

Bldg 240 9700 S Cass Ave.
Lemont, IL 60439, USA.
☎ (630) 252-7232
✉ haley@anl.gov
Canadian citizen

Charlotte L. Haley

Resume

Degrees attained

- 2009-2014 **PhD, Statistics, Queen's University (Canada).**
Thesis: Nonparametric and Parametric Methods for Solar Oscillation Spectra
Advisor: David J. Thomson
- 2008-2009 **MSc, Statistics, Queen's University (Canada).**
Thesis: Statistical Analysis of Atrial Fibrillation Electrograms
Advisors: David J. Thomson, Selim G. Akl, and Damian P. Redfearn
- 2004-2008 **BSc Hon Mathematics, Dalhousie University (Canada), Dean's List.**
Thesis: On Wilson's Theorem
Advisor: Karl Dilcher

Positions held

- 2017-present **Assistant Statistician, Mathematics and Computer Science Division, Argonne National Laboratory, Lemont, IL, USA.**
- 2014-2017 **Postdoctoral Appointee, Mathematics and Computer Science Division, Argonne National Laboratory, Lemont, IL, USA, Supervisor: Mihai Anitescu.**

Honors and Awards

- 2013 **Queen Elizabeth II Graduate Scholarship in Science and Technology,**
Awarded to graduate students enrolled in science and technology disciplines.
- 2010-2011 **Ontario Graduate Scholarship,**
Merit-based scholarship awarded to a full-time graduate student in Ontario.
- 2011-2013 **Student Travel Awards,**
Statistical Society of Canada Congress Jun/2011
Applied Mathematics, Modeling and Computational Science Meeting
Aug/2013.
- 2009 & 2012 **R. Samuel Maclaughlan Scholarship, (Queen's),**
Awarded to first class master's and doctoral students.
- 2008 **Ralph and Frances Jeffery Mathematics Scholarship, (Dalhousie),**
Awarded to a graduating senior in honours mathematics.

Membership in professional societies

- 2010-present **American Statistical Association (ASA) Professional Statistician**, (*PStat*[®]), Chicago Chapter.
- 2009-present **American Mathematical Society (AMS)**.
- 2013-present **American Geophysical Union (AGU)**.
- 2009-present **IEEE member**.

Professional Activities

ANL

- 2017-2018 **Argonne Mathematics & Computer Science Hiring Committee**, Screen and set up interviews for postdoctoral candidates. Attended career fairs promoting Argonne.
- 2017 **Argonne Afro-Academic, Cultural, Technological and Scientific Olympics (ACT-SO) High School Research Program Mentor**, Mentored a local high school student and lead a research project with her.
- Feb 2017 **Introduce a Girl to Engineering Day (IGED2017)**, *Volunteer*, Mentor.
- 2016 **Argonne Open House**, *Volunteer*.
- 2015 & 2016 **Laboratory for Advanced Numerical Simulation (LANS) Summer Argonne Student Symposium (SASSy)**, *Symposium Organizer*, Organized a two-day symposium in which ~ 20 students in the LANS group presented the results of their summer research.
- 2015 & 2016 **LANS Seminar Coordinator**, Managed scheduling, refreshments, and AV equipment for a weekly mathematics seminar. Topics included advanced optimization, numerical analysis, fluid dynamics, statistics and others.
- Mar/2016 **Argonne Mathematics & Computer Science (MCS) Career Expo**, Traveled to a career fair at University of Michigan to recruit new postdocs.
- 2014-2015 **LANS Reading Group**, *Contributor*, Bayesian Data Analysis (Spring 2015)
Image Processing (Fall 2014).
- Sep/2014 **Argonne Postdoctoral Symposium**, *Volunteer*.

Advising

- 2016-2017 **Chris Geoga**, *B.Sc. Math & Stats, University of Chicago*, Predoctoral Appointee, Argonne National Lab.
Co-advised by Mihai Anitescu.

Professional Community

Editorial boards, conference committees, working groups

- April 2017 **Judge**, SIAM Student Paper Prize.

