycle 14, GO, *A Detailed Study of the longest known Ram Pressure Stripped Tail with Deep Chandra Observations of M86*, 2012, \$123,822

NASA, Chandra Cycle 14, GO, *Understanding the Nature and Environment of Radio Relics*, 2012, \$31,825

NASA, ADAP, *The Extended Atmospheres of Strongly Merging Galaxy Clusters*, 2012, \$41,998

NASA, Chandra Cycle 13, GO, *Measuring the Temperature Structure of the A3395/A3391 Large Scale Filament in the Horologium Supercluster*, 2011, \$72,809

NASA, Suzaku Cycle 6, GO, *The Extended Atmospheres of Strongly Merging Galaxy Clusters*, 2011, 120 ksec

NASA, Chandra Cycle 12, GO, *Understanding AGN Feedback with Deep Observations of NGC 5813*, 2010, \$128,914

NASA, Suzaku Cycle 5, GO, *The Extended Atmospheres of Strongly Merging Galaxy Clusters*, 2010, \$22,990

NASA, Chandra Cycle 10, Theory, *A Study of Ram Pressure Stripping with Numerical Simulations of the Merging Galaxy Group M86*, 2008, \$16,495

NASA, Chandra Cycle 7, Theory, *Constraining the Self-Interaction Cross Section of Dark Matter Using Simulations and Observations of E1 0657-56*, 2006, \$40,600

RESEARCH ADVISING:

2022 - present: SAO/University of Southampton Astronomy Masters Program Thesis Advisor, SAO, Arthur Whyley

2016 - 2022: SAO Predoctoral PhD Thesis Advisor, SAO, Gabriella Alvarez

2020 - 2022: SAO Predoctoral PhD Thesis Advisor, SAO, Arnab Sarkar

2021: Visiting Scientist Host, SAO, Kyle Finner

2020: Graduate Research Advisor, Courtney Watson (Boston University)

2019: Graduate Research Advisor, Catherine Cerny (Boston University)

2015 - 2019: Postdoctoral co-Advisor, SAO, Lorenzo Lovisari

2015 - 2018: Postdoctoral co-Advisor, SAO, Yuanyuan Su

2013 - 2015: Postdoctoral Advisor, SAO, G. Esra Bulbul

2013: Graduate Research Advisor, Rachel Paterno-Mahler (Boston University)

2011: Undergraduate Advisor, SAO Summer Intern Program, Sajjan Mehta

2010: Undergraduate Advisor, SAO Summer Intern Program, Kimberly Ward-Duong

TEACHING & PUBLIC OUTREACH:

2019 Public Talk, "20 Years with Chandra", University of Maine

2017 Universe of Learning Webinar, “Shedding Light on Dark Matter”, virtual

2003 - 2004 Science Advisor, “Black Holes” planetarium show at the Science Museum of Virginia, Richmond, VA, and traveling *Chandra* exhibit; with Ed Murphy, Craig Sarazin, and the X-ray group at UVA

2003 - 2004 Science Advisor and participant in film production, “The Largest Structures in the Universe”, exhibit and film at the McCormick Observatory, UVA; with Ed Murphy, Craig Sarazin, and the X-ray group at UVA

2002 Guest Lecturer, meeting of the Charlottesville Astronomical Society, Charlottesville, VA

2000 (Summer) Instructor, Introduction to Cosmology, University of Virginia

1999 - 2001 Night Lab Instructor, hands-on instruction with small telescopes (10” reflecting, 26” refracting), University of Virginia, 1999-2001

1999 - 2000 Head Teaching Assistant, University of Virginia

1999 (Summer) Instructor, Astronomy, Summer Enrichment Program, University of Virginia

1998 - 2004 Lecturer, Telescope Operator, and Tour Guide at Public Nights, Fan Mountain Observatory and McCormick Observatory, University of Virginia

1998 - 2001 Graduate Teaching Assistant, University of Virginia

1996 - 1997 Undergraduate Teaching Assistant, Mathematics Department, Wesleyan University

PUBLICATIONS:

