

# CURRICULUM VITAE

## Douglas Ian Clowe

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Ohio University  
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### EMPLOYMENT

2011–present Associate Professor, Ohio University, Athens, Ohio  
2006–2011 Assistant Professor, Ohio University, Athens, Ohio  
2003–2006 Postdoctoral Researcher, Steward Observatory, University of Arizona, Tucson, Arizona  
2000–2003 Postdoctoral Researcher, Institut für Astrophysik und Extraterrestrische Forschung, Universität Bonn, Bonn, Germany  
1998–2000 Postdoctoral Researcher, Max Planck Institut für Astrophysik, Garching, Germany  
1993–1998 Research Assistant, Institute for Astronomy, University of Hawaii, Honolulu, Hawaii  
1992–1992 Undergraduate Research Assistant, California Institute of Technology, Pasadena, California

### EDUCATION

1998 Ph.D., Astronomy, University of Hawaii  
1996 M.S., Astronomy, University of Hawaii  
1993 B.S., Physics, California Institute of Technology

### PROFESSIONAL SOCIETIES

American Astronomical Society  
International Astronomical Union

### RESEARCH EXPERIENCE AND INTERESTS

My current projects are studying the evolution of clusters of galaxies and the galaxies they contain as a leading member of the European Southern Observatory Distant Cluster Survey, and constraining the properties and existence of dark matter by studying interacting clusters of galaxies. I am also using the gravitational lensing signal from cluster of galaxies to measure the history of the expansion rate of the universe and the nature of dark energy. In addition, I am studying how cluster galaxies evolve from the field population using spectroscopic surveys of galaxies falling in to high-redshift clusters and galaxies in merging clusters. I am a member of the Shear Testing Programme, an international working group dedicated to improving the accuracy of weak lensing shear measurements for future large-scale surveys. I am also involved in planning for the Large Synoptic Survey Telescope weak lensing survey and in planning for the NASA/DOE Wide-Field Infrared Space Telescope Mission.

Past topics of research include: Accurately measuring mass profile of clusters to beyond the virial radius, reconciling systematic biases in different methods of measuring cluster masses, measuring the redshift distribution via gravitational lensing of galaxies too faint to measure spectroscopic redshifts, developing methods of accurately measuring shapes of galaxies.

## MENTORING

2010-	Supervising a graduate masters thesis which is investigating a new technique for correcting the Point Spread Function smearing effect in weak lensing data
2008-	Supervising a Ph.D. dissertation using weak gravitational lensing studies of merging clusters of galaxies to constrain non-Newtonian gravity models
2008-	Supervising a Ph.D. dissertation studying how the variation in the weak gravitational lensing with redshift of distant galaxies can be used to constrain dark energy models
2009-2010	Supervised a senior undergraduate thesis which investigated whether brightest cluster galaxies can be used as standard candles to measure the history of the expansion rate of the universe
2009-2010	Supervised a senior undergraduate thesis which investigated if one can use the speed of in-falling galaxies into galaxy clusters to measure the mass of the galaxy clusters
2008	Supervised a summer undergraduate research project which investigated how various dark energy models can change the expansion rate of the universe.
2007-2008	Supervised a senior undergraduate thesis which investigated changes in the spectroscopic properties of galaxies as they fall into high-redshift clusters of galaxies.
2007-2008	Supervised a graduate masters thesis which investigated how one can use principle component analysis of image point spread functions to better correct weak gravitational lensing measurements for image degradation
2007	Supervised a summer undergraduate research project on detecting filaments of galaxies around high redshift clusters of galaxies
2002–2003	Co-supervised a Diploma Thesis on spectroscopic and imaging observations of binary cluster systems

## TEACHING

Ohio University	PSc 100, “Introduction to Astronomy” in 2007 (2 quarters), 2009, 2010, 2011 ASTR 305, “Introduction to Astrophysics” in 2007, 2008, 2009, 2010 ASTR 310, “Astronomy Laboratory” in 2010 ASTR 403/503, “Extragalactic Astrophysics and Cosmology” in 2009 PHYS 397T, “Physics Tutorial” in 2010 PHYS 398T, “Physics Tutorial” in 2009 PHYS 399T, “Physics Tutorial” in 2008 PHYS 493/897, “Astrophysics Seminar” in 2008, 2009, 2010 PHYS 499T, “Physics Tutorial” in 2008 PHYS 894, “Solving Cosmology in the near future.” in 2006
University of Hawaii	Astr 110, “Survey of Astronomy” in 1998 Teaching Assistant: Astr 110, “Survey of Astronomy” in 1993, 1994

