

SARAH M. HANSEN  
*Curriculum Vitae*

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**RESEARCH INTERESTS** Observational astrophysics: multiwavelength studies of galaxy groups and clusters; cosmological constraints from galaxy clusters; structure formation and evolution; formation and evolution of galaxies

**EDUCATION** **University of Chicago**, Chicago, Illinois USA  
Ph.D. Astronomy (expected 2008)  
M.S. Astronomy, 2004  
**University of Michigan**, Ann Arbor, Michigan USA  
B.S. Physics, 2002

**HONORS AND AWARDS**

DOOLITTLE HARRISON FELLOWSHIP, University of Chicago	2007
CARL SAGAN TEACHING AWARD, University of Chicago	2003
GRADUATED WITH HIGHEST HONORS IN PHYSICS, University of Michigan	2002
WILLIAM L. WILLIAMS AWARD, University of Michigan	2002
VIRGINIA VOSS MEMORIAL SCHOLARSHIP, University of Michigan	2002
GENERAL ELECTRIC FACULTY FOR THE FUTURE FELLOWSHIP	2000-01, 2001-02
MICHIGAN SPACE GRANT CONSORTIUM RESEARCH GRANT	2000, 2001, 2002
UNDERGRADUATE RESEARCH OPPORTUNITIES PROGRAM	1998-99, 1999-2000

**OBSERVING EXPERIENCE**

Co-I, COSMOLOGY WITH OPTICAL+SZ GALAXY CLUSTERS Kitt Peak National Observatory, Mayall 4m imaging with MOSAIC (5 nights)	2006B
SZE+OPTICAL STUDIES OF THE COSMIC ACCELERATION Cerro Tololo Inter-American Observatory, Blanco 4m imaging with MOSAIC II (18 nights)	2005-07
Co-I, DISTANCES TO THE OORT, 21 CM HIGH VELOCITY CLOUDS Apache Point Observatory, 3.5m spectroscopy with DIS (7 nights)	Q1, Q2, Q3 2003

**RESEARCH EXPERIENCE**

<b>University of Chicago</b> , Chicago, Illinois USA	<b>Advisor: Stephan S. Meyer</b>
OPTICAL PROPERTIES OF SZE-SELECTED CLUSTERS Observing and analysis of multi-band photometric data from CTIO 4m ( <i>Blanco Cosmology Survey</i> ) and KPNO 4m ( <i>SZA</i> Optical) in regions that overlap the SPT and SZA surveys with the goal of understanding the SZE selection of clusters for cosmology.	2005-present
OPTICAL CHARACTERISTICS OF CLUSTERS AND GROUPS Analysis of SDSS photometric data with background-corrected cross-correlation techniques to investigate the radial, luminosity, and color distribution of galaxies in clusters as a function of cluster mass and redshift. Detailed comparison of this data with simulations.	2004-present
EMISSIONIVITY OF TREATED ALUMINUM SURFACES FOR USE IN THE SOUTH POLE TELESCOPE Built an instrument to measure the relative emissivity of various samples; characterized the emissivity of potential mirror and ground shield surfaces.	2004-05

**University of Chicago**, Chicago, Illinois USA **Advisor: Donald G. York**  
 SPECTRAL OBSERVATIONS FOR CONSTRAINING HIGH VELOCITY CLOUD DISTANCES 2003  
 Obtained and analyzed spectra of Galactic halo RR Lyrae to determine appropriate targets for high-resolution spectroscopy with the goal of constraining the distances to several High Velocity Cloud complexes.

**University of Michigan**, Ann Arbor, Michigan USA **Advisor: Timothy A. McKay**  
 HONORS THESIS 2002  
 Developed and implemented algorithms to do statistical background subtraction of projected photometric data, enabling investigation of the properties of galaxies in clusters; measured the luminosity function of cluster galaxies as a function of cluster richness for clusters in the SDSS Early Data Release.

COMPARISON OF SDSS CLUSTERS FROM DIFFERENT FINDING ALGORITHMS 2000-02  
 Developed and implemented statistical background subtraction techniques to characterize galaxies in clusters; used these methods to quantify differences among different cluster catalogs produced from SDSS data.

STRONGLY LENSED QSOs IN SDSS DATA 1998-99  
 Developed algorithms to search SDSS data for strongly lensed QSOs, resulting in several candidate objects.