- 2015-present **Journal Referee**,
Earth & Space Science,
Canadian Journal of Statistics,
Computational Statistics & Data Analysis,
Nature,
IEEE Signal Processing Transactions,
IEEE Proceedings.
- 2010-present **Conference Abstract Reviewer, IEEE**,
e.g., i-CADER 2014, ICoSSEET 2014, ICNC 2014, IPCOST 2014.
- 2015-2016 **De Gruyter Nanospectroscopy**, *Language Editor*.
- Aug 2014 **Joint Statistical Meetings Contributed Session**, *Organizer*, Section on Physical and Engineering Sciences, Applied Spectrum Analysis.
- Aug 2013 **AMMCS 2013 Minisymposium**, *Co-organizer*, Multitaper Spectrum Analysis.
- 2012-2013 **Versita Open Access Publications**, *Language Editor*.
- Academic Positions, teaching, student advising**
- Fall 2011 **MTHE 224 Course Instructor**, *Queen's University*,
 Primary instruction and curriculum development for a 13-week second year engineering mathematics course. Course material included ordinary differential equations and introductory statistics with tutorials and laboratory work in Matlab.
- Spring 2011 **Teaching Apprenticeship**, *Queen's University*,
 Lectured for 3 course hours in Introductory Calculus.
- 2009-2013 **Math and Stats private tutor**,
 Private tutoring in calculus, differential equations, introductory statistics, complex variables, real analysis, and others.
- 2010 & 2013 **Tutorial leader**, *Queen's University: Differential Equations and Calculus*,
 Did practice problems and exercises once weekly for a group of undergraduates.
- 2008-2013 **Teaching Assistant**, *Queen's University*,
 Graded assignments, proctored exams, and assisted students at the math help desk.
- Advising**
- Summer 2014 **Paul Wilson**, *B.Sc. Math & Stats, Queen's University*, National Science and Engineering Research Council of Canada (NSERC) Undergraduate Summer Research Assistant (USRA).
 Co-advised by David J. Thomson.
- Summer 2013 **Julian Fortin**, *B.Eng. (Apple Math) Queen's University*, NSERC USRA.
 Co-advised by David J. Thomson.

Others

- 2012-2014 **Queen's Graduate Math Society**, *President 2012 & Treasurer 2013-2014*.
 2012 **Queen's Math Dept Graduate Seminar**, *Coordinator*.
 2011-2012 **Queen's Math & Stats Dept.**, *Tenure, Renewal, and Promotions*.
 2010-2013 **Mathemagics Math Camp for Girls**, *Volunteer, Activity leader, and Co-organizer*.

Research Products

Refereed journal articles

- [1] C. J. Geoga, C. L. Haley, and M. Anitescu. "Frequency-wavenumber spectral analysis of spatiotemporal flows". *Journal of Fluid Mechanics* (Aug. 2017). Submitted.
- [2] C. L. Haley and M. Anitescu. "Optimal Bandwidth for Multitaper Spectrum Estimation". *IEEE Signal Processing Letters* 24 (11 2017), pp. 1558–2361. DOI: 10.1109/LSP.2017.2719943.
- [3] C. L. Haley. "Mathematical physics: Glitches in time". *Nature* 532 (2016), pp. 450–451.
- [4] K. A. Michael, C. L. Haley, A. Baranchuk, C. S. Simpson, H. Abdollah, and D. P. Redfearn. "Failed anti-tachycardia pacing can be used to differentiate atrial arrhythmias from ventricular tachycardia in implantable cardioverter-defibrillators". *Europace* 17.1 (2015), pp. 78–83.
- [5] R. Somani, K. Mohajer, C. L. Haley, C. S. Simpson, H. Abdollah, A. Baranchuk, D. P. Redfearn, and K. A. Michael. "The periprocedural use of dabigatran in patients undergoing left atrial ablation for atrial fibrillation". *Cardiovasc Ther.* 32.5 (2014), pp. 198–201.
- [6] D. J. Thomson and C. L. Haley. "Spacing and shape of peaks in non-parametric spectrum estimates". *Proceedings of the Royal Society of London Series A* 470.2167 (2014), p. 20140101.
- [7] C. L. Haley, Gula L. J., R. Miranda, A. Baranchuk, K. A. Michael, C. S. Simpson, H. Abdollah, A. J. West, S. G. Akl, and D. P. Redfearn. "Validation of a novel algorithm for quantification of fractionation in atrial fibrillation electrograms." *Europace* 15.3 (2013), pp. 447–452.