## SERVICE

### Department

Academic advisor to all Astrophysics majors	09/09 –
Acting head of Astrophysical Institute	09/09 – 09/10
Colloquium Committee	09/06 –
Undergraduate Recruitment Committee	09/07 –
Astronomy Outreach Committee	09/06 –
Astrophysics Quarters to Semesters Conversion Committee	01/09 –
Astrophysics Visiting Professor Search Committee	04/08 – 07/08
URP Tenure-Track Faculty Search Committee	09/06 – 04/07

### University

Ohio University Research Committee	09/08 –
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### National/International

Large Synoptic Survey Telescope weak lensing science working group	01/07 –
NASA/DOE Joint Dark Energy Mission Ad-hoc Figure of Merit Science Working Group	06/08 – 01/09
DESTINY: The Dark Energy Space Telescope weak lensing science team, co-leader	06/06 – 11/08
Scientific organizing committee for SnowCluster 2010 conference	09/09 – 04/10

## Student Research Supervision

### Dissertation Committee

Kellen Murphy, “Tests of the Application of Weak Gravitational Lensing Tomography to Dark Energy Equation of State Parameter Estimates,” Chair	09/08 –
Brett Ragozzine, “Modeling the Dark Matter of Galaxy Clusters Using the Tensor-Vector-Scalar Theory of Alternative Gravity,” Chair	09/08 –
Parisa Roustazadeh, “Pair Cascades in Blazars”	11/09 –
Swati Gupta, “Time Dependent Radiation Spectra from Jets of Microquasars”	09/06 – 06/07
Laura Rafferty, “X-ray Bubbles in Galaxy Clusters”	09/06 – 06/07

### M.S. Thesis Committee

Rebecca Santana, “Improving the Accuracy of Point Spread Function Correction Methods,” Advisor	09/10 –
Yang Liu, “Calibration of Glass Fiber Microcantilevers”	06/09 – 09/09
Brett Ragozzine, “Modeling the Point Spread Function Using Principal Component Analysis,” Advisor	06/08 – 09/08

### Senior Honors Thesis Director

Tyler Peery, “The Use of Brightest Clusters Galaxies as Standard Candles Since $z \sim 1$ ”	06/09 – 06/10
Kayla Fultz, “New Mass Measurement for Galaxy Clusters Using Position and Radial Velocity”	06/09 – 06/10
Jess Wilhelm, “Galaxy Evolution in $z \sim 0.5$ Filaments”	06/07 – 06/08

## HONORS

Alfred P. Sloan Fellowship September 2008

## COLLOQUIA

Northwestern University	January 2011
Ball State University	October 2010
Texas A&M University	February 2010
Gemini Science Center	April 2008
Rice University	October 2007
Syracuse University	February 2007
US Naval Research Laboratory	February 2007
Ohio State University	November 2006
University of Amsterdam	November 2006
University of New Mexico	October 2006
Massachusetts Institute of Technology	October 2006
Fermi National Accelerator Laboratory	September 2006
New York University	September 2006
Ohio University	April 2006
University of California, Davis	February 2006
New Mexico State University	November 2005
Cambridge University	October 1999
Observatoire Midi-Pyrenees	September 1999
University of Groningen	April 1999

## INVITED TALKS

Summer School and Workshop: “Weak and Strong Gravitational Lensing,” National Astronomical Observatory of China, Beijing	July 2011
Workshop: “SF09 Cosmology Summer Workshop,” St. John’s College, Santa Fe	July 2009
Conference: “Dark Energy: Lighting up the Darkness!,” University of Tokyo, Japan	June 2009
Conference: “OZ Lens 2008,” University of Sydney, Australia	September 2008
Workshop: “Upcoming Lensing Surveys: Beyond the Obvious,” Canadian Institute of Theoretical Astrophysics	June 2008
Conference: “Great Lakes Cosmology IX,” Carnegie Mellon University	June 2008
1er Congreso de Cosmologia del IAC, Instituto Avanzado de Cosmologia, Leon, Mexico	February 2008
Workshop: “Weak Lensing from Space,” NASA JPL	August 2007
Ecole Internationale Daniel Chalonge 2007, Observatoire de Paris	July 2007
Conference: “The Dark Side of the Universe 2007,” Univ. of Minnesota	June 2007
INAF-COSMOCT School on Gravitational Lensing, Catania, Italy	November 2006
Conference: “Applications of Gravitational Lensing,” UCSB	October 2006
Conference: “Matter and Energy in Clusters of Galaxies,” Chung-Li, Taiwan	April 2002
Conference: “Cosmological Physics with Gravitational Lensing,” Moriond, France	February 1999

