Adam Michael Bauer

National Science Foundation Graduate Research Fellow

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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

Short-term Consultant

World Bank Group | Jun 2023, Aug 2023 – Jan 2024 | Washington DC

- **Contract value:** $30.56k USD over the length of the contract.
- **Project goals:**
  - 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.

National Science Foundation Graduate Research Fellow

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

- **Contract value:** $102k USD over three years.
- **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.
- **Outcomes:** A first-author paper in preparation; presentation at a number of conferences and seminars.

Staff Associate II in the Faculty of Business

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

- **Contract value:** $18k USD over four months.
- **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

- **Contract value:** $15k USD over three months.
- **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

- **Salary:** $20k USD per year.
- **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

- **Contract value:** $6k over three months.
- **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

- **Contract value:** $5k over ten months.
- **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

- **Salary:** $20k USD per year.
- **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

SUBMITTED

Bauer, A. M., C. Proistosescu, G. Wagner. Carbon Dioxide as a Risky Asset. *In review*, 2023.

Bauer, A. M., L. R. Vargas Zeppetello, C. Proistosescu. On the role of soil moisture in midlatitude heat waves. *In review*, 2023.

PUBLISHED

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., C. Proistosescu, G. Wagner. Carbon Dioxide as a Risky Asset. *CESifo Working Paper No. 10278*, 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

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