Dr. Kenneth W. Cavagnolo
Curriculum Vitae

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University of Waterloo
Department of Physics & Astronomy
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Education

Michigan State University — 2005 - 2008
Doctor of Philosophy, Astronomy & Astrophysics

Michigan State University — 2002 - 2005
Master of Science, Astronomy & Astrophysics

Georgia Institute of Technology — 1998 - 2002
Bachelor of Science, Physics

Research Experience

Postdoctoral Fellow — 2008 - Present
Supervisor: Brian McNamara, *Univ. of Waterloo*

Graduate Research Assistant — 2003 - 2008
Supervisor: Megan Donahue, *Mich. St. Univ.*

Graduate Research Assistant — 2002 - 2003
Supervisor: Jack Baldwin, *Mich. St. Univ.*

Undergraduate Research Assistant — 2000 - 2002
Supervisor: James Sowell, *Geor. Inst. of Tech.*

Research Program & Interests

My research program is focused on better understanding the formation and evolution of cosmic structure via physical properties of the most massive gravitationally-bound objects (galaxy groups and clusters) and their sub-systems, *e.g.* galaxies, supermassive black holes, active galactic nuclei & jets, and thermal instabilities (*i.e.* gaseous nebulae, star formation, gas accretion).

Additional areas of interest:
- Intracluster medium magnetic fields
- Diffuse radio halos
- Mechanical and radiative AGN feedback
- Cosmological studies via structure formation

Honors

- Referee for ApJ, ApJL, AJ, and CanTAC — 2008 - Present
- Sherwood K. Haynes Award for Outstanding Graduate Student — 2008
- MSU College of Natural Science Dissertation Fellow — 2007 - 2008
- ΣΞ National Scientific Research Society Member — 2009 - Present

	• ΣΠΣ National Physics Honor Society Member	2001 - Present
	• American Astronomical Society Member	2002 - Present
	• American Physical Society Member	2002 - Present
	• Perimeter Institute Black Hole Reading Group Member	2009 - Present
	• Dean's List, Georgia Tech	1998-2002

Scientific Skills

- Extensive experience with X-ray and low-frequency radio data analysis
- Familiarity with infrared, optical, and UV data analysis
- Understanding of AIPS, CASA, CIAO, IRAF, OSA, and SAS analysis software
- Fluent in HTML, IDL, LaTeX, and PERL programming languages
- Worked with C, FLASH, FORTRAN, MySQL, PYTHON, SUPERMONGO, and TCL
- Mastery of DOS, Linux, Macintosh, and Windows computing architectures
- Expert of computer maintenance, system construction, and troubleshooting

Observing Experience

Giant Metrewave Radio Telescope (GMRT)	Jan. 2010
56 hours observing 14 galaxy clusters at 325 MHz	
Chandra X-ray Observatory (CXO)	Jan. 2009
21 hours queued observation of IRAS 09104+4109	
Very Large Array Radio Telescope (VLA)	Dec. 2008
39 hours observing 13 giant ellipticals	

Accepted Proposals & Grants

GMRT Cycle 17, Co-I	2009
The Power and Particle Content of Extragalactic Radio Sources	
PI: Somak Raychaudhury, *Univ. Birmingham*	
GMRT Cycle 17, Co-I	2009
The Morphology of Steepest Spectrum Radio Sources in Galaxy Cluster Cores	
PI: Alastair Edge, *Durham Univ.*	
NOAO Cycle 2008A & 2009A/B, Co-I	2008-2009
Normalization and scatter of the $M-T$ relation for supermassive galaxy clusters	
PI: Rachel Mandelbaum, *Princeton Univ.*	
GMRT Cycle 16, Co-I	2008
The Content of Giant Cavities in the IGM of Galaxy Clusters	
PI: Somak Raychaudhury, *Univ. Birmingham*	
CXO Cycle 10, PI	2008
IRAS 09104+4109: An Extreme Brightest Cluster Galaxy	
CXO Cycle 10, Co-I	2008
Conduction and Multiphase Structure in the ICM	
PI: Mark Voit, *Mich. St. Univ.*	
Spitzer Cycle 5, Co-I	2008
Star Formation and AGN Feedback in BCGs	
PI: Megan Donahue, *Mich. St. Univ.*	

