

CONTACT INFORMATION	Department of Neurology Albert Einstein College of Medicine Bronx, NY, 10461 phone: 801-230-3617 email: kellen.petersen@einsteinmed.edu website: https://kellenpetersen.github.io
EDUCATION	<p>New York University, New York, New York, 4.0 GPA Ph.D., Applied Mathematics, May 2020 <i>Dissertation Title:</i> Numerical Studies of Droplets on Superhydrophobic Surfaces <i>Advisor:</i> Robert V. Kohn, Courant Institute of Mathematical Sciences, New York University, New York, NY, USA</p> <p>New York University, New York, New York, 4.0 GPA M.S., Applied Mathematics, May 2009</p> <p>University of Utah, Salt Lake City, Utah, 3.952 GPA B.S., Mathematics (University & Departmental Honors), <i>cum laude</i> (Math GPA: 3.96), May 2007 <i>Honors Thesis:</i> Fluid Connectivity, Percolation Theory, and the Southern Alps of New Zealand <i>Advisor:</i> Kenneth M. Golden, Dept. of Mathematics, University of Utah, Salt Lake City, Utah B.S., Physics, <i>cum laude</i> (Physics GPA: 4.0), May 2007</p>
SKILLS	Computer: MATLAB (advanced), R, Python, Fortran, Maple, L ^A T _E X, and Microsoft Suite (Word, Excel, Powerpoint). Languages: English (native), Portuguese.
SCIENTIFIC RESEARCH INTERESTS	<p>Prediction models of Alzheimers disease (AD) progression; Diagnostic and predictive value of biomarkers in AD and their relationship with cognition; Effect of AD risk factors on brain structure and disease progression; Disentangling heterogeneity of AD; Development of practical decision support tools for use by clinicians as well as in clinical trial design.</p> <p>Machine Learning, Statistical Modeling, and Data Science related to the study of Alzheimer's Disease, Numerical Analysis and Scientific Computing, Phase Field Modeling, Fluid Dynamics, Energy Landscape Calculations, Superhydrophobic Surfaces, and Multiscale Modelling</p>
PUBLICATIONS	<p>Petersen KK, Ezzati A, Nallapu BT, Lipton RB, Sperling RA, Papp KV, Rentz DM, Grober E. Risk of Incident Cognitive Impairment Using Stages of Objective Memory Impairment (SOMI) and Neuroimaging. (in preparation)</p> <p>Petersen KK, Lipton RB, Grober E, et al. Development of Simple Risk Scores for Prediction of Brain β-Amyloid and Tau Status in Older Adults with Mild Cognitive Impairment. (submitted)</p> <p>Petersen KK, Lipton RB, Grober E, Nallapu BT, Ezzati A. MRI-guided Clustering of Patients with Mild Dementia Due to Alzheimer's Disease Using Self-Organizing Maps. (submitted)</p> <p>Nallapu BT, Petersen KK, Lipton RB, Ezzati A. Plasma Biomarkers as Predictors of Progression to Dementia in Individuals with Mild Cognitive Impairment. (in revision)</p> <p>Kloske CM, Barnum CJ, Batista AF, Bradshaw EM, Brickman AM, Bu G, Dennison J, Gearon MD, Goate AM, Haass C, Heneka MT, Hu WT, Huggins LKL, Jones NS, Koldamova R, Lemere CA, Liddel SA, Marcora E, Marsh SE, Nielsen HM, Petersen KK, Petersen M, Piña-Escudero SD, Qiu WQ, Quiroz YT, Reiman E, Sexton C, Tansey MG, Tcw J, Teunissen CE, Tijms BM, van der Kant R, Wallings R, Weninger SC, Wharton W, Wilcock DM, Wishard TJ, Worley SL, Zetterberg H, Carrillo MC. APOE and immunity: Research highlights. <i>Alzheimers Dement.</i> 2023 Mar 28. doi: 10.1002/alz.13020. Epub ahead of print. PMID: 36975090.</p>

Grober E, **Petersen KK**, Lipton RB, Hassenstab J, Morris JC, Gordon B, Ezzati A. Association of Stages of Objective Memory Impairment With Incident Symptomatic Cognitive Impairment in Cognitively Normal Individuals. *Neurology*. 2023 Apr 19;10.1212/WNL.0000000000207276. doi: 10.1212/WNL.0000000000207276. Epub ahead of print. PMID: 37076305.