<https://ui.adsabs.harvard.edu/public-libraries/FCvhZeliR2-425pFUZHBLw>

h-index: 32

- “Line Emission Mapper (LEM): Probing the physics of cosmic ecosystems”, Kraft, R. et al. 2022, White paper for a mission concept to be submitted for the 2023 NASA Astrophysics Probes opportunity, arXiv:2211.09827
- “Gas sloshing and cold fronts in pre-merging galaxy cluster Abell 98”, Sarkar, A., S. W. Randall, Y. Su, G. Alvarez, C. Sarazin, P. Nulsen, C. Jones, F. Andrade-Santos, R. Johnson, P. Chakraborty 2022, *The Astrophysical Journal*, (submitted; arXiv:2211.00130)
- “HST and HSC Weak-lensing Study of the Equal-mass Dissociative Merger CIZA J0107.7+5408”, Finner, K., S. W. Randall, M. J. Jee, E. Blanton, H. Cho, T. Clarke, S. Giacintucci, P. Nulsen, R. van Weeren 2022, *The Astrophysical Journal*, (accepted; arXiv:2210.12165)
- “Chandra X-ray Observations of Abell 119: Shocks and Cold Fronts in an Evolved Off-axis Merger”, Watson, C. B., Blanton, E. L., Randall, S. W., Sarazin, C. L., ZuHone, J. A., Douglass, E. M. 2022, *The Astrophysical Journal*, (submitted)
- “Multiple shocks fronts in RBS 797: the Chandra window on shock heating in galaxy clusters”, Ubertosi, F., M. Gitti, F. Brigenti, M. McDonald, P. Nulsen, M. Donahue, G. Brunetti, S. W. Randall, M. Gaspari, S. Ettori, M. Calzadilla, A. Iagnesi, L. Feretti, E. Blanton 2022, *The Astrophysical Journal*, (submitted)
- “Chemical abundances in the outskirts of nearby galaxy groups measured with joint Suzaku and Chandra observations”, Sarkar, A., Y. Su, N. Truong, S. W. Randall, F. Mernier, F. Gastaldello, V. Biffi, & R. Kraft 2022, *Monthly Notices of the Royal Astronomical Society*, 516, 3068
- “Discovery of a Premerger Shock in an Intercluster Filament in Abell 98”, Sarkar, A., S. W. Randall, Y. Su, G. Alvarez, C. Sarazin, P. Nulsen, E. Blanton, W. Forman. C. Jones, E. Bulbul, J. ZuHone, F. Andrade-Santos, R. Johnson, P. Chakraborty 2022, *The Astrophysical Journal Letters*, 935, 23
- “Suzaku Observations of the Cluster Outskirts and Intercluster Filament in the Triple Merger

