

Maria Patterson

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EDUCATION

NEW MEXICO STATE UNIVERSITY | PHD, ASTRONOMY

May 2013 | Las Cruces, NM

- Advisor: Rene Walterbos
- Thesis Title: "Properties of Star Formation and the Interstellar Medium in Galaxy Outskirts"

NEW MEXICO STATE UNIVERSITY | MS, ASTRONOMY

May 2011 | Las Cruces, NM

UNIVERSITY OF CHICAGO | BA, WITH HONORS, PHYSICS WITH A SPECIALIZATION IN ASTROPHYSICS

May 2007 | Chicago, IL

- Advisors: Simon Swordy and Scott Wakely
- Thesis Title: "Direct Cherenkov Detection with the Very Energetic Radiation Imaging Telescope Array System (VERITAS)"

RESEARCH AND WORK APPOINTMENTS

UNIVERSITY OF WASHINGTON, DEPT OF ASTRONOMY

RESEARCH SCIENTIST, LSST DATA MANAGEMENT

Aug 2016 – present | Seattle, WA

- Building the next generation algorithms and software tools for the Large Synoptic Survey Telescope (LSST).
- Designing and benchmarking a Python-based streaming data ecosystem for astronomical alert distribution and processing using Docker, Kafka, and Avro.

UNIVERSITY OF CHICAGO, CENTER FOR DATA INTENSIVE SCIENCE (CDIS), DEPT OF MEDICINE

DIRECTOR OF THE OPEN SCIENCE DATA CLOUD

Mar 2014 – Jul 2016 | Chicago, IL

- Program manager for a petabyte scale community science cloud, managing several cloud-based scientific projects and services, interfacing with systems and software engineers, and leading training for multi-disciplinary groups of scientists.
- Technical Lead for the development of a 300 TB data distribution system for climate data under the NOAA Big Data Project.
- Science Lead for a summer fellowship program, organizing data science and computing workshops and supervising projects for undergraduate students.

POSTDOCTORAL RESEARCH PROFESSIONAL

Sep 2013 – Jul 2016 | Chicago, IL

- Developer, maintaining an end-to-end automated analytic pipeline of machine learning algorithms for cloud processing and analysis of daily acquired satellite data for NASA using Python, Hadoop, Accumulo, and Storm.
- Data scientist, building a water classifier for satellite image data, developing algorithms for detecting patterns in geo-coded medical records, and modeling data storage systems using Monte Carlo methods to analyze hardware performance issues.

UNIVERSITY OF EDINBURGH, ROYAL OBSERVATORY & SCHOOL OF INFORMATICS

VISITING FELLOW

Jun 2013 – Aug 2013 | Edinburgh, Scotland

- Developed a Python tool to test query speeds and compare system utilization in row-oriented vs. column-oriented SQL database implementations of the astronomical database for the VISTA Variables in the Via Lactea (VVV) Survey.

SAPLING LEARNING, INC. (MACMILLAN)

ASTRONOMY CONTENT AUTHOR AND REVIEWER

Apr 2013 – Nov 2013 | Remote/Online

- Created questions and solutions of varying difficulty to test students' understanding of astronomical concepts in an online interactive system for higher education course homework.

NEW MEXICO STATE UNIVERSITY (NMSU), DEPT OF ASTRONOMY

GRADUATE RESEARCH ASSISTANT

Aug 2007 – May 2013 | Las Cruces, NM

- Modeled the density and rotation of gas in galaxies to identify anomalous features in HALOGAS (Hydrogen Accretion in LOcal GALaxies) Survey observation data.
- Collected and analyzed deep, wide-field optical images of galaxies to search for faint signatures of galaxy mergers and young star formation as Principal Investigator of two observing proposals to the National Optical Astronomy Observatory.
- Reduced and analyzed spectroscopic data to study the abundances of metals in star forming regions.

HEAD TEACHING ASSISTANT

Jan 2010 – May 2010 | Las Cruces, NM

- 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

Aug 2007 – Dec 2009 | Las Cruces, NM

- Taught laboratory component to an undergraduate Astronomy course for non-majors and operated campus observatory telescopes.