#### ACADEMIC EXPERIENCE

**University of Chicago**, Chicago, Illinois USA  
 TEACHING ASSISTANT, *The Origin of the Universe & How We Know* Spring 2007  
 TEACHING ASSISTANT, *The Origin of the Universe & How We Know* Spring 2006  
 TEACHING ASSISTANT, *Evolution of the Universe* Spring 2003  
 TEACHING ASSISTANT, *The Origin of the Universe & How We Know* Winter 2003  
 TEACHING ASSISTANT, *Stellar Astronomy & Astrophysics* Fall 2002

**University of Michigan**, Ann Arbor, Michigan USA  
 TUTOR, *Keller Physics: Introduction to Electricity and Magnetism* Fall 2000

#### OUTREACH ACTIVITIES

CO-PRESENTOR, NATIONAL SCIENCE TEACHERS ASSOCIATION CONFERENCE Spring 2007  
 Presented original science activities appropriate for middle- and high-school students.

INSTRUCTOR, SCIENCE AND TECHNOLOGY OUTREACH MENTORING PROGRAM 2005-06, 2006-07  
 Designed and implemented hands-on science activities for a weekly enrichment program for K-5 students.

INSTRUCTOR, YERKES SUMMER INSTITUTE Summers 2003, 2004, 2005, 2006, 2007  
 Designed and implemented hands-on astrophysics-related laboratories for a week-long science camp for grade 6-12 students.

INSTRUCTOR, KAVLI INSTITUTE SHORT COURSE Fall 2005  
 Presented a student laboratory program for measuring the Cosmic Microwave Background temperature to high school and college instructors.

INSTRUCTOR, SPACE EXPLORERS PROGRAM LEADERSHIP SEMINAR Fall 2004  
 Organized a lecture series about galaxy formation and evolution for high-school students.

ASSISTANT INSTRUCTOR, ASTRO-SCIENCE WORKSHOP Summers 2004, 2006  
 Assisted with a summer lecture and research program about asteroids for high-school students.

INSTRUCTOR, SPACE EXPLORERS PROGRAM 2003-04  
 Designed and implemented a year-long curriculum about temperature and cosmology for a weekly class for grade 5-12 students.

<b>DEPARTMENTAL SERVICE</b>	GRADUATE ADMISSIONS COMMITTEE	2007-present	
	STUDENT ADVISORY COMMITTEE TO THE PHYSICAL SCIENCES DEAN	2006-present	
	STUDENT GOVERNMENT REPRESENTATIVE	2006-07	
	STUDENT REPRESENTATIVE TO THE FACULTY	2005-06, 2006-07	
	COLLOQUIUM SPEAKER WHIP	2003-04, 2004-05	
<b>INVITED TALKS</b>	GALAXY CONTENT OF CLUSTERS AND GROUPS IN THE LOCAL UNIVERSE (November 13, 2007) Cosmology Seminar, UC-Berkeley, Berkeley, CA		
	GALAXY CONTENT OF GROUPS & CLUSTERS FROM THE SDSS (November 12, 2007) Carnegie Lunch Talk, Carnegie Observatories, Pasadena, CA		
	GALAXY POPULATIONS IN SDSS CLUSTERS (November 9, 2007) FLASH Seminar, UC-Santa Cruz, Santa Cruz, CA		
	GALAXY CONTENT OF CLUSTERS AND GROUPS IN THE LOCAL UNIVERSE (October 23, 2007) CCAPP Seminar, The Ohio State University, Columbus, OH		
	GALAXY POPULATIONS IN SDSS GROUPS & CLUSTERS (July 4, 2007) Special Seminar, MPA, Garching, Germany		
	LUMINOSITY AND COLOR DISTRIBUTIONS OF GALAXIES IN CLUSTERS AND GROUPS (June 3, 2007) Great Lakes Cosmology Workshop 8, The Ohio State University, Columbus, OH		
	GALAXY CONTENT IN GROUPS & CLUSTERS (January 30, 2007) KIPAC Tea Talk, Stanford University, Stanford, CA		
	LUMINOSITY FUNCTIONS OF MAXBCG CLUSTER GALAXIES (August, 2002) Sloan Digital Sky Survey Collaboration Meeting, Princeton University, Princeton, NJ		
	<b>CONFERENCE PARTICIPATION</b>	Tracing Cosmic Evolution with Clusters of Galaxies, Sesto, Italy (June 2007)	
		Great Lakes Cosmology Workshop 8, The Ohio State University, Columbus, OH (June 2007)	
Aspen Winter Workshop: Clusters of Galaxies as Cosmological Probes, Aspen, CO (February 2007)			
209th AAS Meeting, Seattle, WA (January 2007)			
Advanced Lectures On: A Pan-Chromatic View on Clusters of Galaxies and LSS, Tonantzintla, Mexico (June 2005)			
Future of Cosmology with Clusters, Kona, HI (February 2005)			
Fundamental Physics from Clusters of Galaxies, Batavia, IL (December 2004)			
203rd AAS Meeting, Seattle, WA (January 2003)			
199th AAS Meeting, Washington, D.C. (January 2002)			

