

Adam Michael Bauer

NSF Graduate Research Fellow

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Champaign, IL, USA

RESEARCH INTERESTS

Climate economics and risk

I am interested in understanding how tail risks in the climate system impact climate policy and the economy.

Climate science

I am interested in building conceptual, dynamical models of the climate system and climate extremes.

Mathematical modeling

I rigorously construct models using a combination of theory, data, and simulations.

EDUCATION

Ph. D. Physics

University of Illinois at Urbana Champaign 2020 –
• Currently enrolled in the physics doctoral program.
• Cumulative GPA: 4.000

B.S. Physics & B.S. Mathematics

University of Arizona 2016 – 2020
• Minor: Astronomy and Astrophysics
• Cumulative GPA: 3.972 (Summa Cum Laude)
• Thesis: *On the Behavior of Null Rays in Spherically Symmetric Spacetimes*

POSITIONS HELD

Staff Associate II in the Faculty of Business

Columbia Business School Sep 2022 – Dec 2022 New York, NY

Graduate Research Fellow

University of Illinois at Urbana Champaign Aug 2022 – present Urbana, IL

Predocutorial Researcher

Columbia Business School Apr 2022 – Jun 2022 New York, NY (worked virtually)

Graduate Research Assistant

University of Illinois at Urbana Champaign Jan 2021 – Aug 2022 Urbana, IL

Graduate Teaching Assistant

University of Illinois at Urbana Champaign Sep 2020 – Jan 2021 Urbana, IL

National Science Foundation Research Experience for Undergraduates Intern

University of Arizona May 2019 – Aug 2019 Tucson, AZ

NASA Space Grant Research Intern

University of Arizona Sep 2018 – May 2019 Tucson, AZ

SOURCES OF FUNDING

Graduate Research Fellowship

National Science Foundation \$102k Aug 2022 – Aug 2025

REFEREED PUBLICATIONS

A. M. Bauer, C. Proistosescu, G. Wagner. Financial modeling of climate risk supports stringent mitigation action. *In preparation*, 2022.

A. M. Bauer, L. R. Vargas Zeppetello, C. Proistosescu. The role of local thermodynamics in midlatitude heat waves. *In preparation*, 2022.

M. Pascale, B. L. Frye, L. Dai, N. Foo, Y. Qin, R. Leimbach, **A. M. Bauer**, E. Merlin, D. Coe, J. Diego, H. Yan, A. Zitrin, S. H. Cohen, C. Conselice, H. Dole, K. Harrington, R. A. Jansen, P. Kamiński, R. A. Windhorst, M. Yun. Possible ongoing merger discovered by photometry and spectroscopy in the field of the galaxy cluster PLCK G165.7+67.0. *The Astrophysical Journal*, 932(85), 2022.

A. M. Bauer, A. Cárdenas-Avendaño, C. F. Gammie, N. Yunes. Spherical accretion in alternative theories of gravity. *The Astrophysical Journal*, 925(2), 2022.

A. Bauer, P. Carter. Existence of transonic solutions in the stellar wind problem with viscosity and heat conduction. *SIAM Journal on Applied Dynamical Systems*, 20(1), 2021.

B. L. Frye, M. Pascale, Y. Qin, A. Zitrin, J. Diego, G. Walth, H. Yan, C. J. Conselice, M. Alpaslan, **A. Bauer**, L. Busoni, D. Coe, S. H. Cohen, M. Dole, M. Donahue, I. Georgiev, R. A. Jansen, M. Limousin, R. Livermore, D. Norman, S. Rabien, R. A. Windhorst. PLCK G165.7+67.0: Analysis of a massive lensing cluster in a Hubble Space Telescope census of submillimeter giant arcs selected using Planck/Herschel. *The Astrophysical Journal*, 871(51), 2019.