Publications in un-refereed conference proceedings

- [8] C. L. Haley and M. Anitescu. "Cyclostationary models of solar irradiance". In: *Joint Statistical Meetings (JSM) Proceedings*. American Statistical Association. Seattle, WA, USA, 2015, pp. 1212–1225.
- [9] C. L. Haley and D. J. Thomson. "On the temporal scales of solar modulation of galactic cosmic radiation". In: *JSM Proceedings*. American Statistical Association. Montreal, QC, Canada, 2013, pp. 3148–3162.

Invited talks

- [T1] C. L. Haley. *On multitaper spatiotemporal spectrum estimation*. Toronto, ON: University of Toronto, Jan. 2017.

Talks at major conferences and symposia

- [C1] C. L. Haley. *Detection and estimation of oscillatory components in power networks*. Baltimore, MA: Joint Statistical Meetings, Aug. 2017.
- [C2] C. L. Haley. *Spectral analysis of spatiotemporal data*. Rockville, MA: Department of Energy Applied Mathematics Principal Investigators' Meeting, Sept. 2017.
- [C3] E. Constantinescu, J. Bessac, C. L. Haley, and J. Wang. *Argonne node contributions to STATMOS initiatives*. Chicago, IL: Statistics in Atmospheric and Oceanic Sciences (STATMOS) annual meeting, Aug. 2016.
- [C4] C. L. Haley. *Optimal Bandwidth for Multitaper Spectrum Estimation*. Chicago, IL: Joint Statistical Meetings, Aug. 2016.
- [C5] C. L. Haley. *Cyclostationary models for solar irradiance*. Seattle, WA: Joint Statistical Meetings, Aug. 2015.
- [C6] D. Schooley, M. Anitescu, S. Abyankar, M. Cheng, C. L. Haley, and F. Lin. *Uses of Phasor Measurement Unit (PMU) data in network fault detection*. Chicago, IL: North American Synchrophasor Initiative, Oct. 2015.
- [C7] C. L. Haley. *A Comparison of Contemporary Metrics for the Identification of Complex Fractionated Electrograms*. Munich, DE: European Cardiac Arrhythmia Society, Apr. 2014.
- [C8] C. L. Haley. *A Lorentzian model for solar modes*. Chicago IL: STATMOS Annual Meeting, Sept. 2014.
- [C9] C. L. Haley. *Estimation and Detection of Individual Solar Oscillations*. Lemont, IL: Postdoctoral Research and Career Symposium, Oct. 2014.
- [C10] C. L. Haley. *Multivariate spectral analysis of 40 years of multidirectional muon observations*. Boston MA: Joint Statistical Meetings, Aug. 2014.
- [C11] C. L. Haley. *Propagation of solar oscillations to secondary cosmic rays*. San Francisco, Ca: American Geophysical Union, Dec. 2013.
- [C12] C. L. Haley. *Propagation of solar oscillations to secondary cosmic rays*. Waterloo On: Applied Mathematics, Modeling and Computational Science Conference, Aug. 2013.
- [C13] C. L. Haley. *Solar modal structure as observed by neutron monitors*. Kingston, ON: Division of Atmospheric and Space Physics Workshop, Feb. 2013.
- [C14] C. L. Haley. *Solar modal structure in the cosmic ray background*. Petit Rouge, Qc: Canadian Solar Workshop, Oct. 2013.
- [C15] C. L. Haley. *Spacing and shape of peaks in nonparametric spectrum estimates*. Montreal, Qc: Joint Statistical Meetings, Aug. 2013.

