

CONTACT INFORMATION	<i>Address:</i>	
	Center for Data Intensive Science, University of Chicago 900 East 57th Street, KCBD 10140, Chicago, IL 60637	<i>E-mail:</i> mtpatter@uchicago.edu <i>Web:</i> mtpatter.github.io
EDUCATION	New Mexico State University (NMSU)	Las Cruces, NM
	Ph.D., with Honors, Astronomy	May 2013
	• Thesis Title: <i>Properties of Star Formation and the Interstellar Medium in Galaxy Outskirts</i>	
	M.S., with Honors, Astronomy	May 2011
	University of Chicago	Chicago, IL
	B.A., with Honors, Physics with Specialization in Astrophysics	June 2007
	• Thesis Title: <i>Direct Cherenkov Detection with the Very Energetic Radiation Imaging Telescope Array System (VERITAS)</i>	
RESEARCH AND WORK APPOINTMENTS	Center for Data Intensive Science, University of Chicago	Chicago, IL
	Research Professional	September 2013 - present
	<ul style="list-style-type: none"> Developing a computational method for detecting spatial patterns in geo-coded medical records data. Scientific Lead for the Open Science Data Cloud (OSDC), a petabyte scale set of compute and storage clouds serving the broad scientific community in various disciplines. Developing a system of daily automated machine learning algorithms for cloud-based processing and analysis of NASA satellite imagery with Project Matsu on the OSDC. Technical Lead for the Open Commons Consortium's (OCC) cooperative research and development partnership with NOAA through the NOAA Big Data Project, coordinating the establishment of a community science cloud of environmental data for the academic and research community. Planning and organizing OSDC NSF Partnerships for International Research and Education (PIRE) data intensive science and computing fellowship program for graduate students. Directly supervised projects for three undergraduate students. 	
	Royal Observatory / School of Informatics, University of Edinburgh	Edinburgh, Scotland
	Open Science Data Cloud (OSDC) NSF PIRE Summer Fellow	June - August 2013
	<ul style="list-style-type: none"> Explored row-oriented vs. column-oriented databases to maximize query speed in the astronomical database for the VISTA Variables in the Via Lactea (VVV) Survey. 	
	Sapling Learning Inc., Macmillan	(Remote/Online)
	Astronomy Content Author and Reviewer	April 2013 - November 2013
	<ul style="list-style-type: none"> Created questions and solutions of varying difficulty to test students' understanding of astronomical concepts in an online interactive system for higher education course homework. Reviewed and edited questions and solutions written by others for subject matter content and clarity and for proper software module functionality. 	
	Department of Astronomy, New Mexico State University	Las Cruces, NM
	Graduate Research Assistant	August 2007 - May 2013
	<ul style="list-style-type: none"> Constructing 3-dimensional models of the morphology and kinematics of gaseous galaxy halos to study accretion of gas as part of the HALOGAS (Hydrogen Accretion in Local GALaxieS) Survey. Collecting and analyzing deep, wide-field optical images of galaxies to search for faint signatures of galaxy mergers and young star formation as Principal Investigator of two accepted observing proposals to the National Optical Astronomy Observatory. Organized a 5-day scientific workshop of presentations, breakout sessions, and evening activities for the HALOGAS collaboration of twenty internationally-based scientists. Reduced and analyzed spectroscopic data to study the abundances of metals in star forming regions. 	
	Head Teaching Assistant	January 2010 - May 2010
	<ul style="list-style-type: none"> Prepared laboratory equipment for all teaching assistants, led weekly meetings to plan exercises, and operated the campus observatory telescopes for students twice weekly. 	
	Laboratory Instructor	August 2007 - December 2009
	<ul style="list-style-type: none"> Taught laboratory component to an undergraduate Astronomy course for non-majors and operated campus observatory telescopes. 	