Nallapu BT, **Petersen KK**, Lipton RB, Grober E, Sperling RA, Ezzati A. Association of Alcohol Consumption with Cognition in Older Population: The A4 Study. *J Alzheimers Dis*. 2023;93(4):1381-1393. doi: 10.3233/JAD-221079. PMID: 37182868.

Petersen KK, Ezzati A, Lipton RB, Gordon BA, Hassenstab J, Morris JC, Grober E. Associations of Stages of Objective Memory Impairment with Cerebrospinal Fluid and Neuroimaging Biomarkers of Alzheimer's Disease. *J Prev Alzheimers Dis*. 2023;10(1):112-119. doi: 10.14283/jpad.2022.98. PMID: 36641615; PMCID: PMC9841119.

Petersen KK, Lipton RB, Grober E, Davatzikos C, Sperling RA, Ezzati A. Predicting amyloid positivity in cognitively unimpaired older adults: A machine learning approach using A4 data. *Neurology*. 2022 Jun 14;98(24):e2425-e2435. doi: 10.1212/WNL.0000000000200553. Epub 2022 Apr 25. PMID: 35470142; PMCID: PMC9231843.

Rubin-Norowitz M, Lipton RB, **Petersen K**, Ezzati A; Alzheimer's Disease Neuroimaging Initiative. Association of Depressive Symptoms and Cognition in Older Adults Without Dementia Across Different Biomarker Profiles. *J Alzheimers Dis*. 2022;88(4):1385-1395. doi: 10.3233/JAD-215665. PMID: 35786653; PMCID: PMC9723980.

Petersen KK, Grober E, Lipton RB, Sperling RA, Buckley RF, Aisen PS, Ezzati A. Impact of sex and APOE ϵ 4 on the association of cognition and hippocampal volume in clinically normal, amyloid positive adults. *Alzheimers Dement (Amst)*. 2022 Feb 9;14(1):e12271. doi: 10.1002/dad2.12271. PMID: 35155730; PMCID: PMC8828988.

Vry J, Powell R, Golden K, **Petersen K**. The role of exhumation in metamorphic dehydration and fluid production. *Nature Geosci* 3, 31-35 (2010). <https://doi.org/10.1038/ngeo699>

Petersen KK, "Bunch Compression in the International Linear Collider," published online (2005): <http://www.classe.cornell.edu/Outreach/REU/2005REU/petersen.pdf>

Petersen KK, Wirth B. Superhydrophobic shape optimization via energy barrier manipulation. (in preparation)

Petersen KK. Spontaneous shrinkage and mass conservation of droplets on a surfaces in a phase field model. (in preparation)

Petersen KK. Understanding the energy landscape of drops on chemically patterned surfaces: A phase field approach. (in preparation)

Petersen KK. Positioning and alignment of Vanadium Oxide nanoribbons by AC dielectrophoresis," (unpublished)

WORK EXPERIENCE

Postdoctoral Research Fellow, 2020-present

My research is related to applying mathematical tools and machine learning techniques to the study of Alzheimer's disease.

Advisor: Richard B. Lipton, Department of Neurology, Albert Einstein College of Medicine, Bronx, NY, USA

Advisor: Ali Ezzati, Department of Neurology, Albert Einstein College of Medicine, Bronx, NY, USA

Department of Neurology, Albert Einstein College of Medicine, Bronx , New York

Adjunct Professor of Mathematics and Physics, 2014-2020

I have taught several different courses in mathematics to undergraduate students. I also have taught the first year Physics course which includes lecturing, running recitation sessions, and leading the laboratory course.

Department of Natural Sciences, Marymount Manhattan College, New York, New York

Graduate Research Assistant, 2009-2020

I have worked under the directions of Dr. Robert V. Kohn, Dr. Benedikt Wirth, and Dr. Weiqing Ren working on theoretical models and numerical implementation of droplets on surfaces. This work makes up, in part, the research included in my dissertation.

