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 — Notre Dame, IN
Ph.D., Physics — May 2021 (Expected)
M.S., Physics — January 2018

Florida Institute of Technology — Melbourne, FL
B.S., Physics and Astronomy & Astrophysics — May 2014
summa cum laude

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 "iLocater" 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 Observation," 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)

PRESENTATIONS

"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 Spineto, 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)

"iLocater: 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

Northrop Grumman Student Design Showcase Best in Show — Spring 2014

- 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

- 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

- Awarded to students with a GPA of 3.8 or higher

ACADEMIC SERVICE & OUTREACH

University of Notre Dame

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

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