

ANDREW EMERICK

CURRICULUM VITAE

aemerick@carnegiescience.edu

www.astro.columbia.edu/~emerick

github: [aemerick](#) — bitbucket: [aemerick](#)

RESEARCH INTERESTS

I study the formation and evolution of **galaxies**, from the smallest dwarf galaxies to massive galaxy clusters, using **hydrodynamics simulations** run on high performance supercomputers. In particular I am interested in properly modelling the detailed physics of **star formation** and **stellar feedback** in galaxy-scale simulations using ENZO. I am interested in how these processes drive galactic **chemical evolution** and determine gas and **stellar abundances** in observations of nearby dwarf galaxies.

APPOINTMENTS

Postdoctoral Fellow 2019 - Present
Carnegie Observatories / California Institute of Technology
Pasadena Fellow in Theoretical Astrophysics
Faculty Sponsors: Andrew Benson (Carnegie), Phil Hopkins (Caltech)

EDUCATION

Columbia University 2019
Ph.D. Candidate, Blue Waters Fellow, Astronomy
Thesis Project: *Feedback and Chemical Evolution of Dwarf Galaxies*
Thesis Advisors: Greg L. Bryan, Mordecai-Mark Mac Low

M. Phil., Astronomy 2016
M. A., Astronomy 2015

University of Minnesota
B.S., Astrophysics, *Summa Cum Laude, with Distinction* 2013
Thesis Topic: *Evolution of Weak Magnetic Fields in a Turbulent Plasma*
Thesis Advisor: Thomas W. Jones

B.S., Physics 2013

SELECTED PUBLICATIONS

Click here for a complete, up-to-date list of all of my publications: [SAO/NASA ADS](#)

First-author journal articles

10. **A. Emerick**, G. L. Bryan, M-M. Mac Low, “[Simulating Metal Mixing of Both Common and Rare Enrichment Sources in a Low Mass Dwarf Galaxy](#)”, 2019, *submitted, ApJ*
Contributions: Developed and ran simulations, led analysis, wrote paper
9. **A. Emerick**, G. L. Bryan, M-M. Mac Low, “[Simulating an Isolated Dwarf Galaxy with Multi-Channel Feedback and Chemical Yields from Individual Stars](#)”, 2019, *MNRAS*, **482**, 1304-29
Contributions: Developed and ran simulations, led analysis, wrote paper
8. **A. Emerick**, G. L. Bryan, M-M. Mac Low, B. Côté, K. V. Johnston, B. W. O’Shea, “[Metal Mixing and Ejection in Dwarf Galaxies is Dependent on Nucleosynthetic Source](#)”, 2018, *ApJ*, *accepted, in press*, arXiv:1809.01167
Contributions: Developed and ran simulations, led analysis, wrote paper

7. **A. Emerick**, G. L. Bryan, M-M. Mac Low, “[Stellar Radiation is Critical for Regulating Star Formation and Driving Outflows in Low Mass Dwarf Galaxies](#)”, 2018, *ApJ*, **865**, L22
Contributions: Developed and ran simulations, led analysis, wrote paper
6. **A. Emerick**, M-M. Mac Low, J. Greveich, A. Gatto, “[Gas Loss by Ram Pressure Stripping and Internal Feedback From Low Mass Milky Way Satellites](#)”, 2016, *ApJ* **826**, 148-61
Contributions: Developed and ran simulations, led analysis, wrote paper
5. **A. Emerick**, G. L. Bryan, M. E. Putman, “[Warm Gas in and Around Simulated Galaxy Clusters as Probed by Absorption Lines](#)”, 2015 *MNRAS* **453**, 4051-69
Contributions: Ran simulations, developed and conducted analysis, wrote paper
4. **A. Emerick**, X. Zhao, R. Rapp, “[Bottomonia in the Quark-Gluon Plasma and their Production at RHIC and LHC](#)”, *Eur. Phys. J. A* (2012) **47**:72
Contributions: Updated and ran semi-analytic model, conducted analysis, wrote paper

Other Journal Articles

3. Zheng, Y., Putman, M. E., **Emerick, A.**, [7 authors], “[Tentative Detection of the Circumgalactic Medium of the Isolated Low-Mass Dwarf Galaxy WLM](#)”, 2019, *MNRAS*, *accepted, in press*
Contributions: Portion of discussion of results
2. Smith, B. D., [8 authors], **Emerick, A.**, [4 authors], “[GRACKLE: a chemistry and cooling library for astrophysics](#)”, 2017, *MNRAS*, **466**, 2217-34
Contributions: New functionality; wrote description in paper; bugfixes to code.
1. S. Brown, **A. Emerick**, L. Rudnick, G. Brunetti, “[Probing the Off-State of Cluster Radio Halos](#)”, 2011 *ApJ* **740** L28
Contributions: Performed image-stacking analysis and contributed to writing of methods

