

Michelle Amanda Berg

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SUMMARY

Research Interests: I am an astrophysicist interested in understanding galaxy evolution through the gas dynamics and metallicity content of the circumgalactic medium and its connection to the galaxy. I am also interested in galaxy quenching and how the environment (groups and clusters) plays a role in this process.

Skills: Expert in UV/optical spectral analysis; observing experience with Keck/HIRES and KCWI, Magellan/MIKE, and the Green Bank Telescope; Python and IDL coding languages; proficient in Cloudy, DESI redrock, SExtractor, kcorrect, and pPXF software tools.

EDUCATION

University of Notre Dame

Ph.D., Physics
M.S., Physics

Notre Dame, IN
May 2021 (Expected)
January 2018

Florida Institute of Technology

B.S., Physics and Astronomy & Astrophysics
summa cum laude

Melbourne, FL
May 2014

GRANTS & FELLOWSHIPS

Future Investigators in NASA Earth and Space Science and Technology (FINESST) NASA SMD

- Received funding of \$90,000 for 2 years September 2019 – August 2021

Graduate School Notebaert Professional Development Fund of \$1000 Spring 2017

Graduate Student Union Conference Presentation Grant of \$350 Spring 2017

RESEARCH EXPERIENCE

University of Notre Dame

Graduate Research Assistant, Physics

August 2016 – Present

Advisors: Chris Howk and Nicolas Lehner, Doctoral Thesis

- Determined the HI covering factor in the circumgalactic medium (CGM) for a sample of 21 luminous red galaxies (LRGs) using QSO absorption line spectroscopy. Estimated the metallicity of the detected Lyman limit systems.
- Identified and characterized the host galaxies associated with a sample of 35 Lyman limit systems with measured metallicities. Explored the connections between the CGM and host galaxy properties.
- Determined the metallicity distribution function in the inner CGM of a sample of 50 LRGs using QSO absorption line spectroscopy.

NSF-REU, Physics

May – August 2013

Advisor: Justin Crepp

- Drafted the first mechanical design of the “iLocator” spectrograph that will be used with the Large Binocular Telescope to search for exoplanets in the Y-band of the infrared spectrum using the 3D CAD software *SolidWorks*.

Florida Institute of Technology

Undergraduate Research Assistant, Physics and Space Sciences January 2013 – May 2014

Advisor: Daniel Batcheldor

- Analyzed doubly ionized oxygen [OIII] emission from active galactic nuclei (AGN) to determine constraints for outflow rates in galaxy models using IRAF and Graphical Astronomy and Image Analysis software to reduce the spectra.

Southeastern Association for Research in Astronomy NSF-REU

May – August 2012

Advisor: Daniel Batcheldor

- Measured and analyzed AGN light curves to determine how their brightness changes on small timescales using IRAF.

REFEREED PUBLICATIONS

“Project AMIGA: The Circumgalactic Medium of Andromeda,” Lehner, N., et al. **including Berg, M.A.**, *The Astrophysical Journal*, 900, 9 (2020)

“The Red Dead Redemption Survey of Circumgalactic Gas About Massive Galaxies. I. Mass and Metallicity of the Cool Phase,” **Berg, M.A.**, et al., *The Astrophysical Journal*, 883, 5 (2019)

“Think Global, Act Local: The Influence of Environment Age and Host Mass on Type Ia Supernova Light Curves,” Rose, B.M., Garnavich, P.M., & **Berg, M.A.**, *The Astrophysical Journal*, 874, 32 (2019)

“Quantifying the AGN-driven Outflows in ULIRGs (QUADROS) II: Evidence for Compact Outflow Regions from HST [OIII] Imaging Observations,” Tadhunter, C., et al. **including Berg, M.A.**, *Monthly Notices of the Royal Astronomical Society*, 478, 1558 (2018)

“Project AMIGA: A Minimal Covering Factor for Optically Thick Circumgalactic Gas Around the Andromeda Galaxy,” Howk, J.C., Wotta, C.B., **Berg, M.A.**, et al., *The Astrophysical Journal*, 846, 141 (2017)

“Optical Monitoring of Three Active Galactic Nuclei,” **Berg, M.A.**, Twadelle, K.F., & Batcheldor, D., *Journal of the Southeastern Association for Research in Astronomy*, 7, 13 (2012)

“Reverberation Mapping of AGN Dusty Tori with Spitzer and IRAC,” Twadelle, K.F., **Berg, M.A.**, & Batcheldor, D., *Journal of the Southeastern Association for Research in Astronomy*, 7, 17 (2012)

INVITED PRESENTATIONS

“The Role of Dense Circumgalactic Gas in Shaping Galaxies,” CGI Seminar, University of California, Santa Cruz, November 9, 2020

PRESENTATIONS

“Galaxies with Accretion Signatures at $z < 1$,” Astrophysics Seminar, University of Notre Dame, October 27, 2020

