SCOTT LUCCHINI

Center for Astrophysics | Harvard & Smithsonian (he/him)
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I use hydrodynamical simulations to study galaxy formation and evolution. I am specifically interested in gas dynamics and have studied the Magellanic Stream and the broader circumgalactic medium with a focus on making mock observations to compare with the data.

EDUCATION

2023 **PhD in Physics** University of Wisconsin – Madison
Thesis: The Magellanic Corona and its Role in the Evolution of the Magellanic Stream
Advisor: Elena D'Onghia, Professor of Astronomy

2017 **M.Sc. with Distinction in Theoretical Physics** University of Edinburgh
Thesis: The Quantum Nature of Self-Dual Yang-Mills Theory
Advisor: Donal O'Connell, Professor of Physics and Astronomy

2014 **B.S. in Physics and Astronomy** University of Rochester

RESEARCH AND PROFESSIONAL EXPERIENCE

2023– **ITC Postdoctoral Fellow** Center for Astrophysics | Harvard & Smithsonian, Cambridge, MA
Faculty Advisors: Lars Hernquist, Professor of Astronomy, Charlie Conroy, Professor of Astronomy

2014–16 **Software Developer** Heretto, Rochester, NY

REFEREED PUBLICATIONS – ADS

*mentored students are underlined

Manuscripts Under Review

On the Origin of High Velocity Clouds in the Galaxy
Lucchini, S., Han, J., Hernquist, L., Conroy, C. *ApJ*. arXiv:2406.04434

Selected Publications

8. The Magellanic Corona as the key to the formation of the Magellanic Stream
Lucchini, S., D'Onghia, E., Fox, A. J., Bustard, C., Bland-Hawthorn, J., & Zweibel, E. *Nature*, 585, 203. (2020) 10.1038/s41586-020-2663-4 arXiv:2009.04368
7. The Magellanic Stream at 20 kpc: A New Orbital History for the Magellanic Clouds
Lucchini, S., D'Onghia, E., & Fox, A. J. *ApJL*, 921, L36. (2021) 10.3847/2041-8213/ac3338
6. Properties of the Magellanic Corona
Lucchini, S., D'Onghia, E., Fox, A. J. *ApJ*, 967, 16. (2024) 10.3847/1538-4357/ad3c3b

Additional Published Research

5. The Milky Way Bar Pattern Speed using Hercules and Gaia DR3
Lucchini, S., D'Onghia, E., Aguerri, J. A. L. *MNRAS*, 531, L14. (2024) 10.1093/mnrasl/slae024
4. Moving Groups Across Galactocentric Radius with Gaia DR3
Lucchini, S., Pellett, E., D'Onghia, E., & Aguerri, J. *MNRAS*, 519, 1. (2023) 10.1093/mnras/stac3519
3. Observations of a Magellanic Corona
Krishnarao, D., Fox, A. J., D'Onghia E., Wakker B. P., Cashman F. H., Howk, C. J., **Lucchini S.**, French D. M., Lehner, N. *Nature*, 609, 915. (2022) 10.1038/s41586-022-05090-5
Contribution: Provided properties of predicted Magellanic Corona from simulations

2. First evidence of a stripped star cluster from the Small Magellanic Cloud
Piatti, A. E., & **Lucchini, S.** *MNRAS*, 515, 4005. (2022) 10.1093/mnras/stac1980
Contribution: Integrated cluster orbits within the evolution of the Magellanic Clouds

1. Using kinematic properties of pre-planetary nebulae to constrain engine paradigms
Blackman, E. G., & **Lucchini, S.** *MNRAS*, 440, L16. (2014) 10.1093/mnrasl/slu001