- Cluster Abell 98”, Alvarez, G. E., S. W. Randall, Y. Su, A. Sarkar, S. Walker, N. Lee, C. Sarazin, E. Blanton 2022, *The Astrophysical Journal* (accepted, in press)
- “The Deepest Chandra View of RBS 797: Evidence for Two Pairs of Equidistant X-ray Cavities”, Ubertosi, F., M. Gitti, F. Brighenti, G. Brunetti, M. McDonald, P. Nulsen, B. McNamara, S. W. Randall, W. Forman, M. Donahue, A. Ignesti, M. Gaspari, S. Ettori, L. Feretti, E. Blanton, C. Jones, M. Calzadilla 2021, *The Astrophysical Journal*, 923, 25
- “Joint Suzaku and Chandra observations of the MKW4 galaxy group out to the virial radius”, Sarkar, A., Y. Su, S. W. Randall, F. Gastaldello, I. Trierweiler, R. White, R. Kraft, E. Miller 2021, *Monthly Notices of the Royal Astronomical Society*, 501, 3767
- “X-Ray Scaling Relations for a Representative Sample of Planck-selected Clusters Observed with XMM-Newton”, Lovisari, L., G. Schellenberger, M. Sereno, S. Ettori, G. W. Pratt, W. R. Forman, C. Jones, F. Andrade-Santos, S. Randall, & R. Kraft 2020, *The Astrophysical Journal*, 892, 102
- “Probing Macro-Scale Gas Motions and Turbulence in Diffuse Cosmic Plasmas”, Bulbul, E., M. Gaspari, G. Alvarez, C. Avestruz, M. Bautz, B. Benson, V. Biffi, D. Burke, N. Clerc, E. Cucchetti, U. Chadayammuri, D. Eckert, S. Ettori, B. Forman, F. Gastaldello, et al. 2019, *Bulletin of the American Astronomical Society*, 51, 210
- “Evidence for a Merger-induced Shock Wave in ZwCl 0008.8+5215 with Chandra and Suzaku”, Di Gennaro, G., R. J. van Weeren, F. Andrade-Santos, H. Akamatsu, S. W. Randall, W. Forman, R. P. Kraft, G. Brunetti, W. A. Dawson, N. Golovich, & C. Jones 2019, *The Astrophysical Journal*, 873, 64
- “Extended X-Ray Study of M49: The Frontier of the Virgo Cluster”, Su, Y., R. P. Kraft, P. E. J. Nulsen, C. Jones, T. J. Maccarone, F. Mernier, L. Lovisari, A. Sheardown, S. W. Randall, E. Roediger, T. M. Fish, W. R. Forman, & E. Churazov 2019, *The Astronomical Journal*, 158, 6
- “An ALMA ACA measurement of the shock in the Bullet Cluster”, Di Mascolo, L., T. Mroczkowski, E. Churazov, M. Markevitch, K. Basu, T. E. Clarke, M. Devlin, B. S. Mason, S. W. Randall, E. D. Reese, R. Sunyaev, & D. R. Wik 2019, *Astronomy and Astrophysics*, 628, A100
- “A Galaxy-scale Fountain of Cold Molecular Gas Pumped by a Black Hole”, Tremblay, G. R., F. Combes, J. B. R. Oonk, H. R. Russell, M. A. McDonald, M. Gaspari, B. Husemann, P. E. J. Nulsen, B. R. McNamara, S. L. Hamer, C. P. O’Dea, S. A. Baum, T. A. Davis, M. Donahue, G. M. Voit, et al. 2018, *The Astrophysical Journal*, 865, 13
- “Chandra and XMM-Newton Observations of the Abell 3395/Abell 3391 Intercluster Filament”, Alvarez, G. E., S. W. Randall, H. Bourdin, C. Jones, & K. Holley-Bockelmann 2018, *The Astrophysical Journal*, 858, 44
- “The Megaparsec-scale Gas-sloshing Spiral in the Remnant Cool Core Cluster Abell 1763”, Douglas, E. M., E. L. Blanton, S. W. Randall, T. E. Clarke, L. O. V. Edwards, Z. Sabry, & J. A. ZuHone 2018, *The Astrophysical Journal*, 868, 121
- “Uplift, Feedback, and Buoyancy: Radio Lobe Dynamics in NGC 4472”, Gendron-Marsolais, M., R. P. Kraft, A. Bogdan, J. Hlavacek-Larrondo, W. R. Forman, C. Jones, Y. Su, P. Nulsen, S. W. Randall, & E. Roediger 2017, *The Astrophysical Journal*, 848, 26
- “Deep Chandra Observations of NGC 1404: Cluster Plasma Physics Revealed by an Infalling Early-type Galaxy”, Su, Y., R. P. Kraft, E. Roediger, P. Nulsen, W. R. Forman, E. Churazov, S. W. Randall, C. Jones, & M. E. Machacek 2017, *The Astrophysical Journal*, 834, 74
- “Hubble Space Telescope Imaging of the Ultra-compact High Velocity Cloud AGC 226067: A Stripped Remnant in the Virgo Cluster”, Sand, D. J., A. C. Seth, D. Crnojević, K. Spekkens, J. Strader, E. A. K. Adams, N. Caldwell, P. Guhathakurta, J. Kenney, S. Randall, J. D. Simon, E. Toloba, & B. Willman 2017, *The Astrophysical Journal*, 843, 134
- “Stripped Elliptical Galaxies as Probes of ICM Physics. III. Deep Chandra Observations of NGC