**PUBLICATIONS**

## GALAXY CONTENT OF SDSS CLUSTERS AND GROUPS

**Hansen, Sarah M.**; Sheldon, Erin S.; Wechsler, Risa H.; Koester, Benjamin P., ArXiv:0710.3780 [astro-ph] (2007)

## CROSS-CORRELATION WEAK LENSING OF SDSS GALAXY CLUSTERS III: MASS-TO-LIGHT RATIOS

Sheldon, Erin S.; Johnston, David E.; Masjedi, Morad; McKay, Timothy A.; Blanton, Michael R.; Scranton, Ryan; Wechsler, Risa H.; Koester, Ben P.; **Hansen, Sarah M.**; Frieman, Joshua A.; Annis, James, ArXiv:0709.1162 [astro-ph] (2007)

## MEASUREMENT OF GALAXY CLUSTER SIZES, RADIAL PROFILES, AND LUMINOSITY FUNCTIONS FROM SDSS PHOTOMETRIC DATA

**Hansen, Sarah M.**; McKay, Timothy A.; Wechsler, Risa H.; Annis, James; Sheldon, Erin Scott; Kimball, Amy, ApJ, 633 (2005)

## A MERGED CATALOG OF CLUSTERS OF GALAXIES FROM EARLY SLOAN DIGITAL SKY SURVEY DATA

Bahcall, Neta A.; McKay, Timothy A.; Annis, James; Kim, Rita S. J.; Dong, Feng; **Hansen, Sarah M.**; Goto, Tomo; Gunn, James E.; Miller, Chris; Nichol, R. C.; Postman, Marc; Schneider, Don; Schroeder, Josh; Voges, Wolfgang; Brinkmann, Jon; Fukugita, Masataka, ApJS, 148 (2003)

## THE MORPHOLOGICAL BUTCHER-OEMLER EFFECT IN THE SDSS CUT &amp; ENHANCE GALAXY CLUSTER CATALOG

Goto, Tomotsugu; Okamura, Sadanori; Yagi, Masafumi; Sheth, Ravi K.; Bahcall, Neta A.; Zabel, Shane A.; Crouch, Michael S.; Sekiguchi, Maki; Annis, James; Bernardi, Mariangela; Chong, Shang-Shan; Gomez, Percy L.; **Hansen, Sarah M.**; Kim, Rita S. J.; Knudson, Adam; McKay, Timothy A.; Miller, Christopher J., PASP, 739 (2003)

## THE CLUSTER MASS FUNCTION FROM EARLY SDSS DATA: COSMOLOGICAL IMPLICATIONS

Bahcall, Neta A.; Dong, Feng; Bode, Paul; Kim, Rita; Annis, James; McKay, Timothy A.; **Hansen, Sarah M.**; Schroeder, Josh; Gunn, James; Ostriker, Jeremiah P.; Postman, Marc; Nichol, Robert C.; Miller, Chris; Goto, Tomotsugu; Brinkmann, Jon; Knapp, Gillian R.; Lamb, Don O.; Schneider, Donald P.; Vogeley, Michael S.; York, Donald G., ApJ, 585 (2003)

## COMPOSITE LUMINOSITY FUNCTIONS BASED ON THE SLOAN DIGITAL SKY SURVEY "CUT &amp; ENHANCE" GALAXY CLUSTER CATALOG

Goto, Tomotsugu; Okamura, Sadanori; McKay, Timothy A.; Bahcall, Neta A.; Annis, James; Bernard, Mariangela; Brinkmann, Jonathan; Gomez, Percy L.; **Hansen, Sarah M.**; Kim, Rita S. J.; Sekiguchi, Maki; Sheth, Ravi K., PASP, 515 (2002)

## List of Referees

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