

LUCIA BAKER

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SUMMARY

Postdoctoral fellow researching the transport of particles in environmental fluid flows.

EDUCATION

University of Minnesota, Minneapolis, MN

Ph.D., Aerospace Engineering and Mechanics 4.00	Jun 2021
M.S., Aerospace Engineering and Mechanics 4.00	Dec 2018
B.Eng., Aerospace Engineering and Mechanics 3.75	May 2016

EXPERIENCE

NSF Postdoctoral Fellow, University of Washington

Jun 2021 – present

Mentor: Prof. Michelle DiBenedetto

Experimentally studying the behavior of microplastic particles in wind-driven ocean surface turbulence

Graduate Research Assistant, University of Minnesota

May 2016 – Jun 2021

Focus: Experimental Fluid Mechanics

Advisor: Prof. Filippo Coletti

Thesis: *Experimental investigation of inertial sphere, rod, and disk particles in a turbulent boundary layer*

Explored the interactions between solid particles and turbulence in boundary layer flows

Summer Institute Participant, St. Anthony Falls Laboratory

Aug 2017

Summer Institute on Earth-Surface Dynamics: explored Earth-surface systems through theory, experiments, numerical modeling, and fieldwork

Undergraduate Research Assistant, University of Minnesota

Jan 2014 – May 2016

Investigated the clustering behavior of particles in turbulence through numerical simulations

Intern, Virgin Galactic

Jun – Aug 2015

Designed engine gimbals and heat exchangers for liquid propulsion rocket engines

Intern, NASA Jet Propulsion Laboratory

Jun – Aug 2013, 2014

Mentor: Dr. Anita Sengupta

Designed and tested magnetic shielding for the ISS Cold Atom Lab research facility

AWARDS

NSF Ocean Sciences Postdoctoral Research Fellowship

2021 – 2023

National Defense Science and Engineering Graduate Fellowship

2017 – 2021

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Edward Silberman Fellowship	2019 – 2020
John A. & Jane Dunning Copper Fellowship	2017
Albert George Oswald Prize for Outstanding Research	2015
Undergraduate Research Opportunities Grant	2015

PUBLICATIONS

Baker, L. & Coletti, F. “Experimental investigation of inertial rod and disk particles in a turbulent boundary layer.” Submitted to *Journal of Fluid Mechanics*.

Sanness Salmon, H., **Baker, L.**, Kozarek, J., & Coletti, F. “Effect of shape and size on the transport of floating particles on the free surface of a turbulent natural stream.” Submitted to *Flow*.

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.

Baker, L. & Coletti, F. (2021) “Particle–fluid–wall interaction of inertial spherical particles in a turbulent boundary layer.” *Journal of Fluid Mechanics*, 908, A39.

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.

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.

Baker, L., Frankel, A., Mani, A., & Coletti, F. (2017) “Coherent clusters of inertial particles in homogeneous turbulence.” *Journal of Fluid Mechanics*, 833, 364-398.

PRESENTATIONS

“Sphere, rod, and disk particles in a turbulent boundary layer.” (Oct 2021) University of Washington Environmental Fluid Mechanics seminar, Seattle, WA.

CONFERENCES

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.

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- 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.
- 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.

TEACHING & SERVICE

Reviewer <i>Journal of Fluid Mechanics</i> <i>Experiments in Fluids</i> <i>International Communications on Heat and Mass Transfer</i>	Mar 2019 – present
Research Mentor , University of Washington Supervised three undergraduate research assistants in Michelle DiBenedetto’s lab	Jun 2021 – present
WoAA Mentor , University of Minnesota Mentored undergraduate students in Women of Aeronautics and Astronautics	Sep 2017 – Jun 2021
Laboratory Instructor , University of Minnesota AEM 4601: Instrumentation Laboratory AEM 4602: Aeromechanics Laboratory	Sep 2016 – May 2017
Teaching Assistant , University of Minnesota AEM 2012: Dynamics	Jan – May 2014