

Curriculum Vitae

John Edward McCarthy

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Professional Information

- *Academic Positions Held:*

Washington University, Spencer T. Olin Professor of Arts and Sciences, 2011-present.
Washington University, Chair of Mathematics and Statistics Department, 2016-2021.
Washington University, Assistant/Associate/Full Professor, 1991-94/1994-99/1999-2011.

- *Visiting Positions*

U.C. Berkeley, Visiting Scholar, Spring 2023.
Université Gustave Eiffel, Visiting Professor, Fall 2022.
Trinity College Dublin, Visiting Professor, 2009-10.
Scuola Matematica Interuniversitaria, Perugia, Professor, 2008.
U.C. San Diego, Visiting Professor, 1996.
Mathematical Sciences Research Institute, Member, 1995-1996.
Indiana University, Visiting Assistant Professor, 1989-1991.

- *Education:*

Ph.D. in Mathematics, University of California, Berkeley, 1989.
M.Sc. in Mathematics, Trinity College, Dublin University, 1987.
B.A., Mod. in Mathematical Sciences, First Class Honours, Trinity College, Dublin University, 1983.

Leadership positions

- Chair of Mathematics/Mathematics and Statistics Department, 2016-2021.
- Secretary of the Faculty Senate and Faculty Senate Council, 2003-2006.
- Director of Graduate Studies in Mathematics Department, 1996-2006.
- Arts and Sciences Academic Planning Committee, 2005-2009, 2016-2020.
- Faculty Council of Arts and Sciences, 1999-2002 (Chair, 2001-02).

Professional Activities:

1. Steering Committee for International Workshop on Operator Theory and Applications, 2018-present.
2. Cooperating Editor, *Journal of Operator Theory*, 2011-present.
3. Mathematical Sciences Research Institute CAS Executive Committee, 2020-2022.
4. Mathematical Sciences Research Institute CAS Subcommittee on Summer Graduate Schools, 2019-2020.
5. Member of the Board of Editorial Advisors, *London Mathematical Society*, 2011-2014.
6. Elected Member of the American Mathematical Society Council, 2003-2006.
7. Member of American Mathematical Society Committee on Publications, 2003-2006.
8. Associate Editor, *Journal of Mathematical Analysis and Applications*, 2002-2004.
9. Member: American Mathematical Society (Life Member), Irish Mathematical Society, Association for Women in Mathematics, American Association for the Advancement of Science.

Grants — Research

- National Science Foundation Grant DMS 2054199, *Operator Analysis and Applications*, (PI) 2021-2026.
- National Institutes of Health R01 AG052550-01A1 *Imaging Tauopathy in the Dominantly Inherited Alzheimer Network* (co-Investigator; PI's B. Ances and T. Benzinger) 2018-2023.
- National Science Foundation Grant DMS 1565243 *Operator Theory and Applications* (PI) 2015-2020.
- National Institutes of Health R21 EB019569-01A1 *Real time ultrasound entropy-based quantification of fibrofatty liver disease* (PI) 2015-2018.
- University Research Strategic Alliance grant, *Matrix conditioning to improve estimates of brain functional architecture*, 2014.
- National Science Foundation Grant DMS 1300280, *Multivariable Operator Theory and applications*, (PI) 2013-2016.
- National Science Foundation Grant DMS 0966845, *Operator Theory and Complex Analysis*, (PI) 2010-2013.
- National Institutes of Health award 1R01HL087847-01A1 *Monitoring disease and therapy in dystrophin-deficient muscle using ultrasound*, (PI) 2009-2011.
- National Science Foundation “High Impact” Grant DMS 0501079, *Operator Theory and Complex Geometry*, (PI) 2005-2010.
- National Science Foundation “High Impact” Grant DMS 0070639, with Creativity Extension DMS 0322255, *Interpolation and Related Topics*, (PI) 2000-2005.

- National Science Foundation Group Infrastructure Grant DMS 9631359, 1996-1999 (joint PI).
- National Science Foundation Grant DMS 9531967, *Subnormal Operators*, (PI) 1996-2000.
- National Science Foundation Grant DMS 9301508, *Holomorphic Spaces*, (PI) 1993-1996.
- National Science Foundation Grant DMS 9102965, *Toeplitz Operators and Hilbert Spaces of Analytic Functions*, (PI) 1991-1993.

Other Grants Authored

- National Science Foundation Grant DMS 2055013 *Conference on Multivariable Operator Theory and Function Spaces* 2021.
- National Science Foundation Grant DMS 0802068 *Conference on Function Spaces and their Operators* 2008.
- Department of Education Grant for Graduate Assistance in Areas of National Need, P200A030039, 2003-2006.
- Department of Education Grant for Graduate Assistance in Areas of National Need, P200A000617, 2000-2003.

Awards and Honors

- Elected Fellow of the American Mathematical Society, 2018.
- G. de B. Robinson Award from the Canadian Mathematical Society, 2016.
- Guido L. Weiss Teaching and Service Award, Washington University, 2016.
- Recognition of Excellence in Mentoring, Graduate Student Senate of Washington University, 2004.
- Member, Mathematical Sciences Research Institute, 1995-1996.

Conference Organization

1. Organizer of Workshop on Non-commutative function theory and free probability, Oberwolfach, April 2024.
2. Organizer of Great Plains Operator Theory Seminar, St. Louis, 2021 and 2022.
3. Scientific Committee member, Conference on Interpolation in Spaces of Analytic functions, Marseille, November 2019.
4. Scientific Committee member, Conference on Algebra, Geometry and Analysis, Dublin, May 2019.
5. Scientific Committee member, Conference on Multivariable Operator Theory, Haifa, June 2017.
6. Organizer of Conference on Hilbert Function Spaces, Gargnano, May 2017.