PUBLICATIONS
AND RESEARCH
PRESENTATIONS

Paper Publications

Detecting spatial patterns of disease incidence using a neighbor-based bootstrapping method on electronic medical records data from 99.1 million patients

M.T. Patterson and R.L. Grossman
(submitted)

The Case for Data Commons: Towards Data Science as a Service

R.L. Grossman, A. Heath, M. Murphy, **M.T. Patterson**, W. Wells

(in review for the IEEE Computing in Science Engineering special issue on Science as a Service)

The Matsu Wheel: A Cloud-based Framework for Efficient Analysis and Reanalysis of Earth Satellite Imagery

M.T. Patterson, N. Anderson, C. Bennett, J. Bruggemann, R.L. Grossman, M. Handy, V. Ly, D.J. Mandl, S. Pederson, J. Pivarski, R. Powell, J. Spring, W. Wells, J. Xia

(accepted to the 2016 IEEE International Conference on Big Data Computing Service and Applications)

HALOGAS observations of NGC 4414: fountains, interaction, and ram pressure

W.J.G. de Blok, G.I.G. Jozsa, **M.T. Patterson**, G. Gentile, G.H. Heald, E. Jutte, P. Kamphuis, R.J. Rand, P. Serra, R.A.M. Walterbos

Astronomy & Astrophysics, June 2014, Volume 566, id.A80, 16 pp.

HALOGAS observations of NGC 5023 and UGC 2082: Modeling of non-cylindrically symmetric gas distributions in edge-on galaxies

P. Kamphuis, R.J. Rand, G.I.G. Jozsa, L.K. Zschaechner, G.H. Heald, **M.T. Patterson**, G. Gentile, R.A.M. Walterbos, P. Serra, W.J.G. de Blok

Monthly Notices of the Royal Astronomical Society, September 2013, Volume 434, Issue 3, pages 2069-2093

HALOGAS: Extraplanar gas in NGC 3198

G. Gentile, G.I.G. Jozsa, P. Serra, G.H. Heald, W.J.G. de Blok, F. Fraternali, **M.T. Patterson**, R.A.M. Walterbos, T. Oosterloo

Astronomy & Astrophysics, June 2013, Volume 554, id.A125, 10 pp.

An oxygen abundance gradient into the outer disc of M81

M.T. Patterson, R.A.M. Walterbos, R.C. Kennicutt, C. Chiappini, D.A. Thilker

Monthly Notices of the Royal Astronomical Society, May 2012, Volume 422, Issue 1, pages 401-419

Oral Presentations

Cloud-based Scanning Analytics for Large Volumes of Hyperspectral Data

June 2014: HypsIRI Product Symposium, NASA Goddard Space Flight Center, Greenbelt, MD

Reproducible Research and Collaborative Tools with the Open Science Data Cloud

June 2014: OSDC PIRE Big Data and Cloud Computing Workshop, University of Amsterdam, Science Park, Netherlands

Gaseous Halos and Outer Disk Star Formation in the HALOGAS Survey: Results for NGC 5055

July 2013: Royal Observatory Edinburgh, Coffee Talk, Edinburgh, Scotland

Evolutionary Processes in Nearby Spiral Galaxies: Characterizing the Metallicities, Star Formation, and Accretion in Galaxy Outskirts

January 2013: 221st Meeting of the American Astronomical Society, Long Beach, CA

Early Results from the HALOGAS Survey: HI Observations of NGC 5055

April 2012: Tully-Fisher at 35: Global Properties of HI in Galaxies Workshop, NRAO, Green Bank, WV

HALOGAS: A Deep HI Survey

March, 2012: NMSU Astronomy Department Pizza Lunch, Las Cruces, NM

HII Region Abundances: A Metallicity Gradient for M81

October 2011: NMSU Astronomy Department Pizza Lunch, Las Cruces, NM

The HALOGAS Survey: HI Observations and Modeling of NGC 5055 and NGC 4258

October 2011: 27th Annual New Mexico Symposium, Socorro, NM

Poster Presentations

Key Lessons in Building Data Commons: The Open Science Data Cloud Ecosystem

December 2015: 225th Meeting of the American Astronomical Society, Seattle, WA

M.T. Patterson, M. Murphy, R.L. Grossman, A. Heath, W. Wells

Counter-Rotating and Lagging Extra-planar HI in NGC 4559

January 2015: 225th Meeting of the American Astronomical Society, Seattle, WA

C.J. Vargas, G. Heald, R.A.M. Walterbos, F. Fraternali, **M.T. Patterson**

Deep HI Observations of NGC 5055 from the HALOGAS Survey

May 2012: STScI May Symposium: Gas Flows in Galaxies, Baltimore, MD

M.T. Patterson, the HALOGAS Team

HI Streams and Spurs in HALOGAS Observations of NGC 5055

January 2012: 219th Meeting of the American Astronomical Society, Austin, TX

M.T. Patterson, R.A.M. Walterbos, G. Heald, G. Jozsa, G. Gentile, D. Thilker

The HALOGAS Project: HI Observations of NGC 5055 and NGC 4258

June 2011: Gas in Galaxies: From Molecular Clouds to Cosmic Web, Kloster Seeon, Germany

