

ANDRE KHALIL, PhD

CURRICULUM VITAE

PERSONAL INFORMATION

ADDRESS: Department of Chemical & Biomedical Engineering
University of Maine, Orono, ME 04469 USA

EMAIL: andre.khalil@maine.edu

BORN: Rimouski, QC, Canada

EDUCATION AND TRAINING

2005 Post-Doctoral Fellow, The Jackson Laboratory, Bar Harbor, ME, USA
Field of Study: *Computational Biomedicine*

2004 Ph.D. in Mathematics and Astrophysics, Université Laval, QC, Canada
Thesis: "*Analyse structurelle de l'hydrogène neutre dans la Voie Lactée*"
English: "*Structural Analysis of Atomic Hydrogen in the Milky Way*"
Advisors: Prof. Gilles Joncas (U. Laval) & Prof. Fahima Nekka (U. Montréal)

1999 M.S. in Mathematics, Concordia University, Montréal, QC, Canada
Thesis: "*Exploration of the Fractal Dimension*"
Advisor: Prof. Pawel Gora

1996 B.S. in Mathematics, Concordia University, Montréal, QC, Canada

PERSONAL STATEMENT

At the University of Maine, I am the founding director of the [CompuMAINE Lab](#) (Computational Modeling, Analysis of Images and Numerical Experiments). I have co-authored **75 publications**. My work is published in journals such as *Astrophysical Journal*, *Frontiers in Physiology*, the *PLoS* journals, and *PNAS*. Applications include breast cancer (which has led to two issued patents), cell nucleus architecture, regenerative medicine, muscle cell morphogenesis, neuroscience, pure mathematics, and astrophysics. I have trained (or am currently training) **30 thesis students** (8 PhDs + 16 Masters + 6 Honors), obtained **33 grants/contracts totaling \$6.5M** (as PI, co-PI or senior personnel), while developing or restructuring several undergraduate and graduate courses.

Breast Cancer Research: I authored 10 peer-reviewed publications on breast cancer, advised 11 students working on their theses over this breast cancer project, and secured **over one million dollars in funding specifically for the breast cancer project:** from the University of Maine (\$158K), the Maine Cancer Foundation (\$328K), the National Cancer Institute (\$418K), the Maine Technology Institute (\$25K), the National Institute of General Medical Sciences (\$25K), and the National Science Foundation (\$50K). PhD candidate Kendra Batchelder and I are co-inventors on three issued patents related to this work (two in the U.S. and one in Europe).

POSITIONS

2020-present Professor of Biomedical Engineering, University of Maine, Orono, ME

2018-2020 Associate Professor of Biomedical Engineering, University of Maine, Orono, ME

2011-2017 Associate Professor of Mathematics, University of Maine, Orono, ME

2005-2011 Assistant Professor of Mathematics, University of Maine, Orono, ME

2019-present Adjunct Graduate Faculty, Boise State University, Boise, ID

2014-2016 Allied Scientist, Eastern Maine Medical Center, Bangor, ME

2011-present	Cooperating Professor of Computing and Information Science, UMaine
2010-2017	Collaborator, Chromatin and Genome Research Group, Laboratoire Joliot-Curie, École Normale Supérieure de Lyon, France
2009-present	Cooperating Professor of Physics, Department of Physics & Astronomy, UMaine
2008	Visiting Researcher, Department of Applied Physical Chemistry, University of Heidelberg, Heidelberg, Germany
2008	Guest Lecturer, Interdisciplinary Center for Scientific Computing, University of Heidelberg, Heidelberg, Germany
2007, 2008, 2009	Visiting Researcher, Centre National de Recherche Scientifique (CNRS), Laboratoire Joliot-Curie, École Normale Supérieure de Lyon, France
2007-present	Mathematics of Information Technology and Complex systems (MITACS) College of Reviewers Faculty Member
2006-present	Graduate School of Biomedical Sciences and Engineering Faculty, UMaine
2006-2008	Adjunct Professor, Department of Physics, Université Laval, Québec, Canada
2005-present	Adjunct Member of the Scientific Staff, The Jackson Laboratory, Bar Harbor, ME
2005-present	Faculty Member of the Functional Genomics Program, UMaine
2005-2015	Faculty Member of the Institute for Molecular Biophysics (IMB), UMaine
2001-2004	Physics Graduate Research Assistant, Université Laval, Québec, Canada
2000-2001	Engineering-Math Adjunct Faculty, Université du Québec a Rimouski, Canada
1999-2000	Geographical Information Systems Faculty, Collège de Rimouski, Canada
1996-1999	Graduate Research Assistant, Concordia University, Montréal, Canada
1992-1996	Music salesman, Le Sillon, Rimouski, QC, Canada

PATENTS

- 1) E.U. Patent 2,988,659 B1 *Improved Methods of Tissue Classification*. Issued: 2022/10/26
- 2) U.S. Patent 10,769,790 B2 *Methods of Cancer Detection*. Issued: 2020/09/08
- 3) U.S. Patent 10,467,755 B2 *Methods of Cancer Detection*. Issued: 2019/11/05

