

# LUCI BAKER, PhD

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## SUMMARY

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Fluid mechanics researcher with expertise in image processing, statistical analysis, and experimental methods, as well as mentorship, teaching, and improving equity and accessibility in academia.

## EDUCATION

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### University of Minnesota, Minneapolis, MN

**Ph.D.**, Aerospace Engineering and Mechanics | 4.00 Jun 2021

*Focus: Experimental Fluid Mechanics*

**M.S.**, Aerospace Engineering and Mechanics | 4.00 Dec 2018

**B.Eng.**, Aerospace Engineering and Mechanics | 3.75 May 2016

## EXPERIENCE

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**Field Organizer & Financial Secretary**, UAW Local Union 4121, WA Aug 2023 – present  
Organizing for equity and accessibility in academia through the academic workers' union at the University of Washington. Mentoring 100+ volunteers to coordinate a strong postdoc collective bargaining campaign. Interfacing with university administration. Responsible for budget planning, financial accounting, and HR for six academic union programs at universities in the Pacific Northwest.

**NSF Postdoctoral Fellow**, University of Washington Jun 2021 – Jul 2023  
*Dept of Mechanical Engineering / Environmental Fluid Mechanics Group*  
Investigating the statistical behavior of microplastic particles in wind-driven ocean surface turbulence and wind waves through laboratory experiments using image processing techniques

**Space Weather Simulation Summer School**, University of Colorado Jul 2022  
Learned and implemented numerical techniques for modeling atmospheric dynamics and chemistry using GitHub, Python, and Julia

**Graduate Research Assistant**, University of Minnesota May 2016 – Jun 2021  
*Dept of Aerospace Engineering / St. Anthony Falls Laboratory*  
Explored the interactions between inertial particles and fluid turbulence in open channel flows through image-based experiments in a laboratory water channel and an outdoor stream

**Summer Institute on Earth-Surface Dynamics**, St. Anthony Falls Laboratory, MN Aug 2017  
Explored geophysical fluid dynamics through theory, experiments, fieldwork, and numerical modeling in Python

## LUCI BAKER, PhD

**Undergraduate Research Assistant**, University of Minnesota Jan 2014 – May 2016  
*Dept of Aerospace Engineering / Laboratories for Turbulent and Complex Flows*  
Studied particle clustering in homogeneous turbulence by analyzing large datasets generated by numerical simulations

**Intern**, Virgin Orbit, CA Jun – Aug 2015  
Designed engine gimbals and heat exchangers for LauncherOne rocket engines

**Intern**, NASA Jet Propulsion Laboratory, CA Jun – Aug 2013 & 2014  
Mentor: Dr. Anita Sengupta  
Designed and tested magnetic shielding for the ISS Cold Atom Lab research facility

## PUBLICATIONS

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9. **Baker, L.**, Aggarwal, A., Chávez-Dorado, J., Garrey, I., & DiBenedetto, M. "Irradiation of nonspherical particles in wind-driven turbulence." In preparation.
8. Sanness Salmon, H., **Baker, L.**, Kozarek, J., & Coletti, F. (2023) "Effect of Shape and Size on the Transport of Floating Particles on the Free-surface of a Meandering Stream." *Water Resources Research*, 59, e2023WR035716.
7. **Baker, L.** & DiBenedetto, M. (2023) "Large-scale particle shadow tracking and orientation measurement with collimated light." *Experiments in Fluids*, 64, 52.
6. **Baker, L.** & Coletti, F. (2022) "Experimental investigation of inertial fibres and disks in a turbulent boundary layer." *Journal of Fluid Mechanics*, 943, A27.
5. **Baker, L.**, Qiao, Y., Ghaemi, S., & Coletti, F. (2021) "Method to minimize polymer degradation in drag-reduced non-Newtonian turbulent boundary layers." *Measurement Science and Technology*, 32, 085303.
4. **Baker, L.** & Coletti, F. (2021) "Particle–fluid–wall interaction of inertial spherical particles in a turbulent boundary layer." *Journal of Fluid Mechanics*, 908, A39.
3. **Baker, L.** & Coletti, F. (2019) "Experimental study of negatively-buoyant finite-size particles in a turbulent boundary layer up to dense regimes." *Journal of Fluid Mechanics*, 866, 598-629.
2. Petersen, A., **Baker, L.**, & Coletti, F. (2019) "Experimental study of inertial particles clustering and settling in homogeneous turbulence." *Journal of Fluid Mechanics*, 864, 925-970.
1. **Baker, L.**, Frankel, A., Mani, A., & Coletti, F. (2017) "Coherent clusters of inertial particles in homogeneous turbulence." *Journal of Fluid Mechanics*, 833, 364-398.