M.T. Patterson, the HALOGAS Team

The HALOGAS Project: HI Observations of NGC 5055

January 2011: 217th Meeting of the American Astronomical Society, Seattle, WA

M.T. Patterson, R.A.M. Walterbos, G. Heald, G. Jozsa, L. Zschaechner, R. Rand, D. Thilker

HII Regions in the Outer Disk and Tidal Arms of M81

January 2010: 215th Meeting of the American Astronomical Society, Washington D.C.

January 2010: 25th Annual New Mexico Symposium, Socorro, NM

M.T. Patterson, R.A.M. Walterbos, D.A. Thilker, R.C. Kennicutt, C. Chiappini

Extraplanar Gas Extent of Edge-on Galaxies: A Comparison of the Galaxies NGC 4244 and NGC 891

June 2009: Galaxy Metabolism Conference, Sydney, Australia

M.T. Patterson, R.A.M. Walterbos

Interstellar Gas and Massive Stars in External Galaxies: Initial Results for the Galaxies M33 and NGC 4517

April 2009: NMSU Graduate Research and Arts Symposium, Las Cruces, NM

M.T. Patterson, R.A.M. Walterbos

Multi-long-slit Spectroscopy for Kinematic Studies. I. Implementation and Demonstration

January 2008: 211th Meeting of the American Astronomical Society, Austin, TX

R.A.M. Walterbos, J. Choi, S. Cisneros, **M.T. Patterson**, C. Wu

Multi-long-slit Spectroscopy for Kinematic Studies. II. Initial Results for the Edge-On Galaxies NGC 891 and NGC 4244

January 2008: 211th Meeting of the American Astronomical Society, Austin, TX

J. Choi, S. Cisneros, C. Wu, **M.T. Patterson**, R.A.M. Walterbos

SUCCESSFUL
PROPOSALS AS
PRINCIPAL
INVESTIGATOR

“Continuing Observations of Stellar Streams and Star Formation in the Outskirts of HALOGAS Spiral Galaxies”

- Telescope observing proposal to National Optical Astronomy Observatory (NOAO) Proposal ID: 2012A-0185
- 4 full nights granted on the Kitt Peak National Observatory (KPNO) Mayall 4-meter Telescope Mosaic 1.1 Wide Field Imager

“Stellar Streams and Star Formation in the Outskirts of HALOGAS Spiral Galaxies“

- Telescope observing proposal to NOAO Proposal ID: 2011B-0355
- 4 full nights granted on the KPNO Mayall 4-meter Telescope Mosaic 1.1 Wide Field Imager

”Star Formation and Chemical Abundances in the Outer Disks and Haloes of Galaxies“

- New Mexico Space Grant Consortium Graduate Research Fellowships 2010
- \$10,000 over two semesters

”Interstellar Gas and Massive Stars in External Galaxies“

- New Mexico Space Grant Consortium Graduate Research Fellowships 2009
- \$5,000 over two semesters

AWARDS AND GRANTS

Academic Fellowships and Awards

- Open Science Data Cloud NSF PIRE Fellowship Summer 2013
- OSDC-PIRE Challenge, 3rd Place Paper June 2013
- Murrell Award for Professional Development and Research Accomplishment 2013
- NMSU Outstanding Graduate Assistant Award (awarded twice) 2008-2009 & 2012-2013
- Pegasus Award for Excellence in Teaching 2010
- New Mexico Higher Education Department Fellowship 2008 - 2011
- NMSU Merit-Based Enhancement Fellowship 2009 - 2010

