

Samuel Kachuck

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I am in the final year of a Ph.D. in geophysics at Cornell University. My interests include fluid dynamics and statistical physics in general, and glacial isostatic adjustment - how the earth responds viscoelastically to the mass redistributions of the last ice age, when over 4 million Gigatons of water moved from the oceans to the continents - in particular. My thesis research comprises the development and benchmarking of a tool for computing this response efficiently. It is the beginning of a comprehensive characterization of the errors in models of glacial isostasy and how these errors propagate to predictions of social importance, like land-water storage and sea-level changes.

Education

Cornell University Ph.D. in Geophysics	Sep 2011 – Jun 2018 (expected)
Cornell University M.S. in Physics	Sep 2011 – Aug 2014
Cambridge University, St. Edmund's College M.A.St., in Applied Mathematics and Theoretical Physics	Oct 2010 – May 2011
Wesleyan University B.A. in Physics and Mathematical Economics	Sep 2006 – June 2010

Research Experience

Graduate Research Fellow Cornell University <i>Advisor:</i> Prof. Lawrence M. Cathles, III <i>Area:</i> Glacial Isostatic Modeling and Analysis ◦ Computational study of the physics and errors in models of glacial isostatic adjustment.	May 2012 – Present
Graduate Research Assistant Cornell University <i>Advisor:</i> Prof. Itai Cohen <i>Area:</i> Insect Flight Stability and Control ◦ Experimental study of the fluid dynamics and control mechanisms employed by <i>Drosophila</i> to stabilize their flight against perturbations.	Sep 2011 – May 2012
Research Assistant GK Batchelor Fluids Laboratory <i>Advisor:</i> Dr. Stuart B. Dalziel <i>Area:</i> Buoyancy in Permeable Media ◦ Experimental study of the various fluid dynamical regimes present when a buoyant plume flows past a permeable medium.	Oct 2010 – May 2011

Undergraduate Research Assistant

Aug 2008 – June 2010

Wesleyan University

Advisor: Prof. Greg A. Voth

Area: Granular Gas Dynamics

- Experimental and computational study of the dynamics of 2D granular gases in gravity, both in steady state (when energy is continuously added) and in decay (when energy it is not).

Publications

- [1] **Kachuck, Samuel B.**, "Nondimensionalized relaxation method for efficient computation of time-domain viscoelastic love numbers," in prep.
- [2] **Kachuck, Samuel B.** and L. M. Cathles, "Constraining the geometry and volume of the barents sea ice sheet," *Journal of Quaternary Science*, in review.
- [3] **Kachuck, Samuel B.** and G. A. Voth, "Simulations of granular gravitational collapse," *Physical Review E*, vol. 88, no. 6, p. 062202, Dec. 2013, ISSN: 1539-3755. DOI: 10.1103/PhysRevE.88.062202. [Online]. Available: <http://link.aps.org/doi/10.1103/PhysRevE.88.062202>.
- [4] J. A. Perez, **Kachuck, Samuel B.**, and G. A. Voth, "Visualization of collisional substructure in granular shock waves," *Physical Review E*, vol. 78, no. 4, pp. 1–6, Oct. 2008, ISSN: 1539-3755. DOI: 10.1103/PhysRevE.78.041309. [Online]. Available: <http://link.aps.org/doi/10.1103/PhysRevE.78.041309>.

Teaching Experience

- Private Tutor (PHYS 2207, 2208, 1112, 2213, 2216; MAE 3780; CEE 3310), S2012 – present
- Analytical Mechanics (CU PHYS 3318), GTA S2017
- Physics II: Electromagnetism (CU PHYS 2213), GTA F2011, S2012, Su2012
- Physics I: Mechanics and Heat (CU PHYS 1112), GTA F2012
- Quantum Mechanics I (W PHYS 214), UTA S2010
- Mathematical Economics (W ECON 380), UTA F2009
- General Physics II (W PHYS 116), UTA S2009
- General Physics I (W PHYS 113), UTA F2008

Skills

Languages: Python, C/C++, FORTRAN, APL, \LaTeX , Matlab

Honors & Awards

- Douglas A Fitchen Scholar 2017
- AGU Outstanding Student Paper Award 2016
- NSF GRFP Honorable Mention 2012
- Phi Beta Kappa 2010
- Graham Prize 2010
- Karl van Dyke Prize 2010
- Plukas Teaching Apprentice Award 2010
- White Prize 2010
- Dean's List, Wesleyan University 2006 – 2010
- Squire Fund Fellow 2007
- Chadbourne Prize 2007

All Publications

Google Scholar ID: [nuMklOMAAAAJ](https://scholar.google.com/citations?user=nuMklOMAAAAJ)

Journal Articles.....

- [J1] **Kachuck, Samuel B.**, "Nondimensionalized relaxation method for efficient computation of time-domain viscoelastic love numbers," in prep.
- [J2] **Kachuck, Samuel B.** and L. M. Cathles, "Constraining the geometry and volume of the barents sea ice sheet," *Journal of Quaternary Science*, in review.
- [J3] **Kachuck, Samuel B.** and G. A. Voth, "Simulations of granular gravitational collapse," *Physical Review E*, vol. 88, no. 6, p. 062 202, Dec. 2013, ISSN: 1539-3755. DOI: 10.1103/PhysRevE.88.062202. [Online]. Available: <http://link.aps.org/doi/10.1103/PhysRevE.88.062202>.
- [J4] J. A. Perez, **Kachuck, Samuel B.**, and G. A. Voth, "Visualization of collisional substructure in granular shock waves," *Physical Review E*, vol. 78, no. 4, pp. 1–6, Oct. 2008, ISSN: 1539-3755. DOI: 10.1103/PhysRevE.78.041309. [Online]. Available: <http://link.aps.org/doi/10.1103/PhysRevE.78.041309>.

Oral Presentations.....

- [O1] S. B. Kachuck and L. M. Cathles, "Nondimensionalized relaxation method for efficient computation of elastic love numbers," in *Workshop on Glacial Isostatic Adjustment and Elastic Deformation*, 2017.
- [O2] S. B. Kachuck, L. M. Cathles, A. Amantov, A. Hormes, and W. Fjeldskaar, "Emergence constraints on late weichselian barents sea ice sheet history," in *EGU*, 2014.
- [O3] S. B. Kachuck, "Velocity dependent energy loss in granular gravitational collapse," in *New York Condensed Matter Workshop*, 2011.

Posters.....

- [P1] S. B. Kachuck and L. M. Cathles, "Sloppy inversion and optimal experiment design for last glacial maximum barents sea ice sheet configuration," in *American Geosciences Union*, 2016.
- [P2] —, "Gla response suggests thick lithosphere under the appalachians," in *Institute for the Study of the Continents*, 2014.
- [P3] S. B. Kachuck, L. M. Cathles, A. Amantov, and W. Fjeldskaar, "North american peripheral bulge constraints on mantle rheology," in *European Geosciences Union*, 2014.
- [P4] L. M. Cathles, A. Amantov, S. B. Kachuck, and W. Fjeldskaar, "The seamod methodology of gla interpretation," in *European Geosciences Union*, 2014.
- [P5] S. B. Kachuck and L. M. Cathles, "Lithosphere, ice history, local emergence," in *European Geosciences Union*, 2013.
- [P6] S. B. Kachuck, "Granular gravitational collapse in realistically simulated granular gases," in *5th Annual Thesis Celebration*, 2010.