## INVITED TALKS

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Mechanical Engineering Graduate Seminar, University of Iowa (Feb 2023)  
Workshop on Microplastic Transport in the Ocean, Banff International Research Station (Feb 2022)  
Center for Coastal and Ocean Mapping / Ocean Engineering Seminar, University of New Hampshire (Feb 2022)  
Hydro-Geo Seminar, University of Minnesota / University of Illinois Urbana-Champaign (Feb 2022)  
Environmental Fluid Mechanics Seminar, University of Washington (Oct 2021)

## TEACHING & SERVICE

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| <b>Guest Lecturer</b> , University of Washington<br>ME 543: Fluid Turbulence  | May 2022            |
| <b>Laboratory Instructor/Teaching Assistant</b> , University of Minnesota<br>AEM 2012: Dynamics<br>AEM 4601: Instrumentation Laboratory<br>AEM 4602: Aeromechanics Laboratory   | Jan 2014 – May 2017 |
| <b>Peer Review</b><br><b>Journal referee:</b> <i>Journal of Fluid Mechanics, Experiments in Fluids, International Communications on Heat and Mass Transfer, European Journal of Mechanics / B Fluids, Physical Review Fluids, Water Research, Microplastics &amp; Nanoplastics</i><br><b>Proposal reviewer:</b> NSF | Mar 2019 – present  |

## MENTORSHIP, OUTREACH, & DEJI

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| <b>Research Mentor</b> , University of Washington<br>Mentees:<br>Anusha Aggarwal, undergraduate research assistant<br>Alexander Erling, undergraduate research assistant<br>Cali McFarland, undergraduate research assistant                    | Sep 2021 – Jan 2023<br>Sep – Dec 2021<br>Jun – Aug 2021 |
| <b>Leadership Academy and Network for Diversity in the Geosciences Academy: Postdoctoral Research Fellows Program</b> , American Geophysical Union<br>Learning to implement evidence-based DEI practices to create equity and inclusion in STEM | Jan 2022 – Jan 2023                                     |
| <b>Postdoc Union Steward</b> , University of Washington<br>Organizing for equitable and safe working conditions and fostering community among postdocs  | May 2022 – Jul 2023                                     |
| <b>Climate Justice Working Group</b> , University of Washington<br>Advocating for climate/social justice initiatives related to housing, transportation, and energy   | Jun 2021 – Jul 2023                                     |
| <b>Volunteer Income Tax Preparer</b> , United Way of King County, WA<br>Preparing income tax returns at no cost for low-income taxpayers  | Jan – Apr 2023 & 2024                                   |
| <b>Seattle Astronomical Society</b> , Seattle, WA<br>Outreach volunteer for Girl Scout astronomy programs and public stargazing events  | Feb 2022 – Jan 2023                                     |
| <b>A Friend in STEM</b> , University of Minnesota<br>Mentor to a woman undergraduate student in Aerospace Engineering   | Mar – Jun 2021  |
| <b>Women of Aeronautics and Astronautics</b> , University of Minnesota<br>Mentor to women undergraduate students in Aerospace Engineering   | Sep 2017 – Jun 2021                                     |

## AWARDS

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| NSF Ocean Sciences Postdoctoral Research Fellowship | Aug 2021 – Aug 2023 |
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## LUCI BAKER, PhD

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| National Defense Science and Engineering Graduate Fellowship | Sep 2017 – Jun 2021 |
| Edward Silberman Fellowship                                  | Jan 2019 – May 2020 |
| John A. & Jane Dunning Copper Fellowship                     | May 2017            |
| Albert George Oswald Prize for Outstanding Research          | Sep 2015 – May 2016 |