Spitzer Cycle 5, Co-I 2008
Infrared Properties of a Control Sample of Brightest Cluster Galaxies
PI: Megan Donahue, *Mich. St. Univ.*

NSF Grant, Co-I 2008
Star Formation in the Universe's Largest Galaxies
PI: Mark Voit, *Mich. St. Univ.*

CXO Cycle 9, Co-I 2007
Quantifying Cluster Temperature Substructure
PI: Mark Voit, *Mich. St. Univ.*

VLA A-configuration Cycle, Co-I 2007
Radio Feedback in Clusters and Galaxies
PI: Brian McNamara, *Univ. Waterloo*

Teaching Experience

Substitute Instructor Fall 2006
Course: "Visions of the Universe"

Honors Physics Tutor Summer 2003
Course: "Introductory Honors Physics I & II"

Graduate Teaching Assistant 2002 - 2003
Course: "Visions of the Universe"

References

Megan Donahue, donahue@pa.msu.edu +00-1-517-884-5618
Tenured professor, Michigan State University

Brian McNamara, mcnamara@uwaterloo.ca +00-1-519-888-4567 ext. 38170
Tenured professor, University of Waterloo

G. Mark Voit, voit@pa.msu.edu +00-1-517-884-5619
Tenured professor, Michigan State University

Chris Carilli, ccarilli@nrao.edu +00-1-505-835-7000
National Radio Astronomy Observatory Chief Scientist

Jack Baldwin, baldwin@pa.msu.edu +00-1-517-884-5611
Associate Chair for Astronomy, Michigan State University

Paul Nulsen, pnulsen@cfa.harvard.edu +00-1-617-495-7043
Research Scientist, Center for Astrophysics at Harvard University

Mike Wise, wise@science.uva.nl +31-0-521-595-564
LOFAR Radio Observatory Chief Scientist

Personal Interests

- Academic: Environmental sciences, "Cradle2Cradle" design, and urban planning.
- Athletics: Triathlons, baseball, rock climbing, and Georgia Tech athletics.
- Hobbies: Backpacking, reading, building model airplanes, and raising bonsai trees.

Dr. Kenneth W. Cavagnolo
List of Publications

Last updated January 19, 2010; Hyperlinks colored blue

In Preparation

"A Relationship Between AGN Jet Power and Radio Power"
K. Cavagnolo, B. McNamara, P. Nulsen, C. Carilli, C. Jones, W. Forman, & L. Bîrzan
Submitted to ApJ

"Gas Uplift and AGN Heating from the Quasar in IRAS 09104+4109"
K. Cavagnolo, M. Donahue, B. McNamara, & G.M. Voit
In prep. for MNRAS

"A Multiwavelength Analysis of the Galaxy Cluster RBS 797: Evidence for a Cluster-scale Line-of-Sight AGN Outburst"
K. Cavagnolo, B. McNamara, P. Nulsen, M. Wise, M. Gitti, & M. Brüggen
In prep. for ApJ

"Entropy Scaling Relations of ACCEPT Galaxy Clusters"
K. Cavagnolo, G.M. Voit, & M. Donahue
In prep. for ApJL

"Constraining the Spin of Black Holes Using Measured AGN Jet Powers"
M. Rohanizadegan, B. McNamara, F. Kazemzadeh, P. Nulsen, & **K. Cavagnolo**
In prep. for ApJL

First Author Refereed Papers

"Intracluster Medium Entropy Profiles for a Chandra Archival Sample Of Galaxy Clusters"
K. Cavagnolo, M. Donahue, G.M. Voit, & M. Sun
ApJ Accepted, 2009

"An Entropy Threshold for Strong Hα and Radio Emission in the Cores of Galaxy Clusters"
K. Cavagnolo, M. Donahue, G.M. Voit, & M. Sun
ApJ Accepted, 2008

"Bandpass Dependence of X-Ray Temperatures in Galaxy Clusters"
K. Cavagnolo, M. Donahue, G.M. Voit, & M. Sun
ApJ Accepted, 2008