Department of Mathematics, Courant Institute of Mathematical Sciences,
New York University, New York, New York

Invited Interview Panelist, Math for America, 2014, 2015, 2016, 2017, 2018, 2019

I have worked as an interviewer for the Math for America Master Teaching Fellows public school mathematics teacher fellowships. Interviews typically run Saturdays and Sundays several times each year.

Research Assistant, Summer 2009

I studied the relationship between virtual mass and self-propulsion of objects in a fluid. In particular, I studied the theory of inertial swimming, and built various small models, some of which show this phenomenon. Subsequent numerical experiments were conducted to compare data obtained from our physical experiments in the lab.

Advisor: Steve Childress

Applied Mathematics Laboratory, Department of Mathematics, Courant Institute of
Mathematical Sciences, New York University, New York, New York

Assistant, Summer 2007

I assisted in editing and preparing for English publication the Russian text “Towards a Unified Geometrical Theory of Control”.

Advisor: Anatoliy Butkovskiy (Russian Academy of Sciences, Institute of Control Sciences)
Department of Mathematics, Tampere University of Technology, Tampere, Finland

Research Assistant, 2006-2007

Worked in collaboration with Dr. Julie Vry from Victoria University of Wellington, New Zealand on applying percolation theory from statistical physics to studying mountain formation and water generation in the South Island of New Zealand by showing the connectivity of fluid during the formation period produces anomalies in the fluid conductivity.

Advisor: Kenneth M. Golden

Department of Mathematics, University of Utah, Salt Lake City, Utah

REU Research Assistant, Spring 2006

Created electric simulations for various electrode geometries, performed numerical calculations to determine the AC dielectrophoresis dependence on various parameters, aligned and positioned vanadium oxide nanoribbons onto electrodes and optimized this process.

Advisor: Irving Herman

Department of Applied Physics and Applied Mathematics, Columbia University, New York, New York

REU Research Assistant, Summer 2005

Simulated the bunch compression process for potential designs of the Bunch Compressor for the International Linear Collider in an effort to optimize it and understand its limitations.

Advisor: Gerald Dugan

Department of Physics, Cornell University, Ithaca, New York

Research Assistant, 2004-2005

Studied conduction in composite materials that have interesting microgeometries, in particular, solved the problem of coated cylinder assemblages with a core of one material and a shell of another which has applications to Hall coefficients of composite materials.

Advisor: Graeme W. Milton

Department of Mathematics, University of Utah, Salt Lake City, Utah

Laboratory Assistant, 2004-2005

Developed methods to reliably produce platinum wire tips of sub-10 nanometer radii by a chemical etching process for use in Scanning Electron Microscopes.

Advisor: Clayton Williams

Department of Physics, University of Utah, Salt Lake City, Utah

TALKS, POSTERS,
& PRESENTATIONS

Contributed Talk, "Risk of Incident Cognitive Impairment Using Stages of Objective Memory Impairment (SOMI) and Neuroimaging," 16th Clinical Trials in Alzheimer's Disease (CtaD23), Boston, Massachusetts, USA, October 24-27, 2023

Poster Presentation, "Predicting of β -amyloid Positivity Using Integer-based Risk Scores with Blood-based Biomarkers," Alzheimer's Association International Conference 2023, Amsterdam, Netherlands, July 16-20, 2023

Poster Presentation, "Developing Integer-based Risk Scores for Predicting the Risk of Incident Cognitive Impairment in Cognitively Normal Older Adults," Alzheimer's Association International Conference 2023, Amsterdam, Netherlands, July 16-20, 2023

Poster Presentation, "Predictive Value of CSF Inflammatory Biomarkers in Alzheimer's disease," Alzheimer's Association International Conference 2023, Amsterdam, Netherlands, July 16-20, 2023

Poster Presentation (co-author), "Impact of sex and ApoE4 on the longitudinal association of plasma ptau-181 and NFL with cognitive decline in non-demented older adults," Alzheimer's Association International Conference 2023, Amsterdam, Netherlands, July 16-20, 2023

Contributed Talk (co-author), "Predicting cognitive decline in short-term as a viable method to improve recruitment in clinical trials of Alzheimer's Disease," Alzheimer's Association International Conference 2023, Amsterdam, Netherlands, July 16-20, 2023

Poster Presentation, "Assessing Risk of Incident Cognitive Impairment Using Stages of Objective Memory Impairment (SOMI) and CSF biomarkers," Albert Einstein College of Medicine Science Strong, Bronx, New York, June 29, 2023