## SCIENTIFIC GRANTS

### PI

“Gravity in the crossfire: A weak lensing study of merging and relaxed galaxy clusters,” 09/11  
National Science Foundation, \$ 317,049

“Gravity in the Crossfire: Revealing the Properties of Dark Matter in Bullet-like Clusters,” 01/11  
Space Telescope Science Institute, \$ 134,114

“Alfred P. Sloan Research Fellowship,” Alfred P. Sloan Foundation, \$50,000 09/08

“Beyond the Bullet: Direct Detection of Dark Matter in Merging Galaxy Clusters,” Space 10/07  
Telescope Science Institute, \$106,882

### co-PI

“DESTINY: The Dark Energy Space Telescope,” Department of Energy via Association of 09/07  
Universities for Research in Astronomy, \$30,000

### co-I

“Magnified Weak Lensing Cross Correlation Tomography with Massive Rich Clusters of 11/08  
Galaxies,” Department of Energy via Northwestern University, \$51,969

## PUBLICATIONS

### In Preparation:

Clowe, D., et al., “Dark Bump Hunting: Weak Lensing Mass Reconstruction of the Merging Cluster System Abell 520,” in prep.

Ragozzine, B., Clowe, D., et al., “Weak Lensing Mass Reconstruction of the Merging Galaxy Cluster A1758,” submitted to ApJ in May 2011.

Clowe, D., et al., “Measuring Weak Lensing Tomography with Clusters of Galaxies,” in prep.

Hall, N., et al. [including D. Clowe], “Using the Bullet Cluster as a Gravitational Telescope to Study  $z > 7$  Lyman Break Galaxies,” submitted to ApJ in January 2011.

### Refereed:

Chung, S.M., Gonzalez, A.H., Clowe, D., Markevitch, M., & Zaritsky, D., “Star Formation in the Bullet Cluster I: The Infrared Luminosity Function and Star Formation Rate,” 2010, ApJ, 725, 1536.

Saglia, R. P., et al. [18 authors including D. Clowe], “The fundamental plane of EDisCS galaxies - The effect of size evolution,” 2010, A&A, 524, 6.

Guennou, L., et al. [23 authors including D. Clowe], “The DAFT/FADA survey. I. Photometric redshifts along lines of sight to clusters in the  $z=[0.4,0.9]$  interval,” 2010, A&A, 523, 21.

Perez-Gonzalez, P., et al. [40 authors including D. Clowe], “Improving the identification of high- $z$  Herschel sources with position priors and optical/NIR and FIR/mm photometric redshifts,” 2010, A&A, 518, 15.

Douglas, L. S., Bremer, M. N., Stanway, E. R., Lehnert, M. D., and Clowe, D., “Photometric selection of  $z \sim 5$  Lyman break galaxies in the ESO Remote Galaxy Survey,” 2009, MNRAS, 400, 561.

Bradac, M., et al. [10 authors including D. Clowe], “Focusing Cosmic Telescopes: Exploring Redshift  $z \sim 5 - 6$  Galaxies with the Bullet Cluster 1E0657-56,” 2009, ApJ, 706, 1201.