- 4552: Measuring the Viscosity of the Intracluster Medium”, Kraft, R. P., E. Roediger, M. Machacek, W. R. Forman, P. E. J. Nulsen, C. Jones, E. Churazov, S. Randall, Y. Su, & A. Sheardown 2017, *The Astrophysical Journal*, 848, 27
- “X-Ray Morphological Analysis of the Planck ESZ Clusters”, Lovisari, L., W. R. Forman, C. Jones, S. Ettori, F. Andrade-Santos, M. Arnaud, J. Démoclès, G. W. Pratt, S. Randall, & R. Kraft 2017, *The Astrophysical Journal*, 846, 51
- “Chandra and JVLA Observations of HST Frontier Fields Cluster MACS J0717.5+3745”, van Weeren, R. J., G. A. Ogrean, C. Jones, W. R. Forman, F. Andrade-Santos, C. J. J. Pearce, A. Bonafede, M. Brüggen, E. Bulbul, T. E. Clarke, E. Churazov, L. David, W. A. Dawson, M. Donahue, A. Goulding, et al. 2017, *The Astrophysical Journal*, 835, 197
- “Capturing the 3D Motion of an Infalling Galaxy via Fluid Dynamics”, Su, Y., R. P. Kraft, P. E. J. Nulsen, E. Roediger, W. R. Forman, E. Churazov, S. W. Randall, C. Jones, & M. E. Machacek 2017, *The Astrophysical Journal*, 835, 19
- “VLA Radio Observations of the HST Frontier Fields Cluster Abell 2744: The Discovery of New Radio Relics”, Pearce, C. J. J., R. J. van Weeren, F. Andrade-Santos, C. Jones, W. R. Forman, M. Brüggen, E. Bulbul, T. E. Clarke, R. P. Kraft, E. Medezinski, T. Mroczkowski, M. Nonino, P. E. J. Nulsen, S. W. Randall, & K. Umetsu 2017, *The Astrophysical Journal*, 845, 81
- “Buoyant AGN Bubbles in the Quasi-isothermal Potential of NGC 1399”, Su, Y., P. E. J. Nulsen, R. P. Kraft, W. R. Forman, C. Jones, J. A. Irwin, S. W. Randall, & E. Churazov 2017, *The Astrophysical Journal*, 847, 94
- “Gas Sloshing Regulates and Records the Evolution of the Fornax Cluster”, Su, Y., P. E. J. Nulsen, R. P. Kraft, E. Roediger, J. A. ZuHone, C. Jones, W. R. Forman, A. Sheardown, J. A. Irwin, & S. W. Randall 2017, *The Astrophysical Journal*, 851, 69
- “The Discovery of Lensed Radio and X-Ray Sources behind the Frontier Fields Cluster MACS J0717.5+3745 with the JVLA and Chandra”, van Weeren, R. J., G. A. Ogrean, C. Jones, W. R. Forman, F. Andrade-Santos, A. Bonafede, M. Brüggen, E. Bulbul, T. E. Clarke, E. Churazov, L. David, W. A. Dawson, M. Donahue, A. Goulding, R. P. Kraft, et al. 2016, *The Astrophysical Journal*, 817, 98
- “Radial Profile of the 3.5 keV Line Out to R200 in the Perseus Cluster”, Franse, J., E. Bulbul, A. Foster, A. Boyarsky, M. Markevitch, M. Bautz, D. Iakubovskiy, M. Loewenstein, M. McDonald, E. Miller, S. W. Randall, O. Ruchayskiy, & R. K. Smith 2016, *The Astrophysical Journal*, 829, 124
- “Merger Hydrodynamics of the Luminous Cluster RX J1347.5-1145”, Kreisch, C. D., M. E. Machacek, C. Jones, & S. W. Randall 2016, *The Astrophysical Journal*, 830, 39
- “Frontier Fields Clusters: Deep Chandra Observations of the Complex Merger MACS J1149.6+2223”, Ogrean, G. A., R. J. van Weeren, C. Jones, W. Forman, W. A. Dawson, N. Golovich, F. Andrade-Santos, S. S. Murray, P. Nulsen, E. Roediger, A. Zitrin, E. Bulbul, R. Kraft, A. Goulding, K. Umetsu, et al. 2016, *The Astrophysical Journal*, 819, 113
- “Multi-wavelength Observations of the Dissociative Merger in the Galaxy Cluster CIZA J0107.7+5408”, Randall, S. W., T. E. Clarke, R. J. van Weeren, H. T. Intema, W. A. Dawson, T. Mroczkowski, E. L. Blanton, E. Bulbul, & S. Giacintucci 2016, *The Astrophysical Journal*, 823, 94
- “Probing the Outskirts of the Early-Stage Galaxy Cluster Merger A1750”, Bulbul, E., S. W. Randall, M. Bayliss, E. Miller, F. Andrade-Santos, R. Johnson, M. Bautz, E. L. Blanton, W. R. Forman, C. Jones, R. Paterno-Mahler, S. S. Murray, C. L. Sarazin, R. K. Smith, & C. Ezer 2016, *The Astrophysical Journal*, 818, 131
- “Searching for the 3.5 keV Line in the Stacked Suzaku Observations of Galaxy Clusters”, Bulbul, E., M. Markevitch, A. Foster, E. Miller, M. Bautz, M. Loewenstein, S. W. Randall, & R. K. Smith 2016, *The Astrophysical Journal*, 831, 55