7. Organizer of International Workshop on Operator Theory and Applications, St. Louis, July 2016.
8. Organizer of a Special Session on “Operator Theory” at AMS Sectional Meeting in St. Louis, October 2013.
9. Organizer of Conference on Hilbert Function Spaces, Gargnano, May 2013.
10. Organizer of a Special Session on “Operator Theory and Several Complex Variables” at the 2012 National AMS Meeting in Boston.
11. Organizer of conference “Frontiers in Science and Technology II”, at Washington University, September 2010.
12. Organizer of conference “Frontiers in Science and Technology I”, at Washington University, April 2009.
13. Organizer of conference on “Function Spaces and their Operators”, at Washington University, May 2008.
14. Co-chair of organizing committee for program on “Holomorphic Spaces” at the Mathematical Sciences Research Institute, Berkeley, Fall 1995.
15. Organizer of workshop on Holomorphic Spaces at MSRI, October 16-20 1995.
16. Organizer of a Special Session on “Holomorphic Spaces” at the 1993 AMS National Meeting in San Antonio.
17. Organizer of a Special Session on “Hilbert Spaces of Analytic Functions” at the March 1991 Sectional AMS Meeting in South Bend.

Books

1. *Operator Analysis*, with Jim Agler and Nicholas Young, Cambridge University Press, 2020.
2. *Transition to Higher Mathematics: Structure and Proof*, with Bob Dumas, McGraw-Hill, 2006.
Second edition, Open Scholarship, Washington University, 2014.
3. *Pick Interpolation and Hilbert Function Spaces*, with Jim Agler, American Mathematical Society Graduate Studies in Mathematics, Providence, 2002.
4. *Holomorphic Spaces*, ed. S. Axler, J.E. McCarthy, D. Sarason. Cambridge University Press, 1998.

Papers in Pure Mathematics

1. *Beurling’s theorem for the Hardy operator on $L^2[0, 1]$* (with Jim Agler), Acta Scientiarum Mathematicarum, to appear.
2. *Asymptotic Müntz-Szász Theorems* (with Jim Agler), Studia Mathematica, 270 (3) [2023] 301-322.
3. *The Hardy-Weyl algebra* (with Jim Agler), Journal of Operator Theory, to appear.

4. *Complete norm preserving extensions of holomorphic functions* (with Jim Agler and Lukasz Kosinski), Israel Journal of Mathematics, 255 (1) [2023] 251-263.
5. *The common range of co-analytic Toeplitz operators on the Drury-Arveson space* (with Alexandru Aleman, Michael Hartz and Stefan Richter), Journal d'Analyse, 150 [2023] 215-247.
6. *Free outer functions in complete Pick spaces* (with Alexandru Aleman, Michael Hartz and Stefan Richter), Transactions of the American Mathematical Society, 376 (3) [2023] 1929-1978.
7. *Norm Preserving Extensions of Holomorphic Functions Defined on Varieties in \mathbb{C}^n* (with Jim Agler and Lukasz Kosiński), Journal of Functional Analysis, 283 (9) [2022] 39 pp.
8. *A generalization of Hardy's operator and an asymptotic Müntz-Szász Theore* (with Jim Agler) Expositiones Mathematicae, 40 (4) [2022] 920-930.
9. *Monomial Operators* (with Jim Agler) Acta Scientiarum Mathematicarum, 88 (1-2) [2022] 371-381.
10. *Multiplier tests and subhomogeneity of multiplier algebras* (with Alexandru Aleman, Michael Hartz and Stefan Richter), Documenta Mathematica, 27 [2022] 719-764.
11. *Operator noncommutative functions* (with Meric Augat), Canadian Mathematical Bulletin, 66 (2) [2022] 495-508.
12. *Symbol functions for symmetric frameworks* (with Eleftherios Katis and Derek Kitson), Journal of Mathematical Analysis and Applications, 497 (2) [2021] .
13. *An H^p scale for complete Pick spaces* (with Alexandru Aleman, Michael Hartz and Stefan Richter), Studia Mathematica, 258 (3) [2021] 343-359.
14. *The Krzyż Conjecture and an Entropy Conjecture* (with Jim Agler) Journal d'Analyse Mathématique, 144 [2021] 207-226.
15. *Weak products of complete Pick spaces* (with Alexandru Aleman, Michael Hartz and Stefan Richter), Indiana University Mathematics Journal, 70 (1) [2021] 325-352.
16. *Extensions of bounded holomorphic functions on the tridisk* (with Lukasz Kosiński) Revista Matematica Iberoamericana, 36 (3) [2020] 791-816.
17. *Calcular Algebras* (with Jim Agler and Nicholas Young) Mathematical Proceedings Royal Irish Academy, 119A (2) [2019] 65-75.
18. *Radially weighted Besov spaces and the Pick property* (with Alexandru Aleman, Michael Hartz and Stefan Richter), Analysis of Operators on Function Spaces, 29-61, Trends Math., Birkhäuser/Springer, 2019.
19. *Norm preserving extensions of bounded holomorphic functions* (with Lukasz Kosiński) Transactions American Mathematical Society, 371(10) [2019] 7243-7257.
20. *Interpolating sequences in spaces with the complete Pick property* (with Alexandru Aleman, Michael Hartz and Stefan Richter) International Mathematical Research Notices [2019] (12) 3832-3854.