Invited Talk, "Unsupervised Clustering Using Self-Organizing Maps of MRI Data," 2023 Methods for Longitudinal Studies in Dementia (MELODEM) Annual Meeting, Wentworth-by-the-Sea, New Hampshire, USA, May 22-24, 2023

Talk (co-author), "Using Predictive Models to Reduce Heterogeneity in Alzheimer's Disease Clinical Trials," American Academy of Neurology Conference, Boston, Massachusetts, USA, April 22-27, 2023

Invited Talk, "Predicting Amyloid Positivity in Cognitively Unimpaired Older Adults," Centre for Quantitative Medicine Seminar Series: Statistics Methods, Duke-National University of Singapore Medical School, Virtual/Zoom, March 30, 2023

Contributed Talk, "MRI-guided Clustering of Alzheimer's Disease patients: A post-hoc analysis of Phase 3 Trial of Solanezumab for Mild Dementia Due to Alzheimer's Disease," Alzheimer's Association International Conference, San Diego, California, USA, July 31 - August 4, 2022

Poster Presentation, "Stages of Objective Memory Impairment (SOMI) predicts incident cognitive impairment: Results from the Knight ADRC," Alzheimer's Association International Conference, San Diego, California, USA, July 31 - August 4, 2022

Contributed Talk (co-author), "Association of Cognition with Alcohol Consumption in Cognitively Unimpaired Older Adults: Results from the A4 study," Alzheimer's Association International Conference, San Diego, California, USA, July 31 - August 4, 2022

Poster Presentation (presenter), "Assessing Risk of Incident Cognitive Impairment Using Stages of Objective Memory Impairment (SOMI) and Cerebrospinal Fluid," Alzheimer's Association International Conference, San Diego, California, USA, July 31 - August 4, 2022

Poster Presentation (co-author), "Association of Cognition with Alcohol Consumption in Cognitively Unimpaired Older Adults: Results from the A4 study," Alzheimer's Association International Conference, San Diego, California, USA, July 31 - August 4, 2022

Poster Presentation (co-author), "Comparison of Plasma-based Biomarkers and Cognitive Assessments in predicting progression of MCI to Dementia," Alzheimer's Association International Conference, San Diego, California, USA, July 31 - August 4, 2022

Poster Presentation (co-author), "Targeting the Correct Population for Trials: A Post-hoc Analysis of Trial of Solanezumab for Mild Dementia Due to Alzheimer's disease," Alzheimer's Association International Conference, San Diego, California, USA, July 31 - August 4, 2022

Poster Presentation, "Simple risk scores for the prediction of brain β -amyloid and tau status in older adults with mild cognitive impairment," American Academy of Neurology, San Diego, California, USA, July 31 - August 4, 2022

Poster Presentation, "Assessing Risk of Incident Cognitive Impairment Using Stages of Objective Memory Impairment (SOMI) and CSF biomarkers," Albert Einstein College of Medicine Science Strong, Bronx, New York, June 29, 2022

Poster Presentation, "The Prediction of Tau Positivity Using Machine Learning-Based Risk Scores." Tau 2022 Conference. Virtual. February 22 - 23, 2022

Poster Presentation, "Predicting Amyloid Positivity Using Machine Learning-Based Risk Scores," Clinical Trials in Alzheimer's Disease, Boston, Massachusetts, USA, November 9-12, 2021

Contributed Talk, "Effect of APOE4 Status on Associations of Stages of Objective Memory Impairment (SOMI) with CSF and Hippocampal vMRI Biomarkers," APOE4 & Immunity Conference, Virtual Presentation, October 18, 2021

Contributed Talk, "Cognition and Hippocampal Volume in Amyloid Positive Clinically Normal Adults: Results from the A4 study," Alzheimer's Association International Conference, Virtual Presentation, July 28, 2021

Poster Presentation, "Machine-Learning Based Risk Scores for Predicting Amyloid Positivity," Albert Einstein College of Medicine Science Strong, Bronx, New York, June 28, 2021

Poster Presentation (co-author), "The Relationship Between Depressive Symptoms and Cognitive Function in Non-Demented Older Adults Across Different Alzheimer's Disease Biomarker Profiles," American Academy of Neurology Conference, Virtual Conference, April 17-22, 2021