- [C16] C. L. Haley. *Spatial and Temporal Variability of Environmental Noise in Toronto*. Edmonton, AB: Statistical society of Canada Congress, Case Study Competition, May 2013.
- [C17] C. L. Haley. *A novel metric for quantifying percentage fractionation in AF electrograms*. Kingston ON: International Conference in Electrocardiology, June 2011.
- [C18] C. L. Haley. *Detection of Changes in Activation in ECG Time Series Modeling*. Wolfville NS: Statistical Society of Canada Congress, June 2011.
- [C19] C. L. Haley. *Electroanatomic Mapping systems to Guide Catheter Ablation for Atrial Fibrillation*. Kingston, ON: Kingston General Hospital Research Showcase, May 2011.
- [C20] C. L. Haley. *An explicit formula for the Stirling numbers of the second kind via multinomial coefficients*. Toronto, On: Canadian Undergraduate Mathematics Conference, May 2008.

Other talks

- [S1] C. L. Haley. *On multitaper spatiotemporal spectrum estimation*. Lemont, IL: Laboratory for Advanced Numerical Simulations (LANS) Seminar, Feb. 2017.
- [S2] C. L. Haley. *On multitaper spatiotemporal spectrum estimation*. Chicago, IL: University of Chicago Dept of Statistics, Stein research group, Feb. 2017.
- [S3] C. L. Haley. *Harmonic analysis of modern synchrophasor measurements*. Lemont, IL: Argonne M2ACS Research Group, Nov. 2016.
- [S4] C. L. Haley. *Propagation of solar oscillations to secondary cosmic rays*. Lemont, IL: Laboratory for Advanced Numerical Simulations (LANS) Seminar, Feb. 2015.
- [S5] C. L. Haley. *Two dimensional spatiotemporal spectrum estimation*. Chicago, IL: University of Chicago Dept. of Statistics, Stein research group, Apr. 2015.

Research Summary

Argonne National Laboratory, Chicago IL

- March 2016-present **Computational Fluid Dynamics Spectrum Estimation**, Development of higher dimensional multitaper spectrum estimation methods for the purpose of quantification of traveling vortices in turbulence,
Collaborators: Mihai Anitescu, Shashi Aithal, Ricardo Vinuesa, Philipp Schlatter.
Talks: [S1, S2, T1]
- Feb 2015-present **Power Grid Interarea Oscillations**, Use of frequency domain methods for nonlinear and nonstationary time series to identify oscillatory signatures in phasor measurement unit (PMU) data,
Collaborators: Mihai Anitescu, David Schooley, Michael Fresh.
Manuscript: [2], Conference: [S3, C6]
- Oct 2015-March 2017 **Bandwidth selection for Spectral Estimation of Time Series**, Development of multitaper spectrum estimation methods to choose the spectral bandwidth based on estimated mean squared error,
Collaborators: Mihai Anitescu.
Manuscript: [2], Conference: [C4]
- Sep 2014-Oct 2015 **Spatio-Temporal Statistics Research**, Characterization of the spatio-temporal cyclostationary covariance structure of solar irradiance measurements for the purpose of predicting solar inputs to the power grid,
Collaborators: Mihai Anitescu, Emil Constantinescu.
Conference Proceedings: [8]

Queen's University

- 2009-2014 **Statistics and Signal Processing**, *Advisor: David Thomson*, Research in spectrum analysis of cosmic ray time series with applications to solar physics & helioseismology.
Papers: [6, 9], Conferences: [C10] & 6 others, and PhD thesis.
- 2008-2010 **Arrhythmia Research Office**, *Advisors: Damian Redfearn, Selim Akl*, Analyzed electrograms taken inside the human atrium during ablation therapy for atrial fibrillation (AF). Additional statistical analyses were done on (i) the side effects of Dabigatran vs Warfarin as an anticoagulant for AF patients and (ii) distribution of complex fractionated electrograms in the atria of paroxysmal vs persistent AF patients.
Papers: [7, 5, 4], Two conferences, and master's thesis.