21. *Non-commutative functional calculus* (with Jim Agler) Journal d'Analyse Mathématique, 137(1) [2019] 211-229.
22. *Non-commutative manifolds, the free square root and symmetric functions in two non-commuting variables* (with Jim Agler and Nicholas Young), Transactions of the London Mathematical Society, 5(1) [2018] 132-183.
23. *A multiplier algebra functional calculus* (with Kelly Bickel and Michael Hartz) Transactions of the American Mathematical Society, 370(12) [2018] 8467-8482.
24. *Factorizations induced by complete Nevanlinna-Pick factors* (with Alexandru Aleman, Michael Hartz and Stefan Richter), Advances in Mathematics, 335 [2018] 372-404.
25. *Global holomorphic functions in several non-commuting variables II* (with Jim Agler) Canadian Mathematical Bulletin, 61(3) [2018] 458-463.
26. *Wandering Montel theorems for Hilbert space valued holomorphic functions* (with Jim Agler) Proceedings of the American Mathematical Society 146(10), [2018] 4353-4367.
27. *A non-commutative Julia Inequality* (with James Pascoe) Mathematische Annalen 307(1), [2018] 423-446.
28. *The Smirnov class for spaces with the complete Pick property* (with Alexandru Aleman, Michael Hartz, and Stefan Richter) Journal London Mathematical Society, 96(1) [2017] 228-242.
29. *The Julia-Carathéodory theorem on the bidisk revisited* (with James Pascoe) Acta Sci. Math. Szeged 82(1-2) [2017] 165-175.
30. *Spaces of Dirichlet series with the complete Pick property* (with Orr Shalit) Israel Journal of Mathematics 220(2) [2017] 509-530.
31. *Aspects of non-commutative function theory* (with Jim Agler) Concrete Operators, Vol. 3 [2016] 15-24.
32. *NC-automorphisms of NC-bounded domains* (with Richard Timoney) Proceedings A of the Royal Society of Edinburgh, 146(5) [2016] 1037-1045.
33. *Unions of Lebesgue spaces and A_1 majorants* (with Greg Knese and Kabe Moen) Pacific Journal of Math, Vol. 280:2 [2016] 411-432.
34. *The implicit function theorem and free algebraic sets* (with Jim Agler) Transactions of the American Mathematical Society, Vol 368:5 [2016] 3157-3175.
35. *Non-commutative holomorphic functions on operator domains* (with Jim Agler) European Journal of Mathematics, Vol. 1:4 [2015] 731-745.
36. *The Use of Kernel Functions in Solving the Pick Interpolation Problem* (with Jim Agler) in Operator Theory, ed. D. Alpay, Springer 2015.
37. *Pick interpolation for free holomorphic functions* (with Jim Agler) American Journal of Mathematics, Vol. 137:6 [2015] 1685-1701.
38. *Global holomorphic functions in several non-commuting variables* (with Jim Agler) Canadian Journal of Mathematics, Vol. 67:2 [2015] 241-285.

39. *Operator Theory and the Oka Extension Theorem* (with Jim Agler) Hiroshima Mathematical Journal, Vol. 45:1 [2015] 9-34.
40. *Thin sequences and the Gram matrix* (with Pam Gorkin, Sandra Pott and Brett Wick) Archiv der Mathematik Vol. 103:1 [2014] 93-99.
41. *Hankel vector moment sequences and the non-tangential regularity at infinity of two variable Pick functions* (with Jim Agler) Transactions of the American Mathematical Society Vol. 366:3 [2014] 1379-1411.
42. *On the Representation of Holomorphic Functions on Polyhedra* (with Jim Agler and Nicholas Young) Michigan Mathematical Journal Vol. 62:4 [2013] 675-689.
43. *On the isomorphism question for complete Pick multiplier algebras* (with Matt Kerr and Orr Shalit) Integral Equations and Operator Theory, Vol. 76(1) [2013] 39-53.
44. *The Takagi problem on the disk and bidisk* (with Jim Agler and Joe Ball) Acta Sci. Math (Szeged) Vol. 79, No. 1-2 [2013] 63-78.
45. *Operator monotone functions and Löwner functions of several variables* (with Jim Agler and Nicholas Young) Annals of Mathematics, Vol. 176:3 [2012] 1783-1826.
46. *Unitary N -dilations for tuples of commuting matrices* (with Orr Moshe Shalit) Proceedings American Mathematical Society, Vol. 141(2) [2012] 563-571.
47. *A Carathéodory theorem for the bidisk using Hilbert space methods* (with Jim Agler and Nicholas Young) Mathematische Annalen, Vol. 352:3 [2012] 581-624.
48. *Shining Hilbert's Lamp on the bidisk* in Valencia Winter School 2010, Contemporary Mathematics, Vol. 561 [2012] 49-65.
49. *Algebraic pairs of isometries* (with Jim Agler and Greg Knese) Journal of Operator Theory, Vol. 67:1 [2012] 215-236.
50. *Facial behavior of analytic functions on the bidisk* (with Jim Agler and Nicholas Young) Bulletin of the London Mathematical Society, Vol. 43 [2011] 478-494.
51. *Polynomial inequalities for noncommuting operators* (with Richard M. Timoney) Electronic Journal of Linear Algebra, Vol. 20 [2010] 506-518.
52. *What can Hilbert space tell us about bounded functions on the bidisk?* (with Jim Agler) Operator Theory Advances and Applications, Vol. 207 [2010] 81-97.
53. *Cusp Algebras* (with Jim Agler) Publicacions Matemàtiques Vol. 53 [2009] 111-118.
54. *Geometry near the torus of zero-sets of holomorphic functions* (with Jim Agler and Mark Stankus) New York Journal of Mathematics, Vol. 14 [2008] 517-538.
55. *Hyperbolic algebraic and analytic curves* (with Jim Agler) Indiana University Mathematics Journal, Vol. 56, No. 6 [2007] 2899-2933.
56. *Toral algebraic sets and function theory on polydisks* (with Jim Agler and Mark Stankus) Journal of Geometric Analysis Vol. 16, No. 4 [2006] 551-562.
57. *Parametrizing Distinguished Varieties* (with Jim Agler) Proceedings of the Conference on Recent Advances in Operator-Related Function Theory, Edited by: A. Matheson, M. Stessin, and R. Timoney [2006] 29-34.