PRESENTATIONS

Invited Talks

Aug. 2024	IAU General Assembly – Division J PhD Prize Seminar	Cape Town, South Africa
Apr. 2024	Via Science Meeting	Cambridge, MA
Nov. 2023	Univ. Vienna Institute for Astrophysics Colloquium	Virtual
Sept. 2023	CfA ITC Luncheon Seminar [Recording Link]	Cambridge, MA
Apr. 2023	CU Boulder Astrophysical & Planetary Sciences Friday Lunch Seminar	Boulder, CO
Mar. 2023	Univ. Maryland Center for Theory and Computation Seminar	College Park, MD
Oct. 2022	CCA Galaxy Evolution Group Meeting Seminar	New York, NY
Oct. 2022	Columbia University Seminar	New York, NY
Oct. 2022	Space Telescope Science Institute Low Density Universe Seminar	Baltimore, MD
Jul. 2022	Madison Astronomical Society Public Talk [Recording Link]	Madison, WI
Jun. 2022	GBO HVCs Workshop Invited Talk	Green Bank, WV
Mar. 2022	Space Telescope/Johns Hopkins Galaxies and AGN Seminar	Virtual

Contributed Talks

Jun. 2024	244th American Astronomical Society Meeting	Madison, WI
Feb. 2024	XMC Workshop: Milky Clouds Over Manhattan	New York, NY
Apr. 2022	53rd Division on Dynamical Astronomy of the AAS Annual Meeting	New York, NY
May 2021	52nd Division on Dynamical Astronomy of the AAS Annual Meeting	Virtual
Jan. 2021	237th American Astronomical Society Meeting	Virtual
Sept. 2019	A synoptic view of the Magellanic Clouds: VMC, Gaia and beyond	Garching, Germany

TEACHING & ADVISING EXPERIENCE

Co-Instructor – UW Madison

Taught five lectures over the eight-week session including active learning components (clicker questions) and live demonstrations. Rewrote two lectures including pre-lecture and bridge material and wrote new problems for exams and discussion worksheets.

General Physics – algebra-based mechanics (PHY 103), Su22 — 50 students

Teaching Assistant – UW Madison

Created worksheets and quizzes each week integrating course materials and writing new questions. Led discussion sections and labs where group work and interactive learning was encouraged. Graded problem sets and exams.

General Physics – algebra-based mechanics (PHY 103), S20	75 students (~400 total)
General Physics – algebra-based E&M (PHY 104), F19	75 students (~400 total)
General Physics – calculus-based E&M (PHY 202), F18, Su18, S19, Su19	50 students (~500 total)
General Physics – calculus-based mechanics (PHY 207), F17, S18	50 students (~300 total)
Electromagnetic Fields (PHY 323), S21	20 students
Theoretical Physics – Dynamics (PHY 711), F21	30 graduate students

Guest Lecturer – UW Madison

Our Exploration of the Solar System (AST 104), S22
General Physics – algebra-based mechanics (PHY 103), review lecture S20

Teaching Intern – University of Rochester

Led labs and workshop sessions and graded coursework and exams for a variety of courses.

Advising Experience

Two UW-Madison undergraduate students from 2020–2023 developing and using the MGWave open-source python wavelet transformation code. Resulted in publication of *Moving Groups through Galactocentric Radius with Gaia DR3*.

One Caltech undergraduate student during Summer 2024 SURF program. Population analysis of cold gas in the circumgalactic medium.

AWARDS & GRANTS

Teaching Awards

Apr. 2022	Joseph R. Dillinger Award for Teaching Excellence	UW-Madison Physics Dept.
May 2020	Best TA Award (General Physics – PHY 104, F19)	UW-Madison Physics Dept.
May 2018	Best TA Award (General Physics – PHY 207, F17)	UW-Madison Physics Dept.
May 2013	Undergraduate Teaching Award	University of Rochester Physics Dept.

