Dr. John A. ZuHone: Curriculum Vitae

Personal

Citizenship	United States of America
Address	Harvard-Smithsonian Center for Astrophysics
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Education

Ph. D. in Astronomy and Astrophysics, University of Chicago	2009
M. S. in Astronomy and Astrophysics, University of Chicago	2004
B. S. in Physics, University of Illinois at Urbana-Champaign	2002

Honors, Awards, and Named Fellowships

NASA Postdoctoral Program	2011-2014
Department of Energy Computational Science Graduate Fellowship	2004-2008
McCormick Fellowship, University of Chicago	2002-2003
Graduated With Highest Honors in Physics, University of Illinois	2002

Research Interests

Astrophysics

Cosmology; large-scale structure formation; galaxy clusters; intracluster medium; dark matter; X-ray astronomy

Computational Science

Numerical algorithms for computational physics; visualization and analysis techniques; infrastructure for scientific software

Positions Held

Chandra X-ray Center, Smithsonian Astrophysical Observatory

Astrophysicist, ACIS Operations	2015-

Kavli Institute for Astrophysics, Massachusetts Institute of Technology
    Postdoctoral Research Associate   2014-2015

Astrophysics Science Division, NASA/Goddard Space Flight Center
    Postdoctoral Research Associate   2011-2014

High-Energy Astrophysics Division, Smithsonian Astrophysical Observatory
    Postdoctoral Research Associate   2009-2011

Teaching Experience

NASA/Goddard Space Flight Center, Volunteer Instructor	2014
Python Boot Camp	

Trinity International University, Instructor	
Physics 350, "Topics in Physical Science: Astronomy"	2007

University of Chicago, Graduate Teaching Assistant	
PHSC 12000, "The Origin of the Universe and How We Know"	2003
PHSC 11900, "Stellar Astronomy and Astrophysics"	2003

University of Illinois at Urbana-Champaign, Undergraduate Teaching Assistant	
PHYS 102, "College Physics: E&M & Modern"	2002
PHYS 111, "University Physics: Mechanics"	2002
PHYS 101, "College Physics: Mech & Heat"	2001
PHYS 111, "University Physics: Mechanics"	2001

Professional Service

Review Panel Member
    Astrophysics Theory Proposal (NASA)
    Chandra X-ray Observatory (NASA)
    Astronomy and Astrophysics Research Grants (NSF)

Collaborations
    Astro-H Science Working Group
    yt Project
    X-ray Surveyor Science Working Group

Peer Review
    The Astrophysical Journal
    Monthly Notices of the Royal Astronomical Society
    Proceedings of the Astronomical Society of Japan

Contributions to Scientific Software

FLASH (http://flash.uchicago.edu), co-developer
>A multiphysics grid-based simulation code for astrophysics. Assisting in development of the particle, cosmology, multigrid gravity, and magnetohydrodynamic modules for FLASH3 and FLASH4

yt (http://yt-project.org), co-developer
>A visualization and analysis software suite for astrophysical simulation data. Assisted in development of FLASH, Athena, and FITS data interfaces; improved capabilities for working with in-memory datasets; developed analysis modules for synthetic observations

YT (http://www.jzuhone.com/yt_julia), main developer
>A Julia (http://julialang.org) wrapper for yt. Used for exposing astrophysical simulation simulation data from a variety of different codes in the Julia technical programming language.

pywwt (http://www.jzuhone.com/pywwt), main developer
>A Python interface to the Microsoft World Wide Telescope (WWT) Windows client. Used for controlling WWT from Python.

pyXSIM (http://hea-www.cfa.harvard.edu/~jzuhone/pyxsim), main developer
>A Python package for simulating X-ray observations from 3D astrophysics simulations.

Computing Proficiency and Experience

Programmming Languages
>proficient in: C, Fortran 77/90, Python
>conversant in: IDL, Julia, C++

Simulation Codes
>FLASH (http://flash.uchicago.edu)
>Athena (http://www.astro.princeton.edu/~jstone/athena.html)
>Enzo (http://enzo-project.org)

Software and Libraries
>Python scientific software: NumPy, SciPy, AstroPy, yt, h5py, IPython
>MPI (parallel computing library, http://www.mcs.anl.gov/research/projects/mpi/)
>HDF5 (hierarchical data format, http://www.hdfgroup.org)
>CIAO (Analysis tools for *Chandra* data, http://cxc.cfa.harvard.edu/ciao/)
>XSPEC (X-ray spectral fitting tool, https://heasarc.gsfc.nasa.gov/xanadu/xspec/)
>MARX (*Chandra* ray-trace simulator, http://space.mit.edu/CXC/marx/)
>Version Control Systems: Subversion, Mercurial, Git