- Pello, R. et al. [20 authors including D. Clowe], “Photometric redshifts and cluster tomography in the ESO Distant Cluster Survey,” 2009, *A&A*, 508, 1173.
- Simard, L., Clowe, D., et al. [17 authors], “Evolution of the Early-Type Galaxy Fraction in Clusters since  $z = 0.8$ ,” 2010, *A&A*, 508, 1141.
- Rudnick, G., et al. [15 authors including D. Clowe], “The Rest-frame Optical Luminosity Function of Cluster Galaxies at  $z < 0.8$  and the Assembly of the Cluster Red Sequence,” 2009, *ApJ*, 700, 1559.
- Sanchez-Blazquez, P., et al. [17 authors including D. Clowe], “Evolution of red-sequence cluster galaxies from redshift 0.8 to 0.4: ages, metallicities, and morphologies,” 2009, *A&A*, 499, 47.
- Barazza, F. D., et al. [18 authors including D. Clowe], “Frequency and properties of bars in clusters and field galaxies at intermediate redshifts,” 2009, *A&A*, 497, 713.
- Corless, V. L., King, L. J., and Clowe, D., “A new look at massive clusters: weak lensing constraints on the triaxial dark matter haloes of A1689, A1835, and A2204,” 2009, *MNRAS*, 393, 1235.
- Poggianti, B. M., et al. [19 authors including D. Clowe], “The Environments and Post-Starburst Galaxies at  $z = 0.4-0.8$ ,” 2009, *ApJ*, 693, 112.
- Chung, S. M., Gonzalez, A. H., Clowe, D., Zaritsky, D., Markevitch, M., and Jones, C., “Impacts of a Supersonic Shock Front on Star Formation in the Bullet Cluster,” 2009, *ApJ*, 691, 963.
- Gonzalez, A. H., Clowe, D., Bradac, M., Zaritsky, D., Jones, C., and Markevitch, M., “A Multiply Imaged Luminous Infrared Galaxy Behind the Bullet Cluster (1E0657-56),” 2009, *ApJ*, 691, 525.
- Poggianti, B., et al. [20 authors, including D. Clowe], “The Relation between Star Formation, Morphology, and Local Density in High-Redshift Clusters and Groups,” 2008, *ApJ*, 684, 888.
- Randall, S. W., Markevitch, M., Clowe, D., Gonzalez, A. H., Bradac, M., “Constraints on the Self-Interaction Cross-Section of Dark Matter from Numerical Simulations of the Merging Galaxy Cluster 1E 0657-56,” 2008, *ApJ*, 679, 1173.
- Sand, D. J., Zaritsky, D., Herbert-Fort, S., Sivanandam, S., Clowe, D., “A Photometric Search for Transients in Galaxy Clusters,” 2008, *AJ*, 135, 1917.
- Milvang-Jensen, B., et al. [20 authors, including D. Clowe], “Spectroscopy of clusters in the ESO distant cluster survey (EDisCS). II. Redshifts, velocity dispersions, and substructure for clusters in the last 15 fields,” 2008, *A&A*, 482, 419.
- Desai, V., et al. [15 authors including D. Clowe], “The Morphological Content of 10 EDisCS Clusters at  $0.5 < z < 0.8$ ,” 2007, *ApJ*, 660, 1151.
- Massey, R., et al. [31 authors including D. Clowe], “The Shear Testing Programme 2: Factors affecting high precision weak lensing analyses”, 2007, *MNRAS*, 376, 13.
- De Lucia, G., et al. [14 authors including D. Clowe], “The build-up of the colour-magnitude relation in galaxy clusters since  $z \sim 0.8$ ,” 2007, *MNRAS*, 374, 809.
- Bradac, M., et al. [10 authors including D. Clowe], “Strong and weak lensing united III: Measuring the mass distribution of the merging galaxy cluster 1E0657-56”, 2006, *ApJ*, 652, 937.