UNREFEREED PUBLICATIONS

A. Bauer, B. Frye. THELI Reduction Software: A write up for inexperienced data reducers. Posted to THELI forums & Cloudynights.com, 2019. (Theli Link.) (Cloudynights Link.)

CURRENT RESEARCH PROJECTS

Understanding how climate risk influences ‘optimal’ emissions mitigation policy

Advisor: Prof. Cristian Proistosescu & Prof. Gernot Wagner

🏛 University of Illinois at Urbana Champaign & Columbia Business School 📅 May 2021 – Present 📍 Urbana, IL

- Led development of the Climate Asset Pricing model – AR6 (CAP6), a numerical financial asset pricing climate-economy model, written in Python.
- Distilled and interpreted IPCC AR6 data and plots into workable CAP6 model components.
- Built modules to be in-line with the Intergovernmental Panel on Climate Change’s (IPCC) sixth assessment report (AR6).
- Calibrated CAP6 with the most up-to-date, empirically-driven estimates of discount rates and technological growth rates.
- Wrote Jupyter notebooks to analyze model output and its implications for mitigated policy.
- **Outcome:** An in preparation publication.

Building a land-atmosphere model for midlatitude heat waves

Advisor: Prof. Cristian Proistosescu & Dr. Lucas R. Vargas Zeppetello

🏛 University of Illinois at Urbana Champaign 📅 Jan 2021 – Present 📍 Urbana, IL

- Used reanalysis data to show the decoupling of soil moisture at atmospheric variability in temperature distributions.
- Developed a conceptual framework highlighting the nonlinear interaction of soil moisture and temperature at the surface.
- Analytically derived a one-dimensional Hasselmann-like model for the soil moisture response to precipitation.
- Built a numerical simulation probing the impacts of soil moisture on the near-surface temperature distribution.
- **Outcome:** An in preparation publication.

PAST RESEARCH PROJECTS

Using accretion physics to test general relativity

Advisor: Prof. Nicolás Yunes & Prof. Charles F. Gammie

🏛 University of Illinois at Urbana Champaign 📅 Dec 2020 – Oct 2021 📍 Urbana, IL

- Performed analytic calculations of accretion flow properties in a generic theory of gravity.
- Built a ray tracing code to calculate the intensity profile of a black hole accretion disk in a modified theory of gravity.
- Investigated the feasibility of testing general relativity using the Event Horizon Telescope.
- **Outcome:** A first-author publication in *The Astrophysical Journal*.

Near-horizon null rays in stationary spherically symmetric spacetimes

Advisor: Prof. Samuel Gralla

🏛 University of Arizona 📅 Aug 2019 – May 2020 📍 Tucson, AZ

- Utilized Penrose limit metrics and perturbation theory to further investigate the Aretakis instability of extremal black holes.
- **Outcome:** Senior thesis.

Transonic canards in the stellar wind problem

Advisor: Prof. Paul Carter

🏛 University of Arizona 📅 Jan 2019 – Dec 2020 📍 Tucson, AZ

- Proved the existence of a canard-shock solution in the hydrodynamic equations governing gas surrounding a star, including the effects of heat conduction and viscosity using geometric singular perturbation theory results.
- **Outcome:** A first-author publication in *SIAM Journal on Applied Dynamical Systems*.

Data-driven investigation of massive galaxy cluster lensing properties

Advisor: Prof. Brenda Frye

🏛 University of Arizona 📅 Sep 2016 – May 2019 📍 Tucson, AZ

- Developed a numerical algorithm to reduce and analyze observational telescope data.

- Used observational data to measure the redshift of galaxy cluster members and calculated the total mass of the cluster.
- **Outcomes:** Two publications in *The Astrophysical Journal* and publication of an open-source user's manual.

PEDAGOGICAL RESEARCH

Analytic Formal Report Development and Implementation (PI)

Collaborators: Prof. Shawn Jackson, Danielle Dickinson

🏢 University of Arizona 📅 Jan 2020 – May 2021 📍 Tucson, AZ

- Led the development of the Analytic Formal Report, a new assignment for upper division physics students.
- Graded AFRs and held office hours to help students with them in the 2020 spring semester.
- Mentored Danielle Dickenson, who performed my spring 2020 duties, in the spring 2021 semester.