High-Performance Computing Platforms
     "Intrepid" BlueGene/P: Argonne National Laboratory / DOE
     "Jaguar" Cray XT5: Oak Ridge National Laboratory / DOE
     "Ranger" Sun Constellation: Texas Advanced Computing Center / XSEDE
     "Pleiades" SGI ICE X: Ames Research Center / NASA
     "Kraken" Cray XT5, National Institute for Computational Science / XSEDE

Recent Invited Colloquia and Conference Participation

"yt: A Python-based Framework for Visualization and Analysis of Physical Simulations"
     Invited Talk, Prospects in Theoretical Physics Summer School, July 2016,
     Princeton, NJ

"Galaxy Cluster Gas Motions with X-ray Surveyor: Probing the Small Scales." Talk,
     X-ray Vision Workshop, October 2015, Washington, DC

"Simulating Astro-H Observations of Galaxy Cluster Gas Motions: What We Can Expect
     and Implications for Future Missions." Talk, The Universe in High-resolution
     X-ray Spectra Workshop, August 2015, Cambridge, MA

"Galaxy Cluster Gas Motions and *Astro-H*: Predictions and Challenges from
     Simulations." Invited Talk, Snowcluster 2015 Meeting, March 2015,
     Snowbird, UT

"Chandra, Cold Fronts, and ICM Physics: The Importance of Magnetic Fields."
     Talk, 15 Years of Chandra Science Workshop, November 2014, Boston, MA

"The Physics of Gas Sloshing in Galaxy Clusters." Astrophysics Science Division
     Colloquium, NASA/Goddard Space Flight Center, August 2014, Greenbelt, MD

"Simulating X-ray Observations with Python", Talk, Scientific Computing in Python
     2014, July 2014, Austin, TX

"The Physics of Gas Sloshing in Galaxy Clusters." Theory Seminar, The Ohio
     State University, April 2014, Columbus, OH

"The Physics of Gas Sloshing in Galaxy Clusters." Colloquium, University of Illinois at
     Urbana-Champaign, February 2014, Urbana, IL

Publications

Journal articles (refereed and submitted)

ZuHone, J., & Roediger, E., "Cold Fronts: Probes of Plasma Astrophysics in Galaxy Clusters." 2016, Journal of Plasma Physics, 82, 535820301

ZuHone, J.A., Miller, E.D, Simionescu, A., & Bautz, M.W., "Simulating Astro-H Observations of Sloshing Gas Motions in the Cores of Galaxy Clusters." 2016, ApJ, 821, 6

ZuHone, J., Markevitch, M., & Zhuravleva, I., "Mapping the Gas Turbulence in the Coma Cluster: Predictions for Astro-H." 2016, ApJ, 817, 110

Werner, N., **ZuHone, J.A.,** Zhuravleva, I., Ichinohe, Y., Simionescu, A., Allen, S.W., Markevitch, M., Fabian, A.C., Keshet, U., Roediger, E., Ruszkowski, M., & Sanders, J.S., "Deep *Chandra* Observation and Numerical Studies of the Nearest Cluster Cold Front in the Sky." 2016, MNRAS, 455, 846

McDonald, M., McNamara, B. R., van Weeren, R. J., Applegate, D. E., Bayliss, M., Bautz, M. W., Benson, B. A., Carlstrom, J. E., Bleem, L. E., Chatzikos, M., Edge, A. C., Fabian, A. C., Garmire, G. P., Hlavacek-Larrondo, J., Jones-Forman, C., Mantz, A. B., Miller, E. D., Stalder, B., Veilleux, S., & **ZuHone, J.A.**, "Deep *Chandra*, *HST-COS*, and *Megacam* Observations of the Phoenix Cluster: Extreme Star Formation and AGN Feedback on Hundred Kiloparsec Scales." 2015, ApJ, 811, 111

ZuHone, J., Brunetti, G., Giacintucci, S., & Markevitch, M. "Secondary Models for Radio Mini-Halos in Galaxy Clusters with MHD Simulations of Gas Sloshing." 2015, ApJ, 801, 146

ZuHone, J. A., Kunz., M. W., Markevitch, M., Stone, J. M., & Biffi, V. "The Effect of Anisotropic Viscosity on Cold Fronts in Galaxy Clusters." 2015, ApJ, 798, 90

Komarov, S.V., Churazov, E.M., Schekochihin, A.A., & **ZuHone, J.A.** "Suppression of Local Heat Flux in a Turbulent Magnetized Intracluster Medium." 2014, MNRAS, 440, 2

