

Adam Michael Bauer

National Science Foundation Graduate Research Fellow

Citizenship: USA

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adam-bauer-34

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.

The clean energy transition

I am interested in how to guide the transition from dirty to clean energy using climate-economic models.

Mathematical modeling

I rigorously construct models using a combination of theory, data, and simulations to better explain the world.

EDUCATION

Ph. D. Physics

University of Illinois Urbana-Champaign 2020 –

- Cumulative GPA: 4.000
- Thesis: *On the physical drivers and economic consequences of climate-related risk*

B.S. Physics & B.S. Mathematics

University of Arizona 2016 – 2020

- Minor: Astronomy and Astrophysics
- Cumulative GPA: 3.972 (Summa Cum Laude)
- Honors Thesis: *On the Behavior of Null Rays in Spherically Symmetric Spacetimes*

WORK EXPERIENCE

National Science Foundation Graduate Research Fellow

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

Services rendered:

- Developed a model for land-atmosphere interactions that highlights the nonlinear impact of soil moisture on heat waves.
- Carried out statistical analysis of climate reanalysis data to understand the drivers of continental heat waves.
- Mentored undergraduate-led research on constraining climate model projections used by policymakers.
- Developed a framework to assess how climate uncertainty evolves over time in response to emissions.
- Outcomes:** A first-author paper in preparation; presentation at a number of conferences and seminars.

Short-term Consultant

The World Bank Group Jun 2023 – present Washington DC

Services rendered:

- Building an abatement investment model with a systematic treatment of climate uncertainty.
- Distilling IPCC reports into physically and economically sound calibrations of an abatement investment model.
- Incorporating learning by doing and increasing returns into the a modeling framework.
- Outcomes:** A first-author working paper; an internal report on research outcomes.

Staff Associate II in the Faculty of Business

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

Services rendered:

- Led development of the Carbon Asset Pricing model – AR6 (CAP6) written in Python.
- Wrote CAP6 code that is in-line with the sixth assessment report from the Intergovernmental Panel on Climate Change.
- Calibrated CAP6 with the latest, empirically-driven estimates of discount rates and technological growth rates.
- Wrote Jupyter notebooks to analyze model output and its implications for carbon dioxide emissions mitigation policy.
- Outcomes:** A first-author *CESifo* working paper; presentations at a number of conferences and seminars; a set of comments on Federal Reserve climate-related risk policy (see *Working Papers and Other Academic Writings*).

Research Consultant

Columbia Business School & Tamer Center for Social Enterprise Apr 2022 – Jun 2022 New York, NY

Services rendered:

- Wrote climate module for the Carbon Asset Pricing model – AR6.
- Rewrote other CAP6 modules to synergize with the new climate model.
- Outcome:** An on-staff position at Columbia Business School to complete the development of CAP6.

Graduate Research Assistant

University of Illinois Urbana-Champaign Jan 2021 – Jul 2022 Urbana, IL

Services rendered:

- Performed analytic calculations of accretion flow properties in a generic theory of gravity.

- Built a ray-tracing code in Python that finds the intensity profile of a black hole in a generalized gravity theory.
- Investigated the feasibility of testing general relativity using the Event Horizon Telescope.
- **Outcome:** A first-author publication in *The Astrophysical Journal*.

NSF Research Experience for Undergraduates Intern

 University of Arizona  May 2019 – Aug 2019  Tucson, AZ

- **Services rendered:**
 - Developed mathematical techniques and proofs to rigorously construct solutions to a dynamical system.
 - Performed numerical calculations to verify our analytical model for astrophysical accretion.
- **Outcome:** A first-author publication in the *SIAM Journal on Applied Dynamical Systems*.

NASA Space Grant Research Intern

 University of Arizona  Sep 2018 – May 2019  Tucson, AZ

- **Services rendered:**
 - Developed Python and IDL code to reduce and analyze observational and spectroscopic telescope data.
 - Processed telescope data to be assimilated into a large-scale gravitational lensing model.
- **Outcomes:** Two publications in *The Astrophysical Journal*; and open-source users manual on our data software.

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

- **Services rendered:**
 - Made the **List of Teachers Ranked as Excellent By Their Students**.
 - Led discussion sections and exam review sessions for introductory physics course designed for non-physics majors.

Undergraduate Teaching Assistant

Course: PHYS 103 – Introductory Physics II

 University of Arizona  Aug 2019 – Dec 2019  Tucson, AZ

- **Services rendered:**
 - Led problem solving sessions where I helped students through exam practice problems.
 - Held office hours to help students with homework and exam preparation.

PEER-REVIEWED PUBLICATIONS

(* implies I directly advised student during the project.)

PUBLISHED

Bauer, A. M., C. Proistosescu, G. Wagner. Carbon Dioxide as a Risky Asset. *Climatic Change*, 177(72), 2024. (Previously CESifo Working Paper No. 10278 and Columbia CEEP Working Paper No. 23.)

Pascale, M., 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. Kamienski, 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.

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

Bauer, A., 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.

Frye, B. L., 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.

WORKING PAPERS AND OTHER ACADEMIC WRITINGS

McDonnell, A.*, **A. M. Bauer**, C. Proistosescu. Does discounting 'hot' climate models improve the predictive skill of climate model ensembles? *ESS Open Archive*, 2024. (Link.)

Bauer, A. M., F. McIsaac, S. Hallegatte. How Delayed Learning about Climate Uncertainty Impacts Decarbonization Investment Strategies. *World Bank Policy Research Working Paper No. 10473*, The World Bank, Washington DC, 2024.

Bauer, A. M. Merging Physics and Economics for Climate Policy. *University of Illinois Department of Physics Research Highlight*, 2023. (Link.)

Bauer, A. M., D. C. Lafferty, K. Schwarzwald, C. Proistosescu, G. Wagner. Comments on “Principles for Climate-Related Financial Risk Management for Large Financial Institutions”. Docket No. OP–1793, The Federal Reserve (3 February 2023).

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

TALKS AND PRESENTATIONS

Carbon dioxide as a risky asset

Midwestern Student Conference on Atmospheric Research 📅 October 2023 📍 Urbana, IL

Financial modeling of climate risk supports stringent mitigation action

European Association of Environmental and Resource Economists Summer Meeting 📅 June 2023 📍 Limassol, Cyprus

Financial modeling of climate risk supports stringent mitigation action

Association of Environmental and Resource Economists Summer Meeting 📅 May 2023 📍 Portland, ME

*Carbon dioxide as a risky asset

Center for Social and Environmental Futures 📅 April 2023 📍 Boulder, CO

Financial modeling of climate risk supports stringent mitigation action

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

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

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

(* implies an invited talk.)

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

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

TECHNICAL STRENGTHS

Strong:

Python, Mathematica, Jupyter notebooks, \LaTeX

Intermediate:

Julia

Beginner:

C/C++, IDL, R

EXTRA CURRICULAR

Graduate Peer Mentor

University of Illinois Urbana Champaign (Department of Physics)

Undergraduate-Graduate Peer Mentor

University of Illinois Urbana Champaign (Department of Atmospheric Sciences)

Grad On-Call

University of Illinois Urbana Champaign

Undergraduate Peer Mentor

University of Arizona

Physics Discovery Team Member & Project Developer

University of Arizona