TALKS AND PRESENTATIONS

(Upcoming) Financial modeling of climate risk supports stringent mitigation action

American Geophysical Union Fall Meeting 📅 December 2022 📍 Chicago, IL

(Upcoming) The role of local thermodynamics in midlatitude heat waves

American Geophysical Union Fall Meeting (Poster) 📅 December 2022 📍 Chicago, IL

Financial modeling of climate risk implies stringent mitigation action

Columbia University Sustainable Development Seminar 📅 November 2022 📍 New York, NY

Exploring the controls on temperature extremes in the midlatitudes

UC San Diego Climate Journal Club 📅 May 2022 📍 San Diego, CA (Given virtually)

Characterization and Analysis of Massive Space Telescopes

Arizona Space Grant Symposium 📅 Apr 2019 📍 Tempe, AZ

Measuring the Dynamical Masses of Sub-millimeter Selected Gravitational Lenses

Steward Observatory Internal Symposium 📅 Sep 2018 📍 Tucson, AZ

Measuring Masses of Galaxy Clusters

Galileo Circle Scholarship Banquet (Poster) 📅 Apr 2018 📍 Tucson, AZ

ACADEMIC HONORS AND ACHIEVEMENTS

NSF Graduate Research Fellowship Program

On tenure – 2022-2025

List of Teachers Ranked as Excellent by Their Students

UIUC Department of Physics – 2020

NSF Graduate Research Fellowship Program

Honorable Mention – 2020

The Excellence in Undergraduate Research Award

UArizona College of Science – 2020

The Excellence in Undergraduate Research Award

UArizona Department of Physics – 2020

Phi Beta Kappa Society

Alpha of Arizona Chapter – 2018

Galileo Circle Scholar

2018 – 2019

Weaver Research Award

UArizona Department of Physics, 2017 – 2018

Highest Academic Achievement

UArizona, 2016 – 2017, 2018 – 2019, & 2019 – 2020

SCHOLARSHIPS AWARDED

Glenn C. Purviance Scholarship

UArizona Department of Physics, 2019 – 2020

Grogan Scholarship

UArizona Department of Mathematics, 2019 – 2020

Gregson Award

UArizona Department of Physics, 2019 – 2020

Douglass/Langadas Scholarship

UArizona Department of Astronomy, 2018 – 2019

TEACHING EXPERIENCE

Graduate Teaching Assistant

Course: PHYS 102 – College Physics: E&M and Modern

🏢 University of Illinois Urbana Champaign 📅 Aug 2020 – Dec 2020 📍 Urbana, IL

- Made the **List of Teachers Ranked as Excellent By Their Students**.
- Led discussion sections for introductory physics course designed for non-physics majors.
- Prepared small lectures and held extra exam review sessions.

Undergraduate Teaching Assistant

Course: PHYS 103 – Introductory Physics II

🏢 University of Arizona 📅 Aug 2019 – Dec 2019 📍 Tucson, AZ

- Oversaw problem solving sessions bi-weekly where I walked students through exam level practice problems.
- Held office hours to help students with homework and exam preparation.

TECHNICAL STRENGTHS

Strong:

Python, Mathematica, Jupyter notebooks, \LaTeX

Beginner:

C/C++, IDL, R

EXTRA-CIRRICULAR

Graduate Peer Mentor

University of Illinois Urbana Champaign (Department of Physics)

Grad On-Call

University of Illinois Urbana Champaign

Undergraduate-Graduate Peer Mentor

University of Illinois Urbana Champaign (Department of Atmospheric Sciences)

Undergraduate Peer Mentor

University of Arizona

Physics Discovery Team Member & Project Developer

University of Arizona