Research Awards

Aug. 2024	International Astronomical Union PhD Prize	
Jun. 2022	NASA Wisconsin Space Grant Consortium Research Fellowship	$5k
Apr. 2022	AAS Division on Dynamical Astronomy 2022 Duncombe Prize	$600
Jul. 2021	Karl Guthe Jansky and Alice Knapp Jansky Scholarship, UW-Madison Physics Dept.	$3k
Apr. 2021	NASA Wisconsin Space Grant Consortium Research Fellowship	$5k
Dec. 2020	Stebbins Award, UW-Madison Astronomy Dept.	$2k
May 2020	Karl Guthe Jansky and Alice Knapp Jansky Scholarship, UW-Madison Physics Dept.	$3k
Apr. 2020	NASA Wisconsin Space Grant Consortium Research Fellowship	$5k

Travel Awards

Apr. 2022	Division on Dynamical Astronomy Travel Award	$175
Apr. 2022	UW Student Research Grant	$600
Mar. 2020	UW Student Research Grant	$600

Awarded Observational Proposals

Feb. 2023	**Period 111 Very Large Telescope Proposal** Co-I: "The Distance to the Magellanic Stream"	26h
Jun. 2022	**Cycle 30 Hubble Space Telescope Archival Research Proposal** Co-I: "The Cool CGM of the Large Magellanic Cloud"	
Jun. 2021	**Cycle 29 Hubble Space Telescope Archival Research Proposal** Co-I: "The LMC's Galactic Wind through the Eyes of ULYSSES"	$110k
May 2020	**Cycle 28 Hubble Space Telescope Archival Research Proposal** Co-I: "Searching for the LMC Corona: The missing element for the formation of the Magellanic Stream"	$276k

SERVICE AND ORGANIZATIONS

Committee Experience

ITC Luncheon Coordinator	since 2023
UW Physics Outreach, Museum, Web Content & Events committee	2022-2023

Peer Review

AAS Journals	since 2022
Monthly Notices of the Royal Astronomical Society	since 2021

Collaboration and Society Membership

GASKAP	since 2022
American Astronomical Society	since 2023
AAS Division on Dynamical Astronomy	since 2021

MEDIA AND PRESS

For: **The Magellanic Stream at 20 kpc: A New Orbital History for the Magellanic Clouds** Lucchini, S., et al. *ApJL*, 921, L36. (2021)

- UW News: "Magellanic Stream arcing over Milky Way may be five times closer than previously thought" [Article Link]
- Phys.org: "Magellanic Stream arcing over Milky Way may be five times closer than previously thought" [Article Link]
- Science Alert: "The Magellanic Stream May Be 5 Times Closer to Us Than We Ever Realized" [Article Link]
- Live Science: "This hot 'stream' of star gas will collide with our galaxy sooner than we thought" [Article Link]

For: **The Magellanic Corona as the key to the formation of the Magellanic Stream** Lucchini, S., et al. Nature, 585, 203. (2020)

- UW News: "Huge Halo of Warm Gas around Magellanic Clouds is Key to Formation of Magellanic Stream" [Article Link]
- Univ. Sydney: "How the Milky Way stole an enormous gas halo from our dwarf neighbours" [Article Link]
- Nature: "Galactic coronae" [Article Link]
- Phys.org: "Massive halo finally explains stream of gas swirling around the Milky Way" [Article Link]
- Universe Today: "The Milky Way is Already Starting to Digest the Magellanic Clouds, Starting With Their Protective Halos of Hot Gas" [Article Link]
- CNET: "Astronomers crack '50-year puzzle' of cosmic stream ripped apart by Milky Way" [Article Link]
- VICE: "Astronomers Are Hunting for a 'Hidden' Halo Orbiting the Milky Way" [Article Link]
- Cosmos Magazine: "Massive haloes explain a massive gas stream" [Article Link]
- Sci News: "Huge Halo of Warm Gas around Magellanic Clouds is Key to Formation of Magellanic Stream" [Article Link]
- Science Daily: "Massive halo finally explains stream of gas swirling around the Milky Way" [Article Link]
- Science Alert: "We May Finally Know The Origins of A Mysterious Stream Circling The Milky Way" [Article Link]