

Benjamin J. Gibson

University of Utah Department of Physics and Astronomy

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Research Interests Measuring the kinematics, star formation history, and chemical evolution of the stellar populations in external galaxies using high resolution integrated light spectroscopy and deep resolved stellar photometry. This work will help bridge the divide between Milky Way and extragalactic astronomy, and better inform our models of galaxy formation and evolution.

Education *PhD in Physics, Astrophysics Track* 2021 - Present
University of Utah, Salt Lake City, UT.
Advised by **Dr. Gail Zasowski** and **Dr. Anil Seth**

MS in Physics 2019 - 2021
University of Utah, Salt Lake City, UT.

BS in Physics, Minor in Mathematics 2015 - 2019
Florida State University, Tallahassee, FL.

Research Experience *The Chemodynamics of the Stellar Populations in M31 from APOGEE Integrated Light Spectroscopy* 2019 - Present
University of Utah

- Analyzed near-infrared integrated light spectra of the inner ~ 7 kpc of M31 from APOGEE.
- Reduced data to optimize for integrated light and spatially binned to increase SNR.
- Used machine learning to interpolate between simple stellar population model spectra.
- Developed new software to perform full spectrum fitting.

Fellowships and Awards *Eccles Astronomy Research Award* - \$5000 2023
University of Utah - *Department of Physics and Astronomy*

Swigart Graduate Research Fellowship - \$6000 2020
University of Utah - *Department of Physics and Astronomy*

Outstanding Graduate Student Award - \$400 2020
University of Utah - *Department of Physics and Astronomy*

Eagle Scout Rank 2014
Boy Scouts of America, Mecklenburg County Council

First Author Publications **Gibson, Benjamin J.**; Zasowski, Gail; Seth, Anil; ...; et al., 2023, *The Chemodynamics of the Stellar Populations in M31 from APOGEE Integrated Light Spectroscopy*, *Astrophysical Journal*, 952, 23 (arXiv:2304.09901)

Other Publications Wainer, Tobin M.; Zasowski, Gail; ...; **Gibson, Benjamin J.**; et al., 2023, *Catalog of Integrated-light Star Cluster Light Curves in TESS*, *Astronomical Journal*, 166, 106 (arXiv:2307.09510)

- Collaborated with the lead author to improve his code and analysis techniques.
- Provided comments focused on making his paper understandable for non-experts.

Dey, Arjun; ...; **Gibson, Benjamin J.**; ...; et al., 2023, *RomAndromeda: The Roman Survey of the Andromeda Halo*, (arXiv:2306.12302)

- This white paper proposed wide-area two-filter observations of M31's halo to get proper motions of individual stars using the upcoming Roman telescope. When combined with other observations, this data would yield full 6-D phase space information for over 100,000 stars in M31's halo, allowing for the study of M31's merger and formation history. I was part of the team that initially investigated this concept.

Abdurro'uf; ...; **Gibson, Benjamin J.**; ...; et al., 2022, *The Seventeenth Data Release of the Sloan Digital Sky Surveys: Complete Release of MaNGA, MaStar, and APOGEE-2 Data*, *Astrophys J Suppl Ser*, 259, 35 (arXiv:2112.02026)

First Author Presentations **Characterizing Kinematically Distinct Stellar Populations in M31 from Integrated Light Spectroscopy** 2023

A Life Devoted to Stellar Populations - Contributed Talk
Puerto de la Cruz, Tenerife, Spain

The Chemodynamics of the Stellar Populations in M31 SDSS Milky Way As a Galaxy Telecon - Research Update 2023

The Milky Way and M31 - Discussion Leader 2023

Wide Field Spectroscopy vs. Galaxy Formation Theory
Biosphere 2.0, Tucson, AZ

Untangling the Chemodynamics of the Stellar Populations in M31 2022

Linking the Galactic and Extragalactic - Contributed Talk
Wollongong, NSW, Australia

Untangling the Chemodynamics of the Stellar Populations in M31 with APOGEE 2022

SDSS Milky Way As a Galaxy Telecon - Research Update

Chemodynamics from Integrated Light Spectroscopy 2021
The SDSS Collaboration Meeting 2021 - Lightning Talk
Hosted by Johns Hopkins University, Baltimore, MD

An Infrared Mapping of the Interior of M31 2020
Swigart Summer Research Symposium
University of Utah, Salt Lake City, UT

First Author Posters ***The Chemodynamics of the Stellar Populations in M31*** 2023
Annual Physics & Astronomy Research Symposium
University of Utah, Salt Lake City, UT

Untangling the Chemodynamics of the Stellar Populations in M31 2022
AAS 240 Summer Meeting
Pasadena, CA

Untangling the Chemodynamics of the Stellar Populations in M31 2022
Annual Physics & Astronomy Research Symposium
University of Utah, Salt Lake City, UT

An Infrared Mapping of the Interior of M31 2021
Annual Physics & Astronomy Research Symposium
University of Utah, Salt Lake City, UT

Teaching and Mentoring Experience ***REU Mentor*** 2023 - Present
University of Utah - *Department of Physics and Astronomy*
- Instructed an undergraduate student from Puerto Rico in recreating my APOGEE integrated light spectral analysis code. Applied it to spectra of the center of M32 and M110 and interpreted it within the context of published literature.

- Project will result in a poster presented at AAS #243, New Orleans, LA - Jan. 2024.

Graduate Teaching Assistant Aug. 2019 - Dec. 2020
University of Utah - *Department of Physics and Astronomy*
- **Fall 2020:** Observational Astronomy, Physics II Lab for Scientists and Engineers
- **Spring 2020:** General Physics II
- **Fall 2019:** Observational Astronomy, The Solar System

Outreach Presentations ***What does the Night Sky Really Look Like?*** 2022
Skyline High School Astronomy Club
Astronomy on Tap Salt Lake City
Our Saviours Lutheran Church Senior Luncheon

Utah Astronomy Club Meeting
University of Utah Astronomy Summer Camp

Service	<i>Graduate Student Advisory Committee</i> , Chair	2023 - Present
	<i>Physics Graduate Peer Mentor Program</i> , Mentor	2023 - Present
	<i>Physics Graduate Social Committee</i> , Member	2019 - Present
	<i>Graduate Student Advisory Committee</i> , Chair-Elect	2022 - 2023
	<i>Recruitment and Admissions Committee</i> , Member	2021 - 2022
	<i>Physics Graduate Social Committee</i> , Chair	2020 - 2022
	<i>Graduate Student Advisory Committee</i> , Officer	2020 - 2022
	<i>Physics Graduate Peer Mentor Program</i> , Mentor	2020 - 2022
	University of Utah - <i>Department of Physics and Astronomy</i>	
	<i>Graduate and Professional Student Council</i> , Member	2023 - Present
	University of Utah	
Professional Memberships	<i>American Astronomical Society</i> , Grad Student Member	2021 - Present
	<i>Sloan Digital Sky Survey V</i>	2021 - Present
	<i>Sloan Digital Sky Survey IV</i>	2020 - Present

Skills	Programming Languages:	
	Python, Matlab, LaTeX	
	Astronomy Software:	
	astropy, pPXF, <i>The Cannon</i> , emcee, matplotlib, Aladin	
	Analysis Methods:	
	Full Spectrum Fitting, MCMC, Stellar Population Synthesis, CMD Analysis, Regression, Bootstrap Sampling, Classification, Jackknife Resampling	
Other:		
	Unix, German	