58. *Distinguished Varieties* (with Jim Agler) Acta Mathematica Vol. 194 [2005] 133-153.
59. *Geometric Characterizations of Centroids of Simplices* (with Steven G. Krantz and Harold Parks) Journal of Mathematical Analysis and Applications Vol. 316 No. 1 [2006] 87-109.
60. *Positivity aspects of the Fantappiè transform* (with Mihai Putinar) Journal d'Analyse Vol. 97 [2005] 57-82.
61. *Hilbert spaces of Dirichlet series and their Multipliers* Transactions of the American Mathematical Society, Vol. 356 No. 3 [2004] 881-893.
62. *Norm preserving extensions of holomorphic functions from subvarieties of the bidisk* (with Jim Agler) Annals of Mathematics, Vol. 157 No.1 [2003] 289-312.
63. *Pick's Theorem - What's the big deal?* American Mathematical Monthly, Vol. 110 No.1 [2002] 36-45.
64. *Interpolating sequences on the bidisk* (with Jim Agler) International Journal of Mathematics, Vol. 12 No. 9 [2001] 1103-1114.
65. *The three point Pick problem on the bidisk* (with Jim Agler) New York Journal of Mathematics, Vol. 6 [2000] 227-236.
66. *Complete Nevanlinna-Pick kernels* (with Jim Agler), Journal of Functional Analysis, Vol. 175 No. 1 [2000] 111-124.
67. *Best approximation in the mean by analytic and harmonic functions* (with Dmitry Khavinson and Harold Shapiro) Indiana University Mathematics Journal, Vol. 49 [2000] 1481-1513.
68. *Nevanlinna-Pick Kernels and Localization* (with Jim Agler) in Operator Theoretical Methods, Proceedings of 17th International Conference on Operator Theory at Timisoara, 1998, published by Theta Foundation, Bucharest, 2000, ed. A. Gheondea, R.N. Gologan and D. Timotin, 1-20.
69. *How to give a good colloquium* Canadian Mathematical Society Notes, Vol. 31 No. 5 [1999] 3-4. Reprinted and distributed by the American Mathematical Society.
70. *Nevanlinna-Pick Interpolation on the Bidisk* (with Jim Agler), Journal für die reine und angewandte Mathematik, Vol. 506, [1999] 191-204.
71. *Operators that dominate normal operators* (with Jim Agler), Journal of Operator Theory, Vol. 40, [1998] 385-407.
72. *Reflexivity of isometries* (with Wing-Suet Li), Studia Mathematica, Vol. 124, No. 2, [1997] 101-105.
73. *Subnormal operators and quadrature domains* (with Liming Yang), Advances in Mathematics, Vol. 127, No. 1, [1997] 52-72.
74. *Boundary values and Cowen-Douglas curvature* Journal of Functional Analysis, Vol. 137, No. 1, [1996] 1-18.
75. *Cyclic subnormal operators with finite rank self-commutators* (with Liming Yang), Proceedings of the Royal Irish Academy, Vol. 95A, No. 2 [1995] 173-177.
76. *The range of Toeplitz operators on the ball* (with Boris Korenblum), Revista Matemática Iberoamericana, Vol. 12, No. 1 [1996] 47-61.

77. *Growth of the Bergman kernel on planar regions* (with Liming Yang), Illinois Journal of Mathematics, Vol. 40, No. 1 [1996] 141-150.
78. *Bounded point evaluations on the boundary of L regions* (with Liming Yang), Indiana University Mathematics Journal Vol. 43, No. 3 [1994] 857-883.
79. *Coefficient estimates in weighted Bergman spaces*, Duke Mathematical Journal Vol. 76, No. 3, [1994] 751-760.
80. *Non-attainable boundary values for H^∞ functions* (with Boris Korenblum), Extracta Mathematicae Vol. 8, No. 2 [1993] 138-141.
81. *Composition preserves rigidity* (with Ben Lotto), Bulletin of the London Mathematical Society Vol. 25 No. 117 [1993] 573-576.
82. *Reflexivity of subnormal operators*, Pacific Journal of Mathematics Vol. 161 No. 2 [1993] 359-370.
83. *Geometric interpolation between Hilbert spaces*, Arkiv för Matematik Vol. 30 No. 2 [1992] 321-330.
84. *Interpolation between weighted Hardy spaces*, (with Michael Cwikel and Thomas Wolff), Proceedings of the American Mathematical Society Vol. 116 No. 2 [1992] 381-388.
85. *Topologies on the Smirnov class*, Journal of Functional Analysis Vol. 104 No. 1 [1992] 229-241.
86. *Weighted Bergman spaces*, in Function Spaces, (K. Jarosz, ed.), Marcel Dekker, 1992, 301-306.
87. *Multipliers of de Branges spaces* (with Mark Davis), Michigan Mathematical Journal Vol. 38 No. 2 [1991] 225-240.
88. *Continuity of semi-norms* (with Henry Helson), in Functional Analysis and Operator Theory, (B.S. Yadav and D. Singh, eds.), Springer LNM 1511, 1992, 88-90.
89. *Common range of co-analytic Toeplitz operators*, Journal of the American Mathematical Society Vol. 3 No. 4 [1990] 793-799.
90. *Quasimilarity of rationally cyclic subnormal operators*, Journal of Operator Theory 24 [1990] 105-116.
91. *Analytic structures for subnormal operators*, Integral Equations and Operator Theory Vol. 13 No. 2 [1990] 251-270.

Papers in Applications of Mathematics

1. *White Matter Hyperintensity Longitudinal Morphometric Analysis in Association with Alzheimer Disease* J.F. Strain, C.-L. Phuah, B. Adeyemo, K. Chen, K.B. Womack, J.E. McCarthy, M. Goyal, Y. Chen, A. Sotiras, H. An, A. Scharf, C. Newsom-Stewart, C. Xiong, J.C. Morris, T.L.S. Benzinger, J.-M. Lee, B.M. Ances, Alzheimer's and Dementia: The Journal of the Alzheimer's Association [2023] Oct;19(10):4488-4497. doi: 10.1002/alz.13377.