- “A Very Deep Chandra Observation of the Galaxy Group NGC 5813: AGN Shocks, Feedback, and Outburst History”, Randall, S. W., P. E. J. Nulsen, C. Jones, W. R. Forman, E. Bulbul, T. E. Clarke, R. Kraft, E. L. Blanton, L. David, N. Werner, M. Sun, M. Donahue, S. Giacintucci, & A. Simionescu 2015, *The Astrophysical Journal*, 805, 112
- “Resolving the Merging Planck Cluster PLCK G147.3-16.6 with GISMO”, Mroczkowski, T., A. Kovács, E. Bulbul, J. Staguhn, D. J. Benford, T. E. Clarke, R. J. van Weeren, H. T. Intema, & S. Randall 2015, *The Astrophysical Journal*, 808, L6
- “Stripped Elliptical Galaxies as Probes of ICM Physics: I. Tails, Wakes, and Flow Patterns in and Around Stripped Ellipticals”, Roediger, E., R. P. Kraft, P. E. J. Nulsen, W. R. Forman, M. Machacek, S. Randall, C. Jones, E. Churazov, & R. Kokotanekova 2015, *The Astrophysical Journal*, 806, 103
- “Frontier Fields Clusters: Chandra and JVLA View of the Pre-merging Cluster MACS J0416.1-2403”, Ogorean, G. A., R. J. van Weeren, C. Jones, T. E. Clarke, J. Sayers, T. Mroczkowski, P. E. J. Nulsen, W. Forman, S. S. Murray, M. Pandey-Pommier, S. Randall, E. Churazov, A. Bonafede, R. Kraft, L. David, et al. 2015, *The Astrophysical Journal*, 812, 153
- “Stripped Elliptical Galaxies as Probes of ICM Physics: II. Stirred, but Mixed? Viscous and Inviscid Gas Stripping of the Virgo Elliptical M89”, Roediger, E., R. P. Kraft, P. E. J. Nulsen, W. R. Forman, M. Machacek, S. Randall, C. Jones, E. Churazov, & R. Kokotanekova 2015, *The Astrophysical Journal*, 806, 104
- “Merger Signatures in the Galaxy Cluster A98”, Paterno-Mahler, R., S. W. Randall, E. Bulbul, F. Andrade-Santos, E. L. Blanton, C. Jones, S. Murray, & R. E. Johnson 2014, *The Astrophysical Journal*, 791, 104
- “Young AGN Outburst Running over Older X-Ray Cavities”, Bogdán, Á., R. J. van Weeren, R. P. Kraft, W. R. Forman, S. Randall, S. Giacintucci, E. Churazov, C. P. O’Dea, S. A. Baum, J. Noell-Storr, & C. Jones 2014, *The Astrophysical Journal*, 782, L19
- “Detection of an Unidentified Emission Line in the Stacked X-Ray Spectrum of Galaxy Clusters”, Bulbul, E., M. Markevitch, A. Foster, R. K. Smith, M. Loewenstein, & S. W. Randall 2014, *The Astrophysical Journal*, 789, 13
- “Gas Sloshing and Radio Galaxy Dynamics in the Core of the 3C 449 Group”, Lal, D. V., R. P. Kraft, S. W. Randall, W. R. Forman, P. E. J. Nulsen, E. Roediger, J. A. ZuHone, M. J. Hardcastle, C. Jones, & J. H. Croston 2013, *The Astrophysical Journal*, 764, 83
- “Chandra View of the Ultra-steep Spectrum Radio Source in A2443: Merger Shock-induced Compression of Fossil Radio Plasma?”, Clarke, T. E., S. W. Randall, C. L. Sarazin, E. L. Blanton, & S. Giacintucci 2013, *The Astrophysical Journal*, 772, 84
- “Deep Chandra Observations of the Extended Gas Sloshing Spiral in A2029”, Paterno-Mahler, R., E. L. Blanton, S. W. Randall, & T. E. Clarke 2013, *The Astrophysical Journal*, 773, 114
- “X-ray surface brightness and gas density fluctuations in the Coma cluster”, Churazov, E., A. Vikhlinin, I. Zhuravleva, A. Schekochihin, I. Parrish, R. Sunyaev, W. Forman, H. Böhringer, & S. Randall 2012, *Monthly Notices of the Royal Astronomical Society*, 421, 1123
- “Shocking Tails in the Major Merger Abell 2744”, Owers, M. S., W. J. Couch, P. E. J. Nulsen, & S. W. Randall 2012, *The Astrophysical Journal*, 750, L23
- “Chandra Observations of NGC 4342, an Optically Faint, X-Ray Gas-rich Early-type Galaxy”, Bogdán, Á., W. R. Forman, R. P. Kraft, C. Jones, C. Blom, S. W. Randall, Z. Zhang, I. Zhuravleva, E. Churazov, Z. Li, P. E. J. Nulsen, A. Vikhlinin, & S. Schindler 2012, *The Astrophysical Journal*, 755, 25
- “Self-similar scaling and evolution in the galaxy cluster X-ray luminosity-temperature relation”, Maughan, B. J., P. A. Giles, S. W. Randall, C. Jones, & W. R. Forman 2012, *Monthly Notices of the Royal Astronomical Society*, 421, 1583