Conference and Travel Grants

- *Grace Hopper Celebration of Women in Computing* Scholar Phoenix, AZ, 2014
- *NM Celebration of Women in Computing* Conference Scholarship Las Cruces, NM, 2012
- NMSU College of Arts and Sciences Graduate Student Travel Award
Gas Flows in Galaxies May Symposium Baltimore, MD, 2012
- American Astronomical Society International Travel Grant
HALOGAS Collaboration Workshop Bochum, Germany, 2011
- *Women in Astronomy and Space Science* Conference Travel Grant College Park, MD, 2009
- *The Evolution of Galaxies Through the Neutral Hydrogen Window* Conference Travel Grant
Arecibo Observatory Puerto Rico, 2008

PROFESSIONAL DEVELOPMENT

Technological Conferences

- Supercomputing, Austin, TX, 2015; New Orleans, LA, 2014
- OSDC Partnerships for International Research and Education, Big Data and Cloud Computing Workshops, University of Amsterdam, June 8–12, 2015 (lecturer); June 16–20, 2014 (lecturer); University of Edinburgh, June 17–21, 2013 (participant)
- Grace Hopper Celebration of Women in Computing, Phoenix, AZ, October 7–10, 2014
- New Mexico Celebration of Women in Computing, Las Cruces, NM, November 8–9, 2012

Continued Learning Efforts

- Reproducible Research, Johns Hopkins University through Coursera, May 2014
- Getting and Cleaning Data, Johns Hopkins University through Coursera, April 2014
- The Data Scientist’s Toolbox, Johns Hopkins University through Coursera, April 2014
- How Viruses Cause Disease Course, Columbia University through Coursera Online, April 2014
- Machine Learning, Stanford University through Coursera, March 2014
- Epidemiology,, UNC at Chapel Hill through Coursera, March 2014
- Computing for Data Analysis, Johns Hopkins University through Coursera, January 2014
- Summer School in Statistics for Astronomers IX, Penn State, June 3–7, 2013
- Introduction to Data Science, University of Washington through Coursera, May 2013

EXTRA-CURRICULAR AND VOLUNTEER EXPERIENCE

Kaggle competition participant
‘Kaggler’ tier

[kaggle.com](https://www.kaggle.com)
ranked 4450th of 470,580+ (top 1%) as of February 2016

Open Science Café

opensciencecafe.org

Writer

April 2014 - present

- Promoting interdisciplinary data analysis resource and opportunity news.
- Posting short reproducible analyses of scientific data with several other PhD scientists.

University of Chicago

Chicago IL

Volunteer, UChicago Alumni Schools Committee

August 2009 - present

- Interviewing prospective undergraduates for possible admission to the University of Chicago.

Committee Member, UChicago Class of 2007 Council

August 2007 - present

- Responsible for planning class reunions, raising funds for the University, and acting as a liaison for the University to alumnae.

Panel Moderator, Taking the Next Step

January 10, 2015

- Moderator of Research Sciences career panel at College Programming Office event for sophomores and juniors.

Treasurer, Samahan Filipino Cultural Association

August 2005 - May 2007

- Maintained account records, processed reimbursements, and prepared annual allocations budget proposal for Student Government Fund Committee approval

New Mexico State University

Las Cruces, NM

Colloquium Committee Member

August 2011 - May 2013

- Organized scheduling of visiting colloquium speakers to the Astronomy Department.

Astronomy Team Captain, ACS Relay for Life

December 2010 - April 2011

- Led Astronomy Team to raise over \$2000 for American Cancer Society.

Committee Member, NMSU Relay for Life

October 2008 - April 2009

- Organized NMSU's American Cancer Society all-night walk-a-thon fundraiser.

Secretary, NMSU Astronomy GSO

August 2008 - May 2009

- Responsible for re-chartering Astronomy Graduate Student Organization.

COLLABORATORS Dr. Robert Grossman - (Advisor) University of Chicago, Chicago, IL
Dr. Daniel Mandl - NASA Goddard Space Flight Center, Greenbelt, MD
Dr. Rene Walterbos - (Thesis Advisor) New Mexico State University, Las Cruces, NM
Dr. George Heald - HALOGAS Principal Investigator, ASTRON, Dwingeloo, Netherlands
Dr. David Thilker - Johns Hopkins University, Baltimore, MD
The HALOGAS Collaboration