2. *Brain Age Predicts Disability Accumulation in Multiple Sclerosis*, M.R. Brier, Z. Li, M. Ly, H. Karim, L. Liang, W. Du, J.E. McCarthy, A.H. Cross, T.L.S. Benzinger, R.T. Naismith, S. Chahin, *Annals of Clinical and Translational Neurology*, [2023]
<https://doi.org/10.1002/acn3.51782>.
3. *Covariance-based vs. Correlation-based Functional Connectivity Dissociates Healthy Aging from Alzheimer Disease*, J. Strain; M. Brier; A. Tanenbaum; B. Gordon; J. E. McCarthy; A. Dincer; D. Marcus; J. Chhatwal; N. Graff-Radford; G. Day; C. la Fougère; R. Perrin; S. Salloway; P. Schofield; I. Yakushev; T. Ikeuchi; J. Vöglein; J. Morris; T. Benzinger; R. Bateman; B. Ances; A. Z. Snyder, *NeuroImage*, 261 [2022] 119511.
4. *Modeling the relative risk of SARS-CoV-2 infection to inform Risk-Cost-Benefit Analyses of activities during the SARS-CoV-2 pandemic*, J.E. McCarthy, B.D. Dewitt, B.A. Dumas, M.T. McCarthy *PLoS ONE* [2021] 16(1): e0245381.
<https://doi.org/10.1371/journal.pone.0245381>
5. *Modeling autosomal dominant Alzheimer’s disease with machine learning*, P. Luckett et al., *Journal of the Alzheimer’s Association*, 17(6) [2021] 1005-1016.
6. *Resolution of Murine Toxic Hepatic Injury Quantified With Ultrasound Entropy Metrics*, Jon N. Marsh, Kevin M. Korenblat, Ta-Chiang Liu, John E. McCarthy, Samuel A. Wickline, *Ultrasound in Medicine & Biology* 45(10):2777-2786 [2019].
7. *On the stability of BOLD fMRI correlations*, Laumann TO, Snyder AZ, Mitra AM, Gordon EM, Gratton C, Adeyemo B, Gilmore AW, Nelson SM, Berg JJ, Greene DJ, McCarthy JE, Tagliazucchi E, Laufs H, Schlaggar BL, Dosenbach NUF, Petersen SE, *Cerebral Cortex*, 27(10):4719-4732 [2017].
8. *High contrast ultrasonic imaging of resin-rich regions in graphite/epoxy composites using entropy*, M.S. Hughes, J.E. McCarthy, P. Bruillard, J.N. Marsh, and S.A. Wickline, *AIP Conference Proceedings* 1706, 120002 [2016].
9. *Acoustic Firearm Discharge Detection and Classification in an Enclosed Environment*, L. Luzi, E. Gonzales, P. Bruillard, M. Prowant, J. Skorpik, M. Hughes, S. Child, D. Kist, J.E. McCarthy, *Journal of the Acoustical Society of America*, 139 (5) [2016] 2723-2731.
10. *Tau and A β imaging, CSF measures, and cognition in Alzheimer’s Disease*, M. Brier, B. Gordon, K. Friedrichsen, J.E. McCarthy, A. Stern, J. Christensen, C. Owen, P. Aldea, Y. Su, J. Hassenstab, N. Cairns, D.M. Holtzman, A. Fagan, J.C. Morris, B. Ances, T. Benzinger, *Science Translational Medicine*, 338RA66 [2016]. Featured in *Wall Street Journal*, 11/May/2016.
11. *Local and Distributed PiB Accumulation Associated with Development of Preclinical Alzheimer’s Disease*, M. Brier, J.E. McCarthy, T. Benzinger, A. Stern, Y. Su, K. Friedrichsen, J.C. Morris, B. Ances, A. Vlassenko, *Neurobiology of Aging*, 38 [2016] 104-111.
12. *Partial covariance based functional connectivity computation using Ledoit-Wolf covariance regularization*, M. Brier, A. Mitra, J.E. McCarthy, B. Ances, A. Snyder, *Neuroimage* 121 [2015] 29-38.
13. *Entropy vs. Energy Waveform Processing: A Comparison Based on the Heat Equation*, M.S. Hughes, J.E. McCarthy, P. Bruillard, J.N. Marsh, and S.A. Wickline, *Entropy*, 17 [2015] 3518-3551.

14. *Additional Results for “Joint entropy of continuously differentiable ultrasonic waveforms [J. Acoust. Soc. Am. 133, 1 283-300 (2013)]”*, M.S. Hughes, J.E. McCarthy, J.N. Marsh, and S.A. Wickline, Journal of the Acoustical Society of America, 137 [2015] 501.
15. *Mathematical modelling of heat exchange in flash tank heat exchanger cascades* A. Korobeinikov, J.E. McCarthy, E. Mooney, K. Semkov, J. Varghese, Mathematics-in-Industry Case Studies Journal, 5 [2013] 43-58.
16. *Joint-Entropy of Continuously Differentiable Ultrasonic Waveforms* M.S. Hughes, J.E. McCarthy, J.N. Marsh, and S.A. Wickline, Journal of the Acoustical Society of America, 133 (1) [2013] 283-300.
17. *Use of smoothing splines for analysis of backscattered ultrasonic waveforms: Application to monitoring of steroid treatment of dystrophic mice* M.S. Hughes, J.N. Marsh, K.F. Agyem, J.E. McCarthy, B.N. Maurizi, M.V. Wickerhauser, K.D. Wallace, G.M. Lanza, and S.A. Wickline, I.E.E.E. Transactions on Ultrasonics, Ferroelectrics and Frequency Control, 58 (11) [2011] 2361-2369.
18. *Model based methodology development for energy recovery in flash heat exchange systems* A. Korobeinikov, J.E. McCarthy, A. Melnik, E. Mooney, J. Rojas, K. Semkov, J. Varkese, T. Zhelev, Proc. Seventy-Fifth European Study Group with Industry, University of Limerick [2010] 3-15.
19. *Improved Signal Processing to Detect Cancer by Ultrasonic Molecular Imaging of Targeted Nanoparticles* M.S. Hughes, J. Marsh, J.E. McCarthy, M.V. Wickerhauser, B. Maurizi, K. Wallace, G. Lanza, and S.A. Wickline, J. Acoustical Society of America, 129(6) [2011] 3756-3767.
20. *Application of real-time calculation of a limiting form of the Renyi entropy for molecular imaging of tumors* J.N. Marsh, K.D. Wallace, J. E. McCarthy, M. V. Wickerhauser, B. Maurizi, G. M. Lanza, S. A. Wickline and M.S. Hughes, Transactions on Ultrasonics, Ferroelectrics, and Frequency Control [2010] Vol. 57, No. 8 [2010] 1890-1895.
21. *Evaluation of root-n bandwidth selectors for kernel home range estimation* T.D. Steury, J.E. McCarthy, T.C. Roth, S.L. Lima, and D.L.Murray, J. Wildlife Management Vol. 74, No. 3 [2010] 539-548.
22. *Real-time calculation of a limiting form of the Renyi entropy applied to detection of subtle changes in scattering architecture* M.S. Hughes, J.E. McCarthy, M. V. Wickerhauser, J.N. Marsh, J.M. Arbeit, R.W. Fuhrhop, K.D. Wallace, T. Thomas, J. Smith, K. Agyem, G.M. Lanza, and S.A. Wickline, Journal of the Acoustical Society of America, Vol. 126, [2009] 2350-2358.
23. *Application of Renyi entropy for ultrasonic molecular imaging* M.S. Hughes, J.N. Marsh, J.M. Arbeit, R.G. Neumann, R.W. Fuhrhop, K.D. Wallace, L. Thomas, J. Smith, K. Agyem, G.M. Lanza, S.A. Wickline, and J.E. McCarthy, J. Acoustical Society of America, Vol. 125, [2009] 3141-3145.
24. *Perfluorocarbon nanoparticles for molecular imaging and targeted therapies* M.S. Hughes, S. Caruthers, T. Tran, J. Marsh, K. Wallace, T. Cyrus, K. Partlow, M. Scott, M. Lijowski, A. Neubauer, P. Winter, G. Hu, H. Zhang, J.E. McCarthy, B. Maurizi, J. Allen, C. Caradine, R. Neumann, J. Arbeit, G. Lanza, and S. Wickline Proceedings of the IEEE Vol. 96, No. 3 [2008] 397-415.