- “Chandra and ROSAT Observations of A194: Detection of an X-Ray Cavity and Mapping the Dynamics of the Cluster”, Bogdán, Á., R. P. Kraft, W. R. Forman, C. Jones, S. W. Randall, M. Sun, C. P. O’Dea, E. Churazov, & S. A. Baum 2011, *The Astrophysical Journal*, 743, 59
- “The Merger Environment of the Wide Angle Tail Hosting Cluster A562”, Douglass, E. M., E. L. Blanton, T. E. Clarke, S. W. Randall, & J. D. Wing 2011, *The Astrophysical Journal*, 743, 199
- “The Dissection of Abell 2744: A Rich Cluster Growing Through Major and Minor Mergers”, Owers, M. S., S. W. Randall, P. E. J. Nulsen, W. J. Couch, L. P. David, & J. C. Kempner 2011, *The Astrophysical Journal*, 728, 27
- “Deep Chandra Observations of Edges and Bubbles in the NGC 5846 Galaxy Group”, Machacek, M. E., D. Jerius, R. Kraft, W. R. Forman, C. Jones, S. Randall, S. Giacintucci, & M. Sun 2011, *The Astrophysical Journal*, 743, 15
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- “Gas Sloshing and Bubbles in the Galaxy Group NGC 5098”, Randall, S. W., C. Jones, M. Markevitch, E. L. Blanton, P. E. J. Nulsen, & W. R. Forman 2009, *The Astrophysical Journal*, 700, 1404
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- “Unraveling AGN feedback and ICM physics with deep Chandra X-ray observations of the galaxy group NGC 5813”, Randall, S. W., P. E. J. Nulsen, C. Jones, W. R. Forman, T. E. Clarke, & E. L. Blanton 2015, *Extragalactic Jets from Every Angle*, 313, 277
- “Extragalactic jets as probes of distant clusters of galaxies and the clusters occupied by bent radio AGN (COBRA) survey”, Blanton, E. L., R. Paterno-Mahler, J. D. Wing, M. L. N. Ashby, E. Golden-Marx, M. Brodwin, E. M. Douglass, S. W. Randall, & T. E. Clarke 2015, *Extragalactic Jets from Every Angle*, 313, 315
- “Simulating X-ray Observations with Python”, ZuHone, J. A., V. Biffi, E. J. Hallman, S. W. Randall, A. R. Foster, & C. Schmid 2014, arXiv:1407.1783
- “Comment on “Dark matter searches going bananas: the contribution of Potassium (and Chlorine) to the 3.5 keV line””, Bulbul, E., M. Markevitch, A. R. Foster, R. K. Smith, M. Loewenstein, & S. W. Randall 2014, arXiv:1409.4143
- “Hot Gas and AGN Feedback in Galaxies and Nearby Groups”, Jones, C., W. Forman, A. Bogdan, S. Randall, R. Kraft, & E. Churazov 2013, *The Intriguing Life of Massive Galaxies*, 295, 257
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- “AGN in Clusters of Galaxies: Feedback, Sloshing, and Lobe Bending”, Blanton, E., S. Randall, T. Clarke, C. Sarazin, B. McNamara, E. M. Douglass, J. Wing, R. Paterno-Mahler, M. Brodwin,

- & M. Ashby 2012, *Half a Century of X-ray Astronomy*, 63
- “Shocking Tails in the Major Merger A2744”, Owers, M., W. Couch, P. Nulsen, & S. Randall 2012, *Galaxy Clusters as Giant Cosmic Laboratories*, 42
- “Shocks and cavities from multiple outbursts in the galaxy group NGC 5813: . A window to AGN feedback”, Randall, S. W., W. R. Forman, S. Giacintucci, P. Nulsen, M. Sun, C. Jones, E. Churazov, L. David, R. Kraft, M. Donahue, E. Blanton, A. Simionescu, & N. Werner 2011, *Memorie della Societa Astronomica Italiana*, 82, 676
- “3C28 in Abell 115- A Radio Source With a Twist”, Forman, W., E. Churazov, S. Giacintucci, M. Machacek, R. Kraft, C. Jones, S. Heinz, M. Markevitch, A. Vikhlinin, M. Murgia, S. Randall, & R. Johnson 2010, *X-ray Astronomy 2009; Present Status, Multi-Wavelength Approach and Future Perspectives*, 1248, 273
- “Hot Gas in Clusters, Groups and Galaxies: From SMBH Outbursts to Cosmology”, Jones, C., E. Churazov, S. Giacintucci, M. Machacek, R. Kraft, P. E. J. Nulsen, A. Vikhlinin, S. Randall, L. David, & W. R. Forman 2010, *X-ray Astronomy 2009; Present Status, Multi-Wavelength Approach and Future Perspectives*, 1248, 253
- “Galaxy Clusters Across Cosmic Time”, Arnaud, M., H. Bohringer, C. Jones, B. McNamara, T. Ohashi, D. Patnaude, K. Arnaud, M. Bautz, A. Blanchard, J. Bregman, G. Chartas, J. Croston, L. David, M. Donahue, A. Fabian, et al. 2009, *astro2010: The Astronomy and Astrophysics Decadal Survey*, 2010, 4
- “The Evolution of Galaxy Clusters Across Cosmic Time”, Arnaud, M., H. Bohringer, C. Jones, B. McNamara, T. Ohashi, D. Patnaude, K. Arnaud, M. Bautz, A. Blanchard, J. Bregman, G. Chartas, J. Croston, L. David, M. Donahue, A. Fabian, et al. 2009, *arXiv:0902.4890*
- “The Bullet Cluster 1E0657-56:. Implications for Dark Matter and Galaxy Evolution”, Gonzalez, A. H., D. Clowe, M. Markevitch, S. Randall, M. Bradač, S. Chung, C. Jones, & D. Zaritsky 2007, *The Identification of Dark Matter*, 128
- “Catching a bullet: direct evidence for the existence of dark matter”, Clowe, D., S. W. Randall, & M. Markevitch 2007, *Nuclear Physics B Proceedings Supplements*, 173, 28
- “Instrumentation for Radial Velocity Determination”, Randall, S. 1995, *Proceedings of the 1995 Undergraduate Symposium on Research in Astronomy*, 54