- Johnson, O., et al. [14 authors including D. Clowe], “The X-ray properties of optically selected  $z > 0.6$  clusters in the European Southern Observatory Distant Cluster Survey”, MNRAS, 371, 1777.
- Clowe, D., Bradac, M., Gonzalez, A. H., Markevitch, M., Randall, S. W., Jones, C., Zaritsky, D., “A Direct Empirical Proof of the Existence of Dark Matter”, 2006, ApJL, 648, 109.
- Heymans, C., et al. [25 authors including D. Clowe], “The Shear Testing Programme - I. Weak lensing analysis of simulated ground-based observations”, 2006, MNRAS, 368, 1323.
- Poggianti, B. M., et al. [19 authors including D. Clowe], “The Evolution of the Star Formation Activity in Galaxies and It’s Dependence on Environment”, 2006, ApJ, 642, 188.
- Clowe, D., et al. [15 authors], “Weak lensing mass reconstructions of the ESO Distant Cluster Survey”, 2006, A&A, 451, 395.
- White, S. D. M., et al. [26 authors including D. Clowe], “EDisCS - the ESO Distant Cluster Survey: Sample Definition and Optical Photometry”, 2005, A&A, 444, 365.
- Dietrich, J. P., Schneider, P., Clowe, D., Romano-Diaz, E., Kerp. J., “Weak lensing study of dark matter filaments and application to the binary cluster A222 and A223”, 2004, A&A, 440, 453.
- Bradac, M., et al. [9 authors including D. Clowe], “Strong and weak lensing united”, A&A, 437, 49.
- Halliday, C., et al. [15 authors including D. Clowe], “Spectroscopy of clusters in the ESO Distant Cluster Survey”, 2004, A&A, 427, 397.
- De Lucia, G., et al. [13 authors including D. Clowe], “The Buildup of the Red Sequence in Galaxy Clusters since  $z \sim 0.8$ ”, 2004, ApJL, 610, 77.
- Clowe, D., Gonzalez, A. H., Markevitch, M., “Weak lensing mass reconstruction of the interacting cluster 1E0657-556: Direct evidence for the existence of dark matter”, 2004, ApJ, 604, 596.
- Markevitch, M., Gonzalez, A. H., Clowe, D., Vikhlinin, A., Forman, W., Jones, C., Murray, S., Tucker, W., “Direct constraints on the dark matter self-interaction cross-section from the merging cluster 1E0657-56”, 2004, ApJ, 606, 819.
- Clowe, D., De Lucia, G., King, L., “Effects of asphericity and substructure on the determination of cluster mass with weak gravitational lensing”, 2004, MNRAS, 350, 1038.
- Clowe, D., Luppino, G., Kaiser, N., “Weak lensing by high-redshift clusters of galaxies II: mean redshift of the faint background galaxy population”, 2003, A&A, 409, 851.
- Donahue, M., Gaskin, J. A., Patel, S. K., Joy, M., Clowe, D., Hughes, J. P., “The mass, baryonic fraction, and X-ray temperature of the luminous, high-redshift cluster of galaxies MS0451.6-0305”, 2003, ApJ, 598, 190.
- Erben, T., et al. [9 authors including D. Clowe], “A weak lensing analysis of a STIS dark-lens candidate”, 2003, A&A, 410, 45.
- Dietrich, J. P., Clowe, D. I., Soucail G., “Spectroscopy of the neighboring massive clusters Abell 222 and Abell 223”, 2002, A&A, 394, 395.
- Clowe, D., Schneider, P., “Wide field weak lensing observations of A1835 and A2204”, 2002, A&A, 395, 385.

- King, L. J., Clowe, D. I., Lidman, C., Schneider, P., Erben, T., Kneib, J.-P., Meylan, G., “The first detection of weak gravitational shear in infrared images: Abell 1689”, 2002, *A&A*, 385, 5.
- King, L. J., Clowe, D., Schneider, P., “Parameterized models for the lensing cluster A1689”, 2002, *A&A*, 383, 118.
- Clowe, D., Schneider, P., “Wide field weak lensing observations of A1689”, 2001, *A&A*, 379, 384.
- Bacon, D. J., Refregier, A., Clowe, D., Ellis, R. S., “Numerical simulations of weak lensing measurements”, 2001, *MNRAS*, 325, 1065.
- Clowe, D., Trentham, N., Tonry, J., “Weak Lensing Observations of the Dark Cluster MG2016+112”, 2001, *A&A*, 369, 16.
- Clowe, D., Luppino, G. A., Kaiser, N., Gioia, I. M., “Weak Lensing by High-Redshift Clusters of Galaxies. I. Cluster Mass Reconstruction”, 2000, *ApJ*, 539, 540.
- Clowe, D., Luppino, G. A., Kaiser, N., Henry, J. P., Gioia, I. M., “Weak Lensing by Two Z approximately 0.8 Clusters of Galaxies”, 1998, *ApJL*, 497, 61.
- Henry, J. P., et al. [9 authors including D. Clowe], “Discovery of a Redshift 0.8 Cluster of Galaxies in the ROSAT North Ecliptic Pole Survey.”, 1997, *AJ*, 114, 1293.
- Gioia, I. M., et al. [9 authors including D. Clowe], “Discovery of a large gravitational arc in the X-ray cluster A2280”, 1995, *A&A*, 297, 75.