Conference Proceedings and Other Articles

5. G. C. Rudie, [11 authors], **A. Emerick** [14 authors], “Observing Galaxies and Dissecting their Baryon Cycle at Cosmic Noon”. *Astro2020: Decadal Survey on Astronomy and Astrophysics*, Vol. 51, Issue 3, id. 48 (2019)
4. **A. Emerick**, G.L. Bryan, M-M. Mac Low, “Feedback Driven Chemical Evolution in Simulations of Low Mass Dwarf Galaxies”. In: *AAS Meeting # 232, # 305.03; Bulletin of the American Astronomical Society*. [Talk abstract](#).
3. X. Zhao, **A. Emerick**, R. Rapp, “In-Medium Quarkonia at SPS, RHIC, and LHC” *Nuclear Physics A, Vol. 904, p. 611-614c*. Quark Matter 2012 - Proceedings. [Abstract](#)
2. **A. Emerick**, X. Zhao, R. Rapp, “Bottomonium in the QGP: production at RHIC and LHC.” *Fall Meeting of the APS Division of Nuclear Physics: Bulletin of the American Physical Society, Volume 56, Number 12*. [Poster abstract](#)
1. **A. Emerick**, S. Brown, L. Rudnick, “Stacking Detection of Diffuse Radio Halo Emission in Galaxy Clusters”. In: *AAS Meeting # 218, # 408.26; Bulletin of the American Astronomical Society, Vol. 43, 201*. [Poster abstract](#).

HONORS, AWARDS AND GRANTS

Graduate Awards

Blue Waters Graduate Fellowship	2018 - 2019
NSF Graduate Research Fellowship	2014 - 2019
Columbia Dean’s Fellowship	2013 - 2019

Research Grants

Blue Waters Graduate Fellowship: 1.6m CPU hours on Blue Waters	2018 - 2019
XSEDE Computing Grant: 1.8m CPU hours on Stampede	2017 - 2018
XSEDE Computing Startup Grant: 50k CPU hours on Stampede	2015 - 2016

Undergraduate Research Opportunities Grant	2012
Undergraduate Research Opportunities Grant	2010

Travel Awards

Conference Experience for Undergraduates: APS Div. of Nuclear Physics	2011
APS Minority Scholarship: AAS 218 th Meeting - Boston	2011

Undergraduate Awards

J. Morris Blair Scholarship in Physics	2012 - 2013
Laverne and Ted Jones Foundation Scholarship	2012 - 2013
Astronaut Scholarship Foundation Scholarship	2012 - 2013
Minnesota Space Grant Consortium Scholarship	2011 - 2012
Franklin Scholarship	2011
American Physical Society Minority Scholarship	2010 - 2012
University of Minnesota Gold National Scholarship	2009 - 2013

SELECTED CONFERENCES AND SCIENTIFIC TALKS

42. Invited Talk: Blue Waters Symposium 2019, Sun River, OR	
41. Invited Talk: U. of Washington, Astronomy Seminar, Seattle, WA	Jan. 2019
40. Talk: AAS 233 rd meeting, Seattle, WA	Jan. 2019
39. Attendee: Near-Far Workshop, Napa, CA	Dec. 2018
38. Invited Talk: Cosmology / Galaxies Seminar, UT, Austin, TX	Nov. 2018
37. Invited Talk: UC Santa Barbara Seminar, Santa Barbara, CA	Nov. 2018
36. Invited Talk: Harvard-Smithsonian CfA ITC Seminar, Cambridge, MA	Oct. 2018
35. Talk: Pizza Lunch, Columbia University, New York, NY	Sep. 2018
34. Talk: MPA Galaxy Coffee, Heidelberg, Germany	Sep. 2018
33. Invited Talk: S. Glover and R. Klessen Group Meeting ITA, Heidelberg, Germany	Sep. 2018
32. Talk: 15 th Potsdam Thinkshop: The Role of Feedback in Galaxy Formation, Potsdam, Germany	Sep. 2018
31. Invited Talk: Blue Waters Fellowship NCSA Visit, Champaign-Urbana, Illinois	Aug. 2018
30. Talk: Santa Cruz Galaxy Workshop 2018, Santa Cruz, CA	Aug. 2018
29. Discussion Lead: Isolated Quenched Galaxies Workshop V: Gas in Quenched Galaxies, Flatiron Institute, New York, NY	Jul. 2018
28. Talk: UC San Diego, Lunch Seminar, San Diego, CA	Jun. 2018
27. Talk: Stellar Abundances in Dwarf Galaxies Meeting-in-a-Meeting, AAS 232, Denver, CO	Jun. 2018
26. Attendee: Blue Waters Symposium 2018, Sun River, OR	Jun. 2018
25. Talk: Olympian Symposium 2018, Katerini, Greece	Jun. 2018
24. Talk: Enzo Workshop 2018, Georgia Tech, Atlanta, GA	May 2018
23. Talk: Pizza Lunch, Columbia University, New York, NY	Mar. 2018
22. Discussion Lead: Isolated Quenched Galaxies Workshop IV: Gas in Quenched Galaxies, Flatiron Institute, New York, NY	Feb. 2018
21. Talk: Galaxies Lunch: Dwarf Galaxies, Columbia University, New York, NY	Feb. 2018
20. Talk: NYC Local Group Local Group Meeting, Columbia University, New York, NY	Nov. 2017
19. Talk: NY Area Computational Hydro Workshop Flatiron Institute, New York, NY	Sep. 2017
18. Poster: GMT Community Science Meeting Chemical Evolution of the Universe, Tarrytown, NY	Sep. 2017
17. Talk: Columbia Astrofest, New York, NY	Sep. 2017