25. *Properties of an Entropy-based Signal Receiver with an Application to Ultrasonic Molecular Imaging* M.S. Hughes, J.E. McCarthy, J.N. Marsh, J.M. Arbeit, R.G. Neumann, R. Fuhrhop, K.D. Wallace, D.R. Znidarsic, B.N. Maurizi, S.L. Baldwin, G.M. Lanza, and S.A. Wickline, J. Acoustical Society of America, 121 [2007] 3542-3557.
26. *Enhanced Cosmetic Outcome with Running Horizontal Mattress Sutures* B. Moody, J.E. McCarthy, J. Linder and G. Hruza, Dermatologic Surgery Vol. 31 No. 10 [2005] 1313-1316.
27. *Collagen Remodeling after 585-nm pulsed dye laser irradiation: an ultrasonographic analysis* (with B. Moody and G. Hruza) Dermatologic Surgery, Vol. 29 [2003] 997-1000.
28. *The apical angle: A mathematical analysis of the ellipse* (with B. Moody and R. Sengelmann) Dermatologic Surgery, Vol. 27 [2001] 61-63.
29. *A note on H_2 optimal control problems with passivity constraints* John E. McCarthy and Clas Jacobson, IEEE Transactions on Automatic Control, Vol. 45 No. 2 [2000] 286-290.
30. *Equilibrium of Highly Asymmetric Non-neutral Plasmas* Joel Fajans, Elena Backhaus and John E. McCarthy, Physics of Plasmas, Vol. 6 [1999] 6-12.
31. *Solving Poisson's Equation with Interior Conditions* John E. McCarthy, Elena Backhaus and Joel Fajans, Journal of Mathematical Physics, Vol. 39 [1998] 6720-6729.

Essays:

1. *Conferences—An Owner's Guide* Notices of the American Mathematical Society, 69 (9) [2022] 1518-1521.
2. *How often do you want your team to win* Mathematical Intelligencer, 44 [2022] 358-359.
3. *How to give a good Colloquium* Canadian Mathematical Society Notes, 31(5) [1999] 3-4.

Business

- Founder: EMC Squared, LLC.
- Founding member: Siena Analytics LLC, Omnium Labs LLC.
- Consultant for manufacturers, retailers, and COVID-19 Planning.
- Patent: Applying Renyi entropy to detect changes in scattering architecture, (M.S. Hughes, J.E. McCarthy, G. Lanza, V.M. Wickerhauser, S.A. Wickline). U.S. Patent 8500644. Issued August 6, 2013.

Recent Plenary Addresses

1. 2023 Douglas Lectures (3 lectures) Texas A&M, November 2023.
2. Advanced Courses in Operator Theory and Complex Analysis, Thessaloniki, June 2023.
3. Paris Functional Analysis Seminar, December 2022.
4. Conference on Harmonic Analysis, Marseille, December 2022.

5. Colloquium, Université Gustave Eiffel, November 2022.
6. Analysis Seminar, Université de Bordeaux, October 2022.
7. Conference on Geometric and Harmonic Analysis, Corte, October 2022.
8. Colloquium, Université de Lille, October 2022.
9. Analysis Seminar, Lund University, September 2022.
10. Conference on Operators, Functions, Systems, Bedlewo, June 2022.
11. Analysis Seminar, Shandong University, September 2021.
12. Colloquium, Fields Institute, Toronto, September 2021.
13. International Workshop on Operator Theory and Applications, Lancaster, August 2021.
14. Colloquium, University of Saarland, December 2020.
15. Operator Theory with its Applications, August 2020.
16. Conference on Interpolation in spaces of analytic functions, Marseille, November 2019.
17. Algebra, Analysis and Geometry, Dublin, May 2019.
18. International Workshop on Operator Theory and Applications, Shanghai, July 2018.
19. Conference on the mathematical legacy of Serguei Shimorin, Stockholm, June 2018.
20. Conference, Multivariable Operator Theory, Haifa, June 2017.
21. London Mathematical Society Invited Lectures (4 lectures) Newcastle, April 2017.
22. Workshop (4 lectures), Operator Theory and Operator Algebras, ISI Bangalore, December 2016.
23. Mini-course (4 lectures) Université Paul Sabatier, Toulouse, October 2016.
24. Journées du Groupement de Recherche “Analyse Fonctionnelle et Harmonique et Probabilités”, Toulouse, October 2016.
25. Conference on Operator Theory, Indianapolis, September 2016.
26. Operator Theory Seminar, Jagiellonian University, Krakow, May 2016.
27. Mathematical Association of America Meeting, Jacksonville IL, April 2016.
28. Colloquium, University of Waterloo, March 2016.
29. North British Functional Analysis Seminar, Newcastle, October 2015. (2 lectures)
30. Colloquium, Technion University, Haifa, June 2015.
31. Mini-course (3 lectures) 12th Advanced Course in Operator Theory and Complex Analysis, Bologna, June 2015.
32. Workshop on Multivariate Operator Theory, Banff, April 2015.
33. Undergraduate Colloquium, Harris-Stowe State University, St. Louis, December 2014.