COLLOQUIA & MEETING PRESENTATIONS:

- “Galaxy Groups from the X-ray Perspective”, 2022, *AXIS Science Working Group: Galaxy Evolution*, Invited Talk, virtual
- “The Role of AGN Feedback in Regulating the Growth of SMBHs”, 2022, *What Drives the Growth of Black Holes?*, Reykjavik, Iceland
- “AGN Feedback Mechanisms in Galaxy Groups”, 2022, *The Physical Properties of the Groups of Galaxies*, Invited Talk, Bertinoro, Italy
- “Chemical Abundances in the Outskirts of Nearby Galaxy Groups”, 2022, *The Physical Properties of the Groups of Galaxies*, Bertinoro, Italy
- “Detection of a Pre-merger Shock in the Galaxy Cluster Abell 98”, 2022, *Galaxy Clusters 2022: Challenging Our Cosmological Perspectives*, virtual
- “Deep Chandra Observations of the Extended Ram-Pressure Stripped Tail in M86”, 2022, *AAS Meeting #240*, Padadena, VA, virtual
- “Multi-wavelength Observations of the Dissociative Merger in the Galaxy Cluster CIZA J0107.7+5408”, 2020, *AAS Meeting #235*, Honolulu, HI
- “20 Years of Science with Chandra”, 2019, Invited Talk, University of Maine, Orono, ME
- “Exploring the Virialization Region of Merging Galaxy Clusters”, 2019, *X-ray Astronomy 2019*, University of Bologna, Bologna, Italy

- “Merging Galaxy Clusters, Cluster Outskirts, and Large Scale Filaments”, *AAS HEAD Meeting #17*, 2019, Monterey, CA
- “Exploring Cluster Outskirts and Large Scale Filaments in Merging Clusters with Current and Future X-ray Missions”, 2018, *Exploring the Hot and Energetic Universe: The second scientific conference dedicated to the Athena X-ray observatory*, Palermo, Italy
- “The Impact of Environment on Galaxy Cluster Outskirts”, 2017, *From Chandra to Lynx*, Cambridge, MA
- “Heating the Intracluster Medium Through AGN Feedback”, 2016, Invited Talk, *High Energy Phenomena Seminar*, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA
- “Heating the Intracluster Medium Through AGN Feedback”, 2016, *Chandra Science for the Next Decade*, Cambridge, MA
- “Unraveling ICM Physics and AGN Feedback with Very Deep Chandra Observations of NGC 5813”, 2015, *Probing the Universe in Depth and Detail with the X-ray Surveyor*, Washington, D.C.
- “Unraveling ICM Physics and AGN Feedback with Very Deep Chandra Observations of NGC 5813”, 2015, *Athena: The Astrophysics of the Hot and Energetic Universe*, Madrid, Spain
- “Probing the Outskirts of Strongly Merging Double Clusters With X-ray Observations”, 2015, *The IAU XXIX General Assembly*, Honolulu, HI
- “AGN Feedback in Galaxies, Groups, and Clusters”, 2015, *Alpine Cosmology Workshop 2015*, Galtür, Austria
- “Probing the Outskirts of Strongly Merging Double Clusters”, 2015, *SnowCluster 2015: The Physics of Galaxy Clusters*, University of Utah, Snowbird, UT
- “Unraveling ICM Physics and AGN Feedback with Deep Chandra X-ray Observations of the Galaxy Group NGC 5813”, 2014, *IAU Symposium 313: Extragalactic Jets from Every Angle*, Galapagos, Ecuador
- “The X-ray View of AGN Feedback in Early Type Galaxies”, 2014, Invited Talk, *The X-ray View of Galaxy Ecosystems*, Boston, MA
- “Unraveling ICM Physics and AGN Feedback with Deep Chandra X-ray Observations of the Galaxy Group NGC 5813”, 2014, *Zeldovich 100: Cosmology and Relativistic Astrophysics*, Moscow, Russia
- “Feedback Through ICM/AGN Interactions in the Cores of Galaxy Groups and Clusters”, 2013, Invited Talk, *SnowCLUSTER 2013: Physics of Galaxy Clusters*, University of Utah, Snowbird, UT
- “Deep Chandra Observations of Extended Sloshing Spirals in Galaxy Clusters”, 2013, Invited Talk, *Cold fronts in Galaxy Clusters: Sloshing through the Dolomites*, Sexten, Italy
- “Initial Results from a Very Deep Chandra Observation of the Galaxy Group NGC 5813”, 2012, *Half a Century of X-ray Astronomy*, Mykonos Island, Greece
- “Initial Results from a Very Deep Chandra Observation of the Galaxy Group NGC 5813”, 2012, *Galaxy Clusters as Giant Cosmic Laboratories*, ESAC, Madrid, Spain
- “Initial Results from a Very Deep Chandra Observation of the Galaxy Group NGC 5813”, 2012, *AAS HEAD Meeting #220*, Anchorage, AK
- “Early Results from a Very Deep Chandra Observation of NGC 5813”, 2011, *High Energy Views of Galaxies and Their Nuclei*, Tulum, Mexico
- “The Role of Shock Heating in AGN Feedback”, 2011, *JENAM-2011: European Week of Astronomy and Space Science*, St. Petersburg, Russia
- “The Role of Shock Heating in AGN Feedback: A Case Study of the Galaxy Group NGC 5813”, 2011, *AAS Meeting #218*, Boston, MA
- “The Role of Shock Heating in AGN Feedback”, 2011, *Structure in Clusters and Groups of Galaxies in the Chandra Era*, Boston, MA