Poster Presentation (co-author), "Predictors of cerebral tauopathy in individuals with normal cognition and amnesic mild cognitive impairment (aMCI): results from the Alzheimer's Disease Neuroimaging Initiative (ADNI)," American Academy of Neurology Conference, Virtual Conference, April 17-22, 2021

Invited Talk, Complex Fluids Laboratory Group Meeting, University of British Columbia, Vancouver, British Columbia, Canada, September 18, 2013

Advanced Psychometric Methods for Cognitive Aging Research (Ψ MCA) Workshop

Topic: Bayesian Approaches to Modeling Cognition

Location: Granlibakken Lodge, Lake Tahoe, CA, USA

Dates: August 6-11, 2023

Alzheimer's Association International Conference 2023

Location: Amsterdam, Netherlands

Dates: July 16 - 20, 2023

2023 Methods for Longitudinal Studies in Dementia (MELODEM) Annual Meeting

Location: Wentworth-by-the-Sea, New Hampshire, USA

Dates: May 22-24, 2023

Alzheimer's Association International Conference 2022

Location: San Diego, CA, USA

Dates: July 31 - August 4, 2022

2022 Fall ADRC Meeting

Location: Virtual Meeting

Dates: October 20 - 21, 2022

Southeastern Neurodegenerative Disease Conference (SENDCon)

Location: Virtual Meeting

Dates: September 28 - 30, 2022 (postponed due to hurricane)

Tau 2022 Conference

Location: Virtual Meeting

Dates: February 22 - 23, 2022

Aging and Memory: Alzheimer's and Beyond

Location: New York Medical College Virtual Conference

Dates: November 18, 2021

Clinical Trials in Alzheimer's Disease Conference

Note: Poster Presentation

Location: Boston, Massachusetts, USA

Dates: November 9-12, 2021

4th Annual NIA-AA Symposium: Enabling Precision Medicine for Alzheimer's Disease

Location: Virtual Conference

Dates: October 27-28, 2021

SuStaIn Workshop

Location: Virtual Workshop

Dates: October 26, 2021

APOE4 & Immunity Conference

Note: Contributed Talk

Location: Virtual Conference

Dates: October 18, 2021

Neuroscience Next Conference

Location: Virtual Conference

Dates: October 12-13, 2021

Alzheimer's Association International Conference 2021
Note: Contributed Talk
Location: Denver, Colorado, USA (attended virtually)
Dates: July 26-30, 2021

Albert Einstein College of Medicine Science Strong
Note: Poster Presented
Location: Bronx, New York, USA
Dates: June 22, 2021

73rd American Academy of Neurology Conference
Note: Two Posters Presented (co-author)
Location: Virtual Conference
Dates: April 17-22, 2021

Tenth Annual Conference on Frontiers in Applied and Computational Mathematics 2013
Note: Contributed Talk
Location: Newark, New Jersey, USA
Dates: May 31 - June 2, 2013

American Physical Society Annual Meeting: Division of Fluid Dynamics
Note: Contributed Talk
Location: San Diego, California, USA
Dates: November 18-20, 2012

IMA Special Workshop: Mathematics and the Materials Genome Initiative
Note: Invited Visit and Poster
Location: Minneapolis, Minnesota, USA
Dates: September 12-15, 2012

Bridging Scales in Computational Polymer Chemistry
Note: Invited Junior Talk
Location: Providence, Rhode Island, USA
Dates: August 6-10, 2012

2012 Annual SIAM Meeting
Note: Poster Presentation
Location: Minneapolis, Minnesota, USA
Dates: July 9-13, 2012

18th Symposium on Thermophysical Properties
Note: Poster Presentation
Location: Boulder, Colorado, USA
Dates: June 24-29, 2012

86th Colloids and Surfaces Symposium of the American Chemical Society (ACS)
Note: Presentation
Location: Baltimore, Maryland, USA
Dates: June 10-13, 2012

Ninth Annual Conference on Frontiers in Applied and Computational Mathematics 2012
Note: Contributed Talk
Location: Newark, New Jersey, USA
Dates: May 18-20, 2012