PUBLICATIONS AND RESEARCH PRESENTATIONS

PAPER PUBLICATIONS

CHANG-ES X: Spatially-resolved Separation of Thermal Contribution from Radio Continuum Emission in Edge-on Galaxies

C.J. Vargas, S.C. Mora-Partiarroyo, P. Schmidt, R.J. Rand, Y. Stein, R.A.M. Walterbos, Q.D. Wang, A. Basu, **M.T. Patterson**, A. Kepley, R. Beck, J. Irwin, G. Heald, J. Li, T. Wiegert
Submitted

Detecting Spatial Patterns of Disease in Large Collections of Electronic Medical Records Using Neighbor-Based Bootstrapping

M.T. Patterson and R.L. Grossman
Big Data, Sep 2017, Vol. 5, No. 3

HALOGAS Observations of NGC 4559: Anomalous and Extraplanar HI and its Relation to Star Formation

C. J. Vargas, G. Heald, R.A.M. Walterbos, F.Fraternali, **M.T. Patterson**, R.J. Rand, G.I.G. Józsa, G. Gentile, P. Serra
The Astrophysical Journal, April 2017, Volume 839, Issue 2

The Matsu Wheel: a reanalysis framework for Earth satellite imagery in data commons

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
International Journal of Data Science and Analytics, Mar 2017, <https://doi.org/10.1007/s41060-017-0052-3>

Hydrological modeling and capacity building in the Republic of Namibia

R.A. Clark III, Z.L. Flamig, H. Vergara, Y. Hong, J.J. Gourley, D.J. Mandl, S. Frye, M. Handy, **M.T. Patterson**
Bulletin of the American Meteorological Society, December 2016

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

R.L. Grossman, A. Heath, M. Murphy, **M.T. Patterson**, W. Wells
Computing in Science Engineering special issue: Science as a Service, Sep 2016, Vol. 18, Issue 5

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
IEEE Second International Conference on Big Data Computing Service and Applications (BigDataService), March 2016, pages 155-165

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. Jozsa, L. 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 AND CONFERENCE PRESENTATIONS

