MATTHEW BELLARDINI

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mbellardini.github.io

EDUCATION

University of California, Davis Jun 2023
Ph.D. in Physics
Advisor: Andrew Wetzel

University of California, Davis Sep 2018
M.S. in Physics

Ithaca College May 2017
B.S. in Physics Summa Cum Laude
Minor in Mathematics

RESEARCH

Graduate Research

· University of California, Davis Sep 2018 - Present
Advisor: Andrew Wetzel
Performed independent and collaborative research. Worked with national supercomputing clusters, e.g. Stampede2, Frontera, Bridges. Programmed in Python to analyze large cosmological hydrodynamic zoom-in simulations of Milky Way-mass galaxies. Presented research at international and national conferences. Mentored graduate and undergraduate students on research projects.

Undergraduate Research

· Ithaca College Jan 2014 - May 2017
Advisor: Luke Keller
Wrote programs in IDL to perform wavelength calibrations and create spectral maps to analyze infrared data of the Jovian troposphere. Examined stellar formation in the Orion nebula using infrared emissions of polycyclic aromatic hydrocarbons as tracers of ultraviolet radiation. Used Python and IDL to reduce, compare, and analyze photometric and spectroscopic data.

· University of California, Davis Jun 2016 - Aug 2016
Advisor: Stefano Valenti
NSF funded summer research program. Used Python to write a data reduction pipeline for spectroscopic data of active galactic nuclei.

· Ithaca College
Advisor: Bruce Thompson Jan 2015 - Dec 2015
Fabricated external housing unit and temperature regulator for an extended cavity laser used in a magneto-optical trap.

HONORS

Sigma Pi Sigma Inductee Spring 2016
Phi Kappa Phi Presidential Scholar Nominee Fall 2015
Phi Kappa Phi Inductee Spring 2015
Ithaca College Oracle Honor Society Inductee Fall 2014

OBSERVING

UCO Graduate Observational Astronomy Workshop Oct 2018
Lick Observatory

PUBLICATIONS

M. A. Bellardini, A. Wetzel, S. R. Loebman, et al. "Radial redistribution and angular momentum change of stellar orbits in FIRE simulations of Milky Way-mass galaxies", in prep.

M. A. Bellardini, "Chemical Evolution Across Cosmic Time: Stellar Elemental Abundance Patterns and Radial Redistribution in Cosmological Simulations", PhD Dissertation, University of California, Davis, 2023

A. Carrillo, M. Ness, K. Hawkins, R. Sanderson, K. Wang, A. Wetzel, and **M. A. Bellardini**, "The relationship between age, metallicity, and abundances for disk stars in a simulated Milky Way galaxy", ApJ, vol. 942, no. 1, pp. 35, Jan. 2023

M. A. Bellardini, A. Wetzel, S. R. Loebman, C.-A. Faucher-Giguère, and J. Bailin, "3D elemental abundances of stars at formation across the histories of Milky Way-mass galaxies in the FIRE simulations", MNRAS, vol. 514, no. 3, pp. 4270–4289, Aug. 2022

M. A. Bellardini, A. Wetzel, S. R. Loebman, C.-A. Faucher-Giguère, X. Ma, and R. Feldmann, "3-D gas-phase elemental abundances across the formation histories of Milky Way-mass galaxies in the FIRE simulations: initial conditions for chemical tagging", MNRAS, vol. 505, no. 3, pp. 4586–4607, Aug. 2021

S. M. Benincasa, S. R. Loebman, A. Wetzel, P. H. Hopkins, N. Murray, **M. A. Bellardini**, C.-A. Faucher-Giguère, D. Guszejnov, and M. Orr, "Live fast, die young: GMC lifetimes in the FIRE cosmological simulations of Milky Way mass galaxies", MNRAS, vol. 497, no. 3, pp. 3993-3999, Jul. 2020

PRESENTATIONS

Galaxy Evolution with Cosmological Simulations Jun 2023
UC Davis - PhD Exit Seminar

Understanding Chemical Tagging with Cosmological Simulations Mar 2023
Tuscon, Arizona - Wide-Field Spectroscopy vs Galaxy Formation Theory

Understanding Chemical Tagging in the MW with Cosmological Simulations Nov 2022
Wollongong, NSW, Australia - Linking the Galactic and Extragalactic

Disk settling as viewed through galactic chemical evolution Sep 2022
UC Irvine - Disk Settling Workshop

Constraining Chemical Tagging Using Cosmological Simulations Feb 2022
UC Merced - Loebman Lab (invited talk)

Constraining Chemical Tagging Using Simulated Galaxies Mar 2021
Australian National University RSAA Seminar (invited talk)

Chemical Tagging in Milky Way-like Galaxies Sep 2019
UC Davis Cosmology and Astrophysics Symposium

Mapping Ultraviolet Radiation in a Star Forming Region Apr 2017
APS New York State Section - Spring Meeting

Mapping Ultraviolet Radiation in a Star Forming Region Apr 2017
Ithaca College - Whalen Symposium

Examining the Radiation in a Star Forming Region Mar 2017
APS - March Meeting, Outstanding Undergraduate Presentation Award Recipient

Reverberation Mapping of Active Galactic Nuclei Aug 2016
University of California, Davis - REU Presentations

Molecular Feature Analysis of the Orion Bar Oct 2015
Ithaca College - Summer Scholars Program

A Spectroscopic View of the Orion Bar Sep 2015
Ithaca College - Physics Department Colloquium

Extraction of Spectra from the Orion Bar Apr 2015

Ithaca College - Whalen Symposium

A Summer of SOFIA Apr 2015

Ithaca College - Physics Department Colloquium

TEACHING EXPERIENCE

Math Tutor Sep 2022 - Jun 2023

Seattle, Washington

Held weekly tutoring sessions for middle school mathematics. Wrote problem sets and solutions for topics such as algebra and geometry.

Teaching Assistant Sep 2017 - Dec 2021

University of California, Davis

Lab TA for introductory physics discussion and lab sections. Grader for introductory and graduate astronomy courses. Responsibilities included grading (homework, lab reports, quizzes, and exams), holding weekly office hours, and facilitating quarterly review sessions.

Math and Physics Tutor Sep 2017 - Dec 2019

University of California, Davis

Designed individualized weekly tutoring sessions for individuals in math classes ranging from high school algebra to introductory calculus and introductory high school and college physics classes.

Teaching Assistant Sep 2014 - May 2017

Ithaca College

Course TA for introductory physics classes, introductory astronomy classes, and upper division electromagnetism. Held weekly office hours and organized final review sessions.