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| 16. Poster: The Galaxy Ecosystem
Flow of Baryons Through Galaxies, Garching, Germany | Jul. 2017 |
| 15. Talk: MIAPP Workshop
In & Out: What Rules the Galaxy Baryon Cycle, Garching, Germany | Jul. 2017 |
| 14. Talk: Enzo Workshop 2017, San Diego Supercomputing Center, San Diego, CA | Jun. 2017 |
| 13. Talk: Pizza Lunch, Columbia University, New York, NY | Sep. 2016 |
| 12. Attendee and LOC: MODEST-16
American Museum of Natural History, New York, NY | Sep. 2016 |
| 11. Poster: Mapping the Pathways of Galaxy Transformation
Across Time and Space, Avalon, CA | Aug. 2016 |
| 10. Talk: ITA Chalk Talk, Heidelberg, Germany | Apr. 2016 |
| 9. Talk: Columbia Astrofest, New York, NY | Sep. 2015 |
| 8. Poster: Lorentz Center Workshop: The Life and
Death of Satellite Galaxies, Leiden, Netherlands | Apr. 2015 |
| 7. Talk: The Role of HI in Galaxies, Kuching, Malaysia | Sep. 2014 |
| 6. Talk: Columbia Astrofest, New York, NY | Sep. 2014 |
| 5. Talk: Enzo Workshop 2014, Columbia University, New York, NY | May 2014 |
| 4. Poster: University of Minnesota Undergraduate
Research Symposium, Minneapolis, MN | Spring 2013 |
| 3. Poster: Fall Meeting of the APS Div.
of Nuclear Physics, East Lansing, MI | Fall 2011 |
| 2. Poster: AAS 218 th Meeting, Boston, MA | May. 2011 |
| 1. Poster: University of Minnesota Undergraduate
Research Symposium, Minneapolis, MN | Spring 2011 |

OPEN SOURCE CODE DEVELOPMENT

In support of open science, **all** of my simulation and analysis code is publicly available in online repositories on [Bitbucket](#) and [GitHub](#). I am a member and active contributor to multiple open-source code projects, including [Enzo](#), [Grackle](#), and [Enzo-E/Cello](#).

TEACHING EXPERIENCE

Tutor, Bespoke Education	2015 - present
Lab. T.A. Astronomy W1904: Astronomy Lab II	Spring 2015
Lab. T.A. Astronomy C1904: Astronomy Lab I	Fall 2014
T.A. Astronomy C1403: Earth, Moon, and Planets	Spring 2014
T.A. Astronomy C1836: Stars and Atoms	Fall 2013
Undergraduate Peer Mentor: Tutor at University of Minnesota	2011 - 2013

SELECTED OUTREACH AND SERVICE

Referee, <i>Monthly Notices of the Royal Astronomical Society</i>	2016 - present
Referee, <i>The Astrophysical Journal</i>	2016 - present
Outreach Volunteer, bi-weekly community stargazing, Columbia University	2013 - 2019
Columbia Astrophysics Lab Computing Committee	2017 - 2019
Guest Speaker / Scientist, Our Lady of Lourdes Middle School, Harlem, New York, NY	2016 - 2019
Astronomy Seminar Organizer, American Museum of Natural History	2016 - 2017
Astrobites Writer	2013 - 2015

STUDENTS ADVISED

Alexandra Mannings, American Museum of Natural History	2015
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