Co-Author Refereed Papers

"Direct Evidence for an Outflow of Metal-Enriched Gas Along the Radio Jets of Hydra A"
C. Kirkpatrick, M. Gitti, **K. Cavagnolo**, B. McNamara, L. David, P. Nulsen, & M. Wise
ApJL Accepted, 2009

"A Chandra X-ray Analysis of Abell 1664: Cooling, Feedback and Star Formation in the Central Cluster Galaxy"

C. Kirkpatrick, B. McNamara, D. Rafferty, P. Nulsen, L. Birzan, F. Kazemzadeh, M. Wise, M. Gitti, & **K. Cavagnolo**
ApJ Accepted, 2009

"Conduction and the Star Formation Threshold in Brightest Cluster Galaxies"
G.M. Voit, **K. Cavagnolo**, M. Donahue, D. Rafferty, B. McNamara, & P. Nulsen
ApJ Accepted, 2008

"Star Formation, Radio Sources, Cooling X-Ray Gas and Galaxy Interactions in the Brightest Cluster Galaxy in 2A0335+096"
M. Donahue, M. Sun, C. O'Dea, G.M. Voit, & **K. Cavagnolo**
AJ Accepted, 2007

"s-Process Abundances in Planetary Nebulae"
B. Sharpee, Y. Zhang, R. Williams, E. Pellegrini, **K. Cavagnolo**, J. Baldwin, M. Phillips, & X. Liu
ApJ Accepted, 2007

"Entropy Profiles in the Cores of Cooling Flow Clusters of Galaxies"
M. Donahue, D. Horner, **K. Cavagnolo**, & G.M. Voit
ApJ Accepted, 2006

Presented Work & Talks

TBD: *"IRAS 09104+4109: At the Cross-roads of Massive Galaxy Formation?"*
Jun. 2010 – From Massive Galaxy Formation to Dark Energy; University of Tokyo-Kashiwa

TALK: *"The AGN Jet Power and Radio Power Relationship for Isolated Giant Elliptical Galaxies"*
Jun. 2009 – The Monster's Fiery Breath: Feedback in galaxies, groups, and clusters; University of Wisconsin-Madison

INVITED TALK: *"Using Galaxy Clusters as Galaxy Formation Labs"*
Oct. 2008 – Undergraduate Seminar Series; University of Waterloo

INVITED TALK: *"Understanding Cluster Cores: The Role of Core Entropy"*
Sep. 2008 – The Cool, Cooler and Cold - Cluster Cooling Flows in a New Light; Lorentz Center, Leiden University

INVITED TALK: *"Investigating Feedback and Relaxation in Clusters of Galaxies"*
Jul. 2008 – Center for Study of Cosmic Evolution; Michigan State University

INVITED TALK: *"From Cluster Cosmology to Galaxy Formation in Under One Hour"*
Mar. 2008 – Astrophysics Seminar; University of Waterloo

INVITED TALK: *"The Effect of Cluster Feedback on High-Precision Cosmology"*
Feb. 2008 – NASA Space Science and Technology Center; UAH-Huntsville

INVITED TALK: *"Understanding Feedback in Galaxy Clusters"*
Jan. 2008 – Center for Study of Cosmic Evolution; Michigan State University

INVITED TALK: *"Band Dependence of X-ray Temperatures"*
Oct. 2007 – Astrophysics Seminar; University of Michigan

POSTER: *"The Entropy-Feedback Connection and Quantifying Cluster Virialization"*
Oct. 2007 – Eight Years of Science with Chandra; UAH-Huntsville

POSTER: *"Chandra Studies of Dark Matter and Galaxy Formation: Signatures from the Intracluster Medium"*
Dec. 2006 – American Astronomical Society Winter Meeting

PROCEEDING: *"Abundances of s-process elements in planetary nebulae: Br, Kr & Xe"*
Jul. 2006 – International Astronomical Union Symposium

POSTER: *"Studies of Entropy Distributions in X-ray Luminous Clusters of Galaxies"*
Dec. 2005 – American Astronomical Society Winter Meeting

POSTER: *"Entropy Distributions in the Cores of Nearby X-ray Luminous Clusters of Galaxies"*
Dec. 2004 – American Astronomical Society Winter Meeting

POSTER: *"Radio-Free Cluster Cooling Flows"*
Dec. 2004 – American Astronomical Society Winter Meeting