Giacintucci, S., Markevitch, M., Brunetti, G., **ZuHone, J.**, Venturi, T., Mazzotta, P., Bourdin, H. "Mapping the Particle Acceleration in the Cool Core of the Galaxy Cluster RX J1720.1+2638." 2014, ApJ, 795, 73

Dubey, A., Antypas, K., Calder, A. C., Daley, C., Fryxell, B., Gallagher, J. B., Lamb, D. Q., Lee, D., Olson, K., Reid, L. B., Rich, P., Ricker, P. M., Riley, K. M., Rosner, R., Siegel, A., Taylor, N. T., Weide, K., Timmes, F. X., Vladimirova, N., & **ZuHone, J.** "Evolution of FLASH, a Multiphysics Scientific Simulation Code for High Performance Computing." 2014, *International Journal of High Performance Computing Applications*, 28, 2

Lal, D. V., Kraft, R. P., Randall, S. W., Forman, W. R., Nulsen, P. E. J., Roediger, E., **ZuHone, J. A.**, Hardcastle, M. J., Jones, C., & Croston, J. H. "Gas Sloshing and Radio Galaxy Dynamics in the Core of the 3C449 Group." 2013, ApJ, 764, 83

ZuHone, J. A., Markevitch, M., Brunetti, G., & Giacintucci, S. "Turbulence and Radio Mini-halos in the Sloshing Cores of Galaxy Clusters." 2013, ApJ, 762, 78

ZuHone, J. A., Markevitch, M., Ruszkowski, M., & Lee, D. "Cold Fronts and Gas Sloshing in Galaxy Clusters with Anisotropic Thermal Conduction." 2013, ApJ, 762, 69

Dubey, A., Daley, C., **ZuHone, J.**, Ricker, P., Weide, K., & Graziani, C. "Imposing a Lagrangian Particle Framework on an Eulerian Hydrodynamics Infrastructure in FLASH." 2012, ApJS, 201, 27

Johnson, R. E., **ZuHone, J. A.**, Jones, C., Forman, W., & Markevitch, M. "Sloshing Gas in the Core of the Most Luminous Galaxy Cluster RXJ 1347.5-1145." 2012, ApJ, 751, 95

Roediger, E., & **ZuHone, J. A.** "Fast Simulations of Gas Sloshing and Cold Front Formation." 2012, MNRAS, 419, 1338

ZuHone, J. A., Markevitch, M., & Lee, D. "Sloshing of the Magnetized Cool Gas in the Cores of Galaxy Clusters." 2011, ApJ, 743, 16

ZuHone, J. A. "A Parameter Space Exploration of Galaxy Cluster Mergers I: Gas Mixing and the Generation of Cluster Entropy." 2011, ApJ, 728, 54

ZuHone, J. A., Markevitch, M., & Johnson, R. E. "Stirring Up the Pot: Can Cooling Flows In Galaxy Clusters Be Quenched By Gas Sloshing?" 2010, ApJ, 717, 908

ZuHone, J. A., Ricker, P. M., Lamb, D. Q., & Yang, H. Y. "A Line-Of-Sight Galaxy Cluster Collision: Simulated X-Ray Observations." 2009, ApJ, 699, 1004

ZuHone, J. A., Lamb, D. Q., & Ricker, P. M. "Rings of Dark Matter in Collisions Between Clusters of Galaxies." 2009, ApJ, 696, 694

Zingale, M., Dursi, L. J., **ZuHone, J.**. Calder, A. C., Fryxell, B., Plewa, T., Truran, J. W., Caceres, A., Olson, K., Ricker, P. M., Riley, K., Rosner, R., Siegel, A., Timmes, F. X., & Vladimirova, N. "Mapping Initial Hydrostatic Models in Godunov Codes." 2002, ApJS, 143, 539

Conference proceedings

John A. ZuHone, Veronica Biffi, Eric J. Hallman, Scott W. Randall, Adam R. Foster, and Christian Schmid. "Simulating X-ray Observations with Python." In Stéfan van der Walt and James Bergstra, editors, Proceedings of the 13th Python in Science Conference, pages 103 – 110, 2014.

ZuHone, J., Markevitch, M., & Brunetti, G. "Testing the Connection Between Radio Mini-halos and Core Gas Sloshing with MHD Simulations" 2011, in Non-thermal Phenomena in Colliding Galaxy Clusters, G. Ferrari, M. Brüggen, G. Brunetti, and T. Venturi, eds. (Pisa, Italy: Journal of the Italian Astronomical Society), 632

ZuHone, J., & Markevitch, M. "Cluster Core Heating from Merging Subclusters" 2009, in The Monster's Fiery Breath: Feedback in Galaxies, Groups, and Clusters, S. Heinz and E. Wilcots, eds. (Melville, NY: AIP Press), 383