34. Workshop on Function theory in several complex variables in relation to modelling uncertainty, ICMS, Edinburgh, July 2014.
35. Conference on Function Spaces, Edwardsville, May 2014.
36. Workshop on Hilbert Modules and Complex Geometry, Oberwolfach, April 2014.
37. Dublin Area Analysis Seminar, Dublin, April 2014.
38. New York Regional Graduate Mathematics Conference, Syracuse, April 2014.
39. South-Eastern Analysis Meeting, Clemson University, March 2014.
40. Meeting on Dirichlet Series and Function Theory in Polydiscs, Oberwolfach, February 2014.

Teaching

- *Ph.D. Dissertations Supervised:*

John Stapel. Ph.D. 1994: “Interpolation between Compatible Hilbert Space Couples”.

Michael Jury. Ph.D. 2002: “Matrix Products and Interpolation Problems in Hilbert Function spaces”.

Saida Sultanic. Ph.D. 2005: “Commutant Lifting Theorem for the Bergman Space”.

Prasada Vegulla. Ph.D. 2007: “Geometry of Distinguished Varieties”.

Gregory Knese. Ph.D. 2007: “Schwarz Lemmas on the Polydisk”.

Brian Maurizi. Ph.D. 2008: “Noise Sensitivity of an Entropy Based Signal Receiver”.

Kelly Bickel. Ph.D. 2013: “Several problems about multivariable functions and associated operators”.

Qingyun Wang. Ph.D. 2013: “Tracial Rokhlin property and noncommutative dimension”.

Ben Passer. Ph.D. 2016: “Non-commutative Borsuk-Ulam Theorems”.

Cheng Chu. Ph.D. 2016: “Three problems in Operator Theory and Complex Analysis”.

Meredith Sargent. Ph.D. 2018: “Carlson’s theorem for different measures”.

Mark Mancuso. Ph.D. 2020: “Operator noncommutative function theory and partial matrix and operator convexity”.

Alberto Dayan. Ph.D. 2021 “Interpolating matrices”.

Chris Felder. Ph.D. 2022 “Some problems in reproducing kernel spaces”.

Georgios Tsikalas. Ph.D. 2024 (expected).

Jiachen Lu. Ph.D. 2026 (expected).

- *Postdoctoral Advisees*

Liming Yang 1993-1995

Scott Saccone 1996-1998

Alex Schuster 1997-1999

Geir-Arne Hjelle 2006-2008

Zhenghui Huo 2016-2018

Zhao Chong 2017-2018

James Pascoe 2015-2018

Michael Hartz 2016-2018

Meric Augat 2019-2022

- *M.A. Theses Supervised*

Patrick Lopatto, 2014-15. “Schatten class membership of Truncated Toeplitz Operators”.

- *Undergraduate Honors Theses Supervised*

Alex Gillula, 2008. “Analysis of hedging strategies using the Black-Scholes formula”.

Vivek Kulkarni, 2009. “An inquiry into optimality of diseases”.

Yuanqing Jin, 2016. “A diffusion model of the progression of Alzheimer’s disease”.

Mo Wu, 2019. “Algorithms for assignment problem with application to child care centers”.

- *Member of Ph.D. Dissertation Committee*

Maciej Paluszynski: Ph.D. 1992; Jianwen Wang: Ph.D. 1995; Judy Munshower: Ph.D. 1997; Dylan Retsek: Ph.D. 2001; Van Maurice Savage: Ph.D. 2001 (Physics); Lynn Apfel: Ph.D. 2003; Seth Howell: Ph.D. 2004; Leonid Kovalev: Ph.D. 2005; David Opela: Ph.D. 2006; Wang-Q Lim: Ph.D. 2006; Paul Koester: Ph.D. 2007; Junhua Chen: Ph.D. 2007 (Physics); Jeff Blanchard: Ph.D. 2007; Bo Zhao: Ph.D. 2007; Lina Lee: Ph.D. 2007; Jim Gill: Ph.D. 2009; Yonhow Lin: Ph.D. 2009; Baili Min: Ph.D. 2011; Jeffrey Langford: Ph.D. 2012; Ryan Hamilton: Ph.D. 2012 (University of Waterloo); Timothy Chumley: Ph.D. 2013; Bingyuan Liu: Ph.D. 2015; Matt Wallace: Ph.D. 2015; Javad Komijani: Ph.D. 2015 (Physics); Matt Brier: Ph.D. 2015 (Neuroscience); Chris Cox: Ph.D. 2016; Robert Rahm: Ph.D. 2016; José Jorge Bueno Contreras: Ph.D. 2018 (Universidad de Sevilla); Muxi Li: Ph.D. 2018; Mohammad Jabbari: Ph.D. 2019; Umber Dube: Ph.D. 2019 (Neuroscience); Marie Jose Kuffner: Ph.D. 2019; Manasa Vempati: Ph.D. 2021; Jeet Sampat: Ph.D. 2022; Nathan Wagner: Ph.D. 2022; Mary Barker: Ph.D. 2022.

- *Neuroscience Qualifying Exam Committees* Umber Dube: Ph.D. 2017; Matt Singh: Ph.D. 2019.