- “Bubbles and Shocks in NGC 5813: A Window to AGN Feedback in Galaxy Clusters”, 2010, *AAS HEAD Meeting #11*, Waikoloa, HI,
- “Shocks and Bubbles in NGC 5813: A Window to AGN Feedback”, 2010, *Evolution of Galaxies, Their Central Black Holes and Their Large-scale Environment*, Potsdam, Germany
- “Shocks and Cavities from Multiple Outbursts in the Galaxy Group NGC 5813: A Window to AGN Feedback”, 2010, *Non-thermal Phenomena in Colliding Galaxy Clusters*, Nice, France
- “Gas Bubbles, Sloshing, and AGN Feedback in the Galaxy Group NGC 5098”, 2009, *X-ray Astronomy 2009: Present Status, Multi-Wavelength Approach, and Future Perspectives*, University of Bologna, Bologna, Italy
- “Gas Bubbles, Sloshing, and AGN Feedback in the Galaxy Group NGC 5098”, 2009, *XXVII IAU General Assembly*, Rio de Janeiro, Brazil
- “Gas Bubbles, Sloshing, and AGN Feedback in the Galaxy Group NGC 5098”, 2009, *The Monsters Fiery Breath: Feedback in Galaxies, Groups, and Clusters*, University of Wisconsin, Madison, WI
- “Chandra’s View of the Ram Pressure Stripped Galaxy M86”, 2008, *AAS HEAD Meeting #10*, Los Angeles, CA
- “Chandra’s View of the Ram Pressure Stripped Galaxy M86”, 2007, *X-ray Surveys: Evolution of Accretion, Star Formation, and Large Scale Structure*, Rhodes, Greece
- “Constraining the Self-Interaction Cross-Section of Dark Matter with Simulations of E1 0657-56”, 2006, *Cosmic Frontiers: ASP Conference Series*, Durham University, Durham, UK
- “Constraining the Self-Interaction Cross-Section of Dark Matter with Simulations of E1 0657-56”, 2006, *36th COSPAR Scientific Assembly*, Beijing, China
- “Constraining the Self-Interaction Cross-Section of Dark Matter with Simulations of E1 0657-56”, 2006, *The Future of Cosmology with Clusters of Galaxies*, Waikoloa, HI
- “The Effects of Mergers on Thermal and Non-thermal Emission from Clusters of Galaxies as Studied Using Merger Trees”, 2002, *AAS Meeting #201*, Seattle, WA
- “Chandra Observation of Diffuse Gas and LMXBs in the Elliptical Galaxy NGC 4649 (M60)”, 2001, *Two Years of Science with Chandra*, Washington, D.C.
- “Instrumentation for Radial Velocity Determination”, 1995, *Undergraduate Symposium on Research in Astronomy*, Vassar College, Poughkeepsie, NY,