Building a community fountain around your data stream

PyData Seattle Conference

Microsoft Campus, Redmond, WA | Jul 2017

A prototype architecture for alert stream processing at LSST scale

Building the Infrastructure for Time-Domain Alert Science in the LSST Era

NOAO, Tucson, AZ | May 2017

Alert filtering system prototyping for ZTF and LSST

International Virtual Observatory Alliance northern interop meeting

Shanghai, China | May 2017

Big Data vs The Scientist: Or how I learned to stop worrying and love the cloud

ACM Chicago Meetup

Chicago, IL | Jun 2016

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

2015 American Geophysical Union Fall Meeting

San Francisco, CA | Dec 2015

Cloud-based Scanning Analytics for Large Volumes of Hyperspectral Data

HyspIRI Product Symposium

NASA Goddard Space Flight Center, Greenbelt, MD | Jun 2014

Reproducible Research and Collaborative Tools with the Open Science Data Cloud

OSDC PIRE Big Data and Cloud Computing Workshop

University of Amsterdam, Netherlands | Jun 2014

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

221st Meeting of the American Astronomical Society

Long Beach, CA | Jan 2013

Deep HI Observations of NGC 5055 from the HALOGAS Survey

STScI May Symposium: Gas Flows in Galaxies

Baltimore, MD | May 2012

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

Tully-Fisher at 35: Global Properties of HI in Galaxies Workshop

NRAO, Green Bank, WV | Apr 2012

HI Streams and Spurs in HALOGAS Observations of NGC 5055

219th Meeting of the American Astronomical Society

Austin, TX | Jan 2012

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

Gas in Galaxies: From Molecular Clouds to Cosmic Web

Kloster Seeon, Germany | Jun 2011

The HALOGAS Project: HI Observations of NGC 5055

217th Meeting of the American Astronomical Society

Seattle, WA | Jan 2011

HI Regions in the Outer Disk and Tidal Arms of M81

215th Meeting of the American Astronomical Society

Washington D.C. | Jan 2010

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

Galaxy Metabolism Conference

Sydney, Australia | Jun 2009

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

NMSU Graduate Research and Arts Symposium

Las Cruces, NM | Apr 2009

SUCCESSFUL PROPOSALS AND GRANTS

Conference Travel Grant

- Women in Astronomy IV, Austin, TX 2017

"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

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

"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

Conference Travel Grant

- Women in Astronomy and Space Science, College Park, MD, 2009

Conference Travel Grant

- Evolution of Galaxies Through the Neutral Hydrogen Window, Arecibo Observatory, Puerto Rico, 2008

HONORS AND AWARDS

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| 20th Century Fox and PepsiCo's "Search for Hidden Figures" in STEM, Award Winner | Jan 2017 |
| Insight Data Science Program Fellowship (declined) | Jul 2016 |
| Outstanding Paper Award, BigDataService Conference, Oxford, UK | May 2016 |
| Target Scholar, Grace Hopper Celebration of Women in Computing, Phoenix, AZ | Oct 2014 |
| NSF Partnerships for International Research and Education (PIRE) Fellowship, Open Science Data Cloud | Jun 2013 |
| Murrell Award for Professional Development and Research Accomplishment | May 2013 |
| NMSU Outstanding Graduate Assistant Award (awarded twice) | May 2009 & May 2013 |
| New Mexico Celebration of Women in Computing Conference Scholarship | May 2012 |
| New Mexico Higher Education Department Fellowship | 2008 - 2011 |
| Pegasus Award for Excellence in Teaching | May 2010 |
| NMSU Merit-Based Enhancement Fellowship | 2009 - 2010 |
| University of Chicago Helen Myers-McLoraine Scholarship | 2004 - 2007 |
| Robert C. Byrd Honors Scholarship | 2004 - 2007 |
| Illinois Space Grant Undergraduate Research Fellowship | 2006 |

VOLUNTEERING AND SERVICE

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| Member, American Astronomical Society's Committee on the Status of Women in Astronomy | Jun 2017 - present |
| Technical Talk Night Organizer, PyLadies Seattle and PyData Seattle Meetup Groups | Jan 2017 - present |
| Editor, AASWomen's "Women in Astronomy" Newsletter | Aug 2016 - present |
| Volunteer, UChicago Alumni Schools Committee | Aug 2009 - present |
| Panelist on befriending failure, Tapia Celebration of Diversity in Computing, Atlanta, GA | Sep 2017 |
| Mentor, New York Academy of Sciences NEXT Scholar Program | Mar 2017 - Aug 2017 |
| Volunteer, PyData Seattle Conference, Diversity Committee | Jul 2017 |

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| Committee Member , UChicago Class of 2007 Council | Aug 2007 - Jun 2017 |
| Panelist on big data , Tapia Celebration of Diversity in Computing, Austin, TX | Sep 2016 |
| Participant , White House Office of Science and Technology Policy Open Data Roundtable, Washington DC | Jun 2016 |
| Panel Moderator on research careers , "Taking the Next Step" Conference, UChicago | Jan 2015 |
| Member , NMSU Dept of Astronomy Colloquium Committee | Aug 2011 - May 2013 |
| Team Captain , American Cancer Society (ACS) "Relay for Life", Astronomy team | Dec 2010 - Apr 2011 |
| Secretary , NMSU Astronomy Graduate Student Organization | Aug 2008 - May 2009 |
| Committee Member , NMSU ACS "Relay for Life" | Oct 2008 - Apr 2009 |
| Treasurer , Samahan Filipino Cultural Association | Aug 2005 - May 2007 |

EXTRACURRICULARS

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| Distance runner , 18 races including 1 marathon and 6 half marathons | runningaverage.com |
| Kaggle data science competitor , 11-time participant, two top 20% placements | kaggle.com/mtpatter |
| Blog contributor , programming tutorials | opensciencecafe.org |