- *Courses Taught at Washington University*

Survey of Calculus II (122)

Calculus I (131) (7 times)

Calculus II (132) (4 times)

Applications of Mathematics (139A) (3 times)

Freshman Seminar: How Mathematicians think (201) (2 times)

Honors Mathematics I (203)

Honors Mathematics II (204)

Calculus III (233) (4 times)

Differential Equations (217) (3 times)

Mathematics for Elementary School Teachers (266)

Foundations for Higher Mathematics (310) (3 times)

Foundations for Higher Mathematics : Writing Intensive version (310W)

Differential Equations and Dynamical Systems (312)

Elementary Probability and Statistics (320)
 Mathematical Biology (350)
 Dynamical Systems and Chaos (350) (2 times)
 Partial Differential Equations (415) (2 times)
 Complex Analysis (416)
 Topology and Analysis I (417)
 Topology and Analysis II (418)
 Topology (4171)
 Financial Derivatives and Differential Equations (450)
 Introduction to Financial Modeling (456)
 Complex Analysis I (5021) (3 times)
 Complex Analysis II (5022) (3 times)
 Measure Theory and Functional Analysis I (5051) (3 times)
 Measure Theory and Functional Analysis II (5052) (4 times)
 Hilbert Spaces I (517)
 Hilbert Spaces II (518)
 Dirichlet Series (521) (2 times)
 Bounded Analytic Functions (523)
 Nevanlinna-Pick Interpolation (527)
 Several Complex Variables (567)
 Teaching Seminar (597) (3 times)

- *Courses taught at Trinity College Dublin*

2009-10: Harmonic Analysis, 342 A and B

- *Courses taught at S.M.I.*

2008: Functional Analysis

- *Courses Taught at U.C. San Diego*

1996: Calculus IV (20D)

- *Courses Taught at Indiana University*

1989-91: Finite Mathematics (118); Business Calculus II (120); Calculus I (215) (2 sections); Calculus II (216); Calculus III (311).

Outreach Activities

2022: Taught *Math Teacher Circle* at Ladue High School.

2021: Lectured in Washington University Prison Education Program.

2021: Opinion essay in St. Louis Post Dispatch on mathematical implications of requiring vaccination at work.

2020: Interview with St. Louis Post Dispatch on quantifying Covid risk.

2019: Public Lecture “Chaos”.

2018: Talk to Math Circles (High School Students).

2018: Founder (with Bryan Clair) of St. Louis Academy of Mathematical Sciences.

2016: Talk to Mu Alpha Theta Conference (800 registrants) “Why you should major in math”.

2016: Two talks to Clayton High School Honors Precalculus Class on applications of mathematics.

2015: Talk to St. Louis Machine Learning and Data Science Meetup.

2015: Talk to Math Circles (Middle School Students).

2014: Talk to Math Circles (Middle School Students) “Summing series”.

2012: Talk to Math Circles (Middle School Students) “Fibonacci Sequence”.

2010: Talk to Math Circles (Middle School Students) “Penrose Tilings”.

2009: 2 lectures to high school students on uses of mathematics.

2009: Talk at Dublin “Ignite” to general audience.

2009: Talk to Math Circles (Middle School Students).

2008: Presentation to “Teachers’ Circle”, a group of middle school mathematics teachers, on polyhedra and the Euler characteristic.

2007: Presentation to Captain Elementary School Math Club.

2006: Pew Undergraduate Research Symposium. Talk to 70 students about careers in mathematics.

2006: Missouri Scholars Academy: Lecture to 300 High School students on uses of mathematics.

2005: Science on Tap Lecture on “Chaos”.

2005: Century Club Lecture “How Mathematics saves lives”.

2005: Talks to Washington University Alumni Chapters (Los Angeles and San Diego) on applications of mathematics to medicine.

2002: Talk at Eureka High School on “Calculus in the Medical Field”.

Service and Administrative Work

- *University and School of Arts and Sciences*

Undergraduate Faculty-Student Mediator, 2023-current.

Center for Theoretical and Computational Neuroscience, Executive Committee, 2022-current.

Chemistry External Chair Search Committee, chair, 2021-2022.

Arts and Sciences Academic Planning Committee, 2016-2020.

External Review Committee, Weidenbaum Center, 2019.
Cornerstone Review Committee, 2019.
Undergraduate Student Diversity Working Group 2016-2017.
Conflict of Interest Faculty Focus Group, 2015-2016.
Arts and Sciences Review Committee on Faculty Personnel Procedures, 2014-2017.
Arts and Sciences Advisory Committee on Tenure, Promotion and Personnel, 2010-13.
Internal Review Committee, Center for Materials Innovation, 2010-2011.
Arts and Sciences Academic Planning Committee, 2005-2009.
External Review Committee, Center for Materials Innovation, 2007-08.
Philosophy Department Search Committee, 2005-06.
Internal Review Committee for Performing Arts, 2005-06.
Secretary of the Faculty Senate and Faculty Senate Council, 2003-2006.
Faculty Representative to Washington University Board of Trustees, 2003-2006.
Task Force on Graduate Education, 2004-2006.
Faculty Council of Arts and Sciences, 1999-2002 (Secretary, Fall 2000; Chair, 2001-02).
Subcommittee on Student Concerns of the Internal Review Committee of the Division of
Biology and Biomedical Sciences 2002.

- *Mathematics and Statistics Department*

Chair of Department, 2016-2021.
Chair of Graduate Committee, 1996-2006.
Executive Committee, 1999-2000, 2001-02, 2002-03, 2005-06, 2006-07, 2007-08, 2008-09,
2010-11, 2011-12, 2012-13, 2014-15, 2016-17, 2017-18, 2018-19, 2019-20, 2020-21,
2021-22.
Intern Training and Placement Coordinator, 2023-present.
Teaching Schedule Committee, 2021-2022.
Website Committee, 2021-2022.
Putnam Exam Coach, 2015.
Chair of Search Committee, 2011-12, 2012-13, 2014-15.
Chair of Statistics Search Committee, 2007-08.
Member of Search Committee, 2013-14.
Undergraduate Math Club Coordinator, 2007-08, 2008-09, 2010-11.
Graduate Committee, Member 2005-09, 2023-24.
Undergraduate Committee, 1993-95.
Library Committee, 1994-95.

Personal Information

Born: 1964.

Citizenship: American, Irish, British.