## Non-Refereed

- Clowe, D. and DellAntonio, I. P., 2009, section 14.3.1 through 14.3.8 “Galaxy Clusters,” in *LSST Science Book, Version 2.0*, ed. J. A. Tyson, D. W. Sweeney, and M. A. Strauss (Tucson, AZ: LST Corporation), 506-511
- Working group report to NASA and DoE: Albrecht, A., et al. [11 authors including Clowe], “Findings of the Joint Dark Energy Mission Figure of Merit Science Working Group,” 2009, arXiv:0901.0721
- Clowe, D. “Seeing Dark Matter,” 2008, in *Hubble 2007: Science Year in Review*, 89–96.
- Clowe, D. and Zaritsky, D., “A Shot in the Dark,” *Physics World*, Feb 2007, 26–29.
- Clowe, D., Randall, S. W., Markevitch, M., “Catching a bullet: direct evidence for the existence of dark matter,” 2007, *Nuclear Physics B (Proceeding Supplement)*, 173, 28.
- Clowe, D., Schneider, P., “Results from the ESO Distance Cluster Survey”, 2005, *Gravitational Lensing Impact on Cosmology*, IAU Symposium, vol. 225, eds. Mellier and Meylan.
- Clowe, D., Desai, V., Simard, L., Dalcanton, J., “Weak lensing mass reconstructions of high-z EDisCS clusters with ACS mosaic images”, 2004, *New Astronomy Reviews of Wide-Field Imaging from Space*, eds. McKay, Fruchter, and Linder.
- De Lucia, G., et al. [13 authors including D. Clowe], “Observing the build-up of the colour-magnitude relation at redshift  $z$  0.8”, 2004, *Proc. of the IAU Colloq.* 195.
- Dietrich, J. P., Clowe, D., Schneider, P., Kerp, J., Romano-Diaz, E., “Weak lensing evidence for a filament between A222/A223”, 2004, *Proc. of the IAU Colloq.* 195.



- Rudnick, G., et al. [26 authors including D. Clowe], “Studying high redshift galaxy clusters with the ESO Distant Cluster Survey”, 2003, *The Messenger*, 112, 19.
- Clowe, D. “Wide-field weak lensing cluster mass reconstructions”, 2002, in *Matter and Energy in Clusters*, eds. Bowyer and Hwang.
- Clowe, D., Simard, L., “First Results from the ESO Distant Cluster Survey”, 2002, in *Lighthouses of the Universe: The Most Luminous Celestial Objects and their use for Cosmology*, eds. Churazov and Gilfanov
- Clowe, D., Schneider, P., “Mass profiles of clusters at large radii from weak gravitational lensing”, 2002, in *Where’s the matter? Tracing dark and bright matter with the new generation of large scale surveys*, eds. Treyer and Tresse
- King, L. J., Clowe, D., Schneider, P., Springel, V., “Gravitational lensing studies of high resolution cluster simulations”, 2000, in *IAU symposium 201*
- Castander, F. J., Holder, G. P., Clowe, D., Carlstrom, J. E., Schirmer, M., Reese, E., Kneib, J. P., “Combining SZ, X-rays and lensing data on the cluster of galaxies CL0016”, 2000, in *Constructing the Universe with Clusters of Galaxies*, eds. F. Durret and D. Gerbal
- Clowe, D., Luppino, G. A., Kaiser, N., Gioia, I. M., “Weak Lensing Observations of High-Redshift Clusters of Galaxies”, 2000, in *Clustering at High Redshift*, ASP Conference Series, eds. A. Mazure and O. LeFevre
- Clowe, D., Luppino, G. A., Kaiser, N., Gioia, I. M., “Weak Lensing by High-Redshift Clusters of Galaxies”, 1998, in *Wide Field Surveys in Cosmology*, eds. S. Colombi, Y. Mellier, and B. Raban
- Garnavich, P., Dahle, H., Luppino, G., Clowe, D., Schmidt, B., Tonry, J., Challis, P., Jha, S., 1997, *IAU Circular 6779*
- Clowe D., Luppino, G., Gioia, I., “A Hubble Diagram from X-Ray Selected Clusters”, 1996, in *Clusters, Lensing, and the Future of the Universe*, ASP Conference Proceedings, Vol 88, eds. V. Trimble and A. Reisenegger
- Luppino, G., Metzger, M., Kaiser, N., Clowe, D., Gioia, E., Miyazaki, S., “Observations of Weak Lensing in Clusters with an 8192 X 8192 CCD Mosaic Camera”, in *Clusters, Lensing, and the Future of the Universe*, ASP Conference Proceedings, Vol 88, eds. V. Trimble and A. Reisenegger

## **PUBLIC OUTREACH**

### **Public Lectures:**

“The Dark Side of the Universe,” Ohio University Science Cafe, Athens, Ohio	January 2010
“The Dark Side of the Universe,” Athens Public Library, Athens, Ohio	August 2007
“Gravitational Lensing,” University of Arizona, Tucson, Arizona	November 2005

### **Other Public Outreach:**

Led or participated in public stargazing events, both naked eye and small telescopes, Athens, Ohio	September 2006 –
Featured in Nova Science Now podcast “The Dark Matter Mystery”	June 2008
Judge at Ohio State Science Fair	March 2008, 2009
Judge at southeast Ohio Science Olympiad	March 2007
Interviewed in URB magazine	December 2006