“The Galaxies Associated With the Bimodal Metallicity Distribution,” 235th meeting of the American Astronomical Society, Honolulu, HI, January 4-8, 2020

“New Results from the RDR and BASIC Programs,” What Matter(s) Between Galaxies conference, Abbazia di Spinetto, Italy, June 3-7, 2019

“The Red Dead Redemption Survey: Cool Gas in the Halos of Massive Galaxies,” Astrophysics Seminar, University of Notre Dame, March 19, 2019

“Unexpected Detection of a Cool Gas Reservoir in the Hot Halos of LRGs,” Intergalactic Interconnections conference, Aix Marseille Université, France, July 9-13, 2018

“A First Look at the Origin of the Bimodal Metallicity Distribution of the Dense $z < 1$ CGM Gas with HST/ACS and VLT/MUSE Observations,” What Matter(s) Around Galaxies conference, Durham University, UK, June 19-23, 2017

POSTER PRESENTATIONS

“VLT/MUSE and HST/ACS Observations of $z < 1$ Galaxies: Origin of the Bimodal Metallicity Distribution of the Lyman Limit Systems,” Space Telescope Science Institute 2017 Spring Symposium

“Green Bank Telescope Observations of HI in the Circumgalactic Medium of M31,” Denny, L., et al. **including Berg, M.**, *American Astronomical Society, meeting #231*. Abstract (2018)

“iLocator: A Diffraction-Limited Doppler Spectrometer for the Large Binocular Telescope,” Crepp, J.R., et al. **including Berg, M.**, *American Astronomical Society, meeting #223*. Abstract (2014)

“Reverberation Mapping of AGN Dusty Tori in the Infrared,” Twadelle, K., **Berg, M.**, & Batcheldor, D., *American Astronomical Society, meeting #221*. Abstract (2013)

TEACHING EXPERIENCE

University of Notre Dame

Teaching Assistant, Physics

August 2014 – May 2016

- Physics I and II for Engineers Tutorials: Fall 2014, Spring 2015, 2016
Guided ~25 students through 1-3 problems in a group setting to reinforce topics from the lectures for a 50-minute class period, graded their work, and graded exams.
- Observatory: Fall 2014, Spring 2015, 2016
Set up 8” telescopes, helped students in Descriptive Astronomy (~60) and Elementary Cosmology (~100) complete projects, and graded exams.
- Modern Observational Techniques: Fall 2015
Attended lectures, created homework solutions, and facilitated the observatory project using the 0.8m telescope for ~15 students.

Physics Practicum

Fall 2019

- Delivered 3 lectures for the 75-minute class Physics of Astrophysics to ~10 students with an observer. Received peer-evaluations from professors and reflected on teaching and lecture goals. Topics covered: ionization equilibrium, thermal equilibrium, and emission line diagnostics.

AWARDS & HONORS

Florida Institute of Technology

Northrop Grumman Student Design Showcase President’s Cup Award

Spring 2014

- Awarded for the best project and presentation for the College of Science

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| Northrop Grumman Student Design Showcase Best in Show | Spring 2014 |
| <ul style="list-style-type: none"> Awarded for the best project and presentation for the Department of Physics and Space Sciences | |
| Outstanding Student Award in Astronomy/Astrophysics | Spring 2013 |
| Outstanding Student Award in Physics | Spring 2013 |
| <ul style="list-style-type: none"> Selected by faculty members and awarded to students for accomplishments in several categories including academic standing, research projects, memberships and honor societies | |
| Distinguished Student Scholar | Spring 2013, 2014 |
| <ul style="list-style-type: none"> Awarded to students with a GPA of 3.8 or higher | |

ACADEMIC SERVICE & OUTREACH

University of Notre Dame

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| Student member on Faculty Colloquium Committee | Fall 2020 – Spring 2021 |
| Student faculty-hire interviewer | Spring 2017, 2020 |
| Summertime Stargazing volunteer | Summer 2018 |
| Student panel for external departmental review | Fall 2016 |
| Astronomy Star Party volunteer | Fall 2014 |

PROFESSIONAL MEMBERSHIPS, AFFILIATIONS, & ORGANIZATIONS

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| American Astronomical Society | 2019 – Present |
| Graduate Physics Society | 2014 – Present |
| Sigma Pi Sigma Physics Honor Society | Inducted 2013 |
| Phi Kappa Phi Honor Society | Inducted 2012 |
| Phi Eta Sigma Freshman National Honor Society | Inducted 2011 |

REFERENCES

Dr. J. Christopher Howk

University of Notre Dame
Professor, Physics
Graduate Research Advisor

Dr. Nicolas Lehner

University of Notre Dame
Research Professor, Physics
Graduate Research Co-Advisor

Dr. Joseph Burchett

New Mexico State University
Assistant Professor, Astronomy
Collaborator

Dr. John O'Meara

W. M. Keck Observatory
Chief Scientist
Collaborator