Midwest Numerical Analysis Days 2012

Note: Contributed Talk

Location: South Bend, Indiana, USA

Dates: May 12-13, 2012

Mid-Atlantic Regional Student Conference

Note: Presentation and chaired a conference session

Location: Shippensburg, Pennsylvania, USA

Dates: April 6-7, 2012

NYU-Tulane 2012 Focused Research Group (FRG) Workshop

Location: New York, New York, USA

Dates: February 10-11, 2012

American Physical Society Annual Meeting: Division of Fluid Dynamics

Location: Baltimore, Maryland, USA

Dates: November 20-22, 2011

von Neumann Symposium: Multimodel and Multialgorithm Coupling for Multiscale Problems

Location: Snowbird, Utah, USA

Dates: July 4-7, 2011

24th Biennial Conference on Numerical Analysis

Location: University of Strathclyde, Scotland, United Kingdom

Dates: June 28 - July 1, 2011

Warwick/ Numerical Algorithms and Intelligent Software DUNE Summer School 2011

Location: University of Warwick, England, United Kingdom

Dates: June 20-24, 2011

HONORS AND AWARDS

While at **New York University**, New York, New York

- Travel Support to 2023 Advanced Psychometric Methods for Cognitive Aging Research (Ψ MCA) Workshop
- Travel Support to 2023 Methods for Longitudinal Studies in Dementia (MELODEM) Annual Meeting
- Leonard and Sylvia Marx Award for Research in Cognitive Aging and Dementia

While at **New York University**, New York, New York

- Travel Support to attend Materials Genome Initiative Workshop
- Travel Support to attend Institute for Computational and Experimental Research in Mathematics: Bridging Scales in Computational Polymer Chemistry
- Courant Institute Summer Support Award
- Honorarium to visit the National Institute of Standards and Technology (NIST) and deliver talk at the Applied and Computational Mathematics Division (ACMD)
- Travel Support to Ninth Annual Conference on Frontiers in Applied and Computational Mathematics
- Travel Support to Midwest Numerical Analysis Days
- Travel Support to the Mid-Atlantic Regional Student Conference
- American Mathematical Society Travel Support
- 24th Biennial Conference on Numerical Analysis Conference Support
- Summer Support Awarded from the Courant Institute
- MacCracken Ph.D. Fellowship, Department of Mathematics, NYU
- RTG Ph.D. Fellowship: Numerical Methods for Scientific Computing, NSF
- Summer Funding in the Applied Mathematics Laboratory (AML) at the Courant Institute

While at **University of Utah**, Salt Lake City, Utah

- College of Science Research Scholar Award
- College of Science Dean's Scholarship
- Honors-at-Entrance Scholarship Full Tuition Scholarship
- Barry S. Goldwater Honorable Mention
- Kennecott Scholarship
- Lloyd E. Malm Chemistry Award (Chemistry Department)
- Dean's List of Distinguished Students (every semester)
- Farmer's Insurance Scholarship
- James B. and Betty Debenham Scholarship
- Undergraduate Representative for the Mathematics Department at the NWCCU Accreditation Luncheon
- Undergraduate Representative for the Physics Department at the NWCCU Accreditation Luncheon
- Delta Epsilon Chi, International Leadership Organization
- Pi Mu Epsilon, National Mathematics Honor Society
- Sigma Pi Sigma, National Physics Honor Society
- Founded student SIAM chapter at the University of Utah

TEACHING

I have taught and assistant taught courses from undergraduate to graduate level (from 2009 - present):

- Courses Taught as Professor:
 - Physics 1 and 2 (2 classes, Marymount Manhattan College)
 - I present lecture, run the recitation meeting, and am in charge of the laboratory sessions
 - Quantitative Reasoning (5 classes, Marymount Manhattan College)
 - Intermediate Algebra (3 classes, Marymount Manhattan College)
 - Calculus III (1 class, New York University)
- Courses Assistant Taught as Recitation Leader:
 - Undergraduate-level Introduction to Numerical Analysis (2 classes, New York University)
 - Calculus I (1 class, New York University)
 - Introduction to Mathematical Analysis I - Masters Level Course (1 class, New York University)
 - Scientific Computing - Masters Level Course (Grader, 1 class, New York University)

REFERENCES

Available upon request.