### CONFERENCE PRESENTATIONS

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- DiBenedetto, M., **Baker, L.**, & Chávez-Dorado, J. E. (2024) "Vertical dispersion of buoyant particles in a free surface flow." APS Division of Fluid Dynamics, Salt Lake City, UT.
- DiBenedetto, M., Chávez-Dorado, J. E., & **Baker, L.** (2024) "Dynamics of buoyant, non-spherical particles in a wind-driven surface boundary layer." Ocean Sciences Meeting, New Orleans, LA.
- Baker, L.**, Aggarwal, A., Chávez-Dorado, J. E., Garrey, I., & DiBenedetto, M. (2023) "Non-spherical particle orientation dynamics under a wind-driven free surface boundary layer." APS Division of Fluid Dynamics, Washington D.C.
- Baker, L.**, Aggarwal, A., Chávez-Dorado, J. E., Garrey, I., & DiBenedetto, M. (2023) "Buoyant, Non-Spherical Particles in Wind-Driven Waves." Waves in Sea Environment Meeting, Princeton, NJ.
- Baker, L.**, Aggarwal, A., Chávez-Dorado, J. E., Garrey, I., & DiBenedetto, M. (2022) "Buoyant, Non-Spherical Plastic Particles in Turbulent Wind-Driven Waves." AGU Fall Meeting, Chicago, IL.
- Baker, L.**, Aggarwal, A., Chávez-Dorado, J. E., Garrey, I., & DiBenedetto, M. (2022) "Buoyant, non-spherical particles in turbulent wind-driven waves." APS Division of Fluid Dynamics, Indianapolis, IN.
- Baker, L.**, Aggarwal, A., Chávez-Dorado, J. E., Garrey, I., & DiBenedetto, M. (2022) "Buoyant, non-spherical particles in turbulent wind-driven waves." Atmospheres, Oceans, Earths—Unifying perspectives on geophysical and environmental multiphase flows, KITP, Santa Barbara, CA.
- Axworthy, J., Wang, S., DiBenedetto, M., **Baker, L.**, & Padilla-Gamiño, J. (2022) "Microplastics ingestion and adhesion by reef-building corals under different flow rates." International Coral Reef Society, Bremen, Germany.
- Baker, L.** & DiBenedetto, M. (2022) "Vertical transport and orientation of buoyant, non-spherical particles in the wind-mixed ocean surface boundary layer." Ocean Sciences Meeting, virtual.
- Baker, L.** & Coletti, F. (2021) "Orientation and tumbling of inertial rod and disk particles in a turbulent boundary layer." APS Division of Fluid Dynamics, Phoenix, AZ.
- Baker, L.** & Coletti, F. (2020) "Effects of shape on microplastic particle–fluid–wall interaction and transport in a turbulent boundary layer." AGU Fall Meeting, virtual.
- Baker, L.** & Coletti, F. (2020) "Particle-fluid-wall interaction of anisotropic inertial particles in a turbulent boundary layer." APS Division of Fluid Dynamics, virtual.
- Sanness Salmon, H., **Baker, L.**, Kozarek, J., & Coletti, F. (2020) "Effect of size and shape on the transport of particles over the free surface of a natural stream." APS Division of Fluid Dynamics, virtual.
- Baker, L.** & Coletti, F. (2019) "Experimental Investigation of the Dynamics of Resuspending Spherical Sediment Particles in a Turbulent Boundary Layer." AGU Fall Meeting, San Francisco, CA.
- Coletti, F. & **Baker, L.** (2019) "Simultaneous tracking of suspended particles and time-resolved PIV in a turbulent boundary layer." APS Division of Fluid Dynamics, Seattle, WA.
- Petersen, A., **Baker, L.**, & Coletti, F. (2017) "Laboratory Study of Air Turbulence-Particle Coupling." AGU Fall Meeting, New Orleans, LA.
- Baker, L.** & Coletti, F. (2017) "Experimental study of dense suspension of large particles in a turbulent boundary layer." APS Division of Fluid Dynamics, Denver, CO.

## LUCI BAKER, PhD

- Petersen, A., **Baker, L.**, & Coletti, F. (2017) "Particle Plumes Falling Through Quiescent and Turbulent Environments." APS Division of Fluid Dynamics, Denver, CO.
- Petersen A., Carter D., **Baker L.**, & Coletti F. (2017) "Experimental Study of Particle-turbulence Interaction in Homogeneous Turbulence." 10th International Symposium on Turbulence and Shear Flow Phenomena, Chicago, IL, USA.
- Coletti F., Toloui M., Fong, K.O., Nemes A., & **Baker L.** (2016) "Volumetric distribution and velocity of inertial particles in a turbulent channel flow." 18th International Symposium on Application of Laser and Imaging Techniques to Fluid Mechanics, Lisbon, Portugal.
- Coletti F., Petersen A., Carter D., & **Baker L.** (2016) "Measurements of particle settling velocity in homogeneous turbulence with no mean flow." International Conference on Multiphase Flows, Florence, Italy.
- Baker L.**, Frankel A., Mani A., & Coletti F. (2016) "Coherent clusters of inertial particles in homogeneous turbulence." APS Division of Fluid Dynamics, Portland, OR.
- Petersen A., Carter D., **Baker L.**, & Coletti F. (2015) "Settling of inertial particles through quiescent, weakly turbulent and strongly turbulent air." APS Division of Fluid Dynamics, Boston, MA.