Adam Michael Bauer

National Science Foundation Graduate Research Fellow *Citizenship: USA*

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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 in preparation; 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

PUBLISHED

Bauer, A. M., C. Proistosescu, G. Wagner. Carbon Dioxide as a Risky Asset. *Climatic Change (forthcoming)*, 2024.

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 sub-millimeter giant arcs selected using Planck/Hershel. *The Astrophysical Journal*, 871(51), 2019.

WORKING PAPERS AND OTHER ACADEMIC WRITINGS

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

Bauer, A. M., C. Proistosescu, G. Wagner. Carbon Dioxide as a Risky Asset. *CESifo Working Paper No. 10278* and *Columbia CEEP Working Paper No. 23*, 2023.

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