PUBLICATIONS

Refereed Journal Articles

- 1) Hamilton, J, Breggia, A, Fitzgerald, TL, Jones, MA, Brooks, PC, Tilbury, KB, **Khalil, A** 2022 *Multiscale anisotropy analysis of second-harmonic generation collagen imaging of human pancreatic cancer*. Frontiers in Oncology. 12:991850. doi: 10.3389/fonc.2022.991850
- 2) Liu, J, Enderlin, E, Marshall, HP, **Khalil, A** 2022 *Synchronous retreat of southeast Greenland's peripheral glaciers*. Geophysical Research Letters 49 (13), e2022GL097756. doi: 10.1029/2022GL097756.
- 3) Juybari, J, **Khalil, A** 2022 *Elimination of image saturation effects on multifractal statistics using the 2D WTMM method*. Frontiers in Physiology. 13:921869. doi: 10.3389/fphys.2022.921869.
- 4) Willows, JW, Blaszkiewicz, M, Lamore, A, Borer, S, Dubois, AL, Garner, E, Breeding, WP, Tilbury, KB, **Khalil, A**, Townsend, K 2021 *Visualization and analysis of whole depot adipose tissue neural innervation*. iScience. 24(10), 103127. doi: 10.1016/j.isci.2021.103127
- 5) Castro, IJ, Toner, BC, Xie, SQ, Swingland, J, Hodges, A, Tabrizi, SJ, Turkheimer, F, Pombo, A, **Khalil, A** 2021 *Altered nuclear architecture in blood cells from Huntington's disease patients*. Neurological Sciences. 43 (1) 379-385. doi: 10.1007/s10072-021-05289-w
- 6) Tilbury, K, Han, X, Brooks, P, **Khalil, A** 2021. *Multiscale Anisotropy Analysis of Second-Harmonic Generation Collagen Imaging of Mouse Skin*. Journal of Biomedical Optics. 26(6), 065002. doi: 10.1117/1.JBO.26.6.065022
- 7) Gerasimova-Chechkina, E, Toner, BC, Batchelder, KA, White, B, Freynd, G, Antipev, I, Arneodo, A, **Khalil, A** 2021. *Loss of mammographic tissue homeostasis in invasive lobular and ductal*

- breast carcinomas vs. benign lesions. Frontiers in Physiology – Fractal Physiology. 12, 660883. doi: 10.3389/fphys.2021.660883*
- 8) Liu, J, Enderlin, EM, Marshall, HP, **Khalil, A** 2021. *Automated detection of marine glacier calving fronts using the 2D Wavelet Transform Modulus Maxima (WTMM) segmentation method. IEEE Transactions on Geoscience and Remote Sensing. 59(11), 9047-9057. DOI: 10.1109/TGRS.2021.3053235*
 - 9) Robitaille, JF, Abdeldayem, A, Joncour, I, Moraux, E, Motte, F, Lesaffre, P, **Khalil, A** 2020. *Statistical model for filamentary structures of molecular clouds. The modified multiplicative random cascade model and its multifractal nature. Astronomy & Astrophysics. 641, A138 (11 pages).*
 - 10) Marquis, K, Chasse, B, Regan, DP, Boutiette, A, **Khalil, A**, Howell, C 2019, *Vascularized Polymers Spatially Control Bacterial Cells on Surfaces. Advanced Biosystems, 4 (10), 1900216.*
 - 11) Bailey, EC, Alrowaished, SS, Kilroy, EA, Crooks, ES, Drinkert, DM, Karunasiri, CM, Belanger, JJ, **Khalil, A**, Kelley, JB, & Henry, CA 2019, *NAD⁺ improves neuromuscular development in a zebrafish model of FKR_P-associated dystroglycanopathy. Skeletal Muscle, 9 (1), 1-23.*
 - 12) Bradley, DM, D'Alessio, D, **Khalil, A**, Niemeyer, RG, Ossanna, E, Tanenbaum, A, Toner, B 2019, *On the relative frequency of residue classes in Pascal's Triangle modulo a prime. Fractals, 27 (06) 1950098.*
 - 13) Garrett, AM, **Khalil, A**, Walton, D, Burgess, RW 2018, *DSCAM promotes self-avoidance in the developing mouse retina by masking the functions of cadherin superfamily members. PNAS, 115 (43), E10216-E10224.*
 - 14) Bradley, DM, **Khalil, A**, Niemeyer, RG, Ossanna, E 2018 *The Box-Counting Dimension of Pascal's Triangle $r \bmod p$. Fractals, 26, 05, 1850071.*
 - 15) Marin, Z, Wallace, JK, Nadeau, JL **Khalil, A** 2017 *Wavelet-based tracking of bacteria in unreconstructed, off-axis holograms. Methods, doi.org/10.1016/j.ymeth.2017.09.003.*
 - 16) Marin, Z, Batchelder, KA, Toner, BC, Guimond, L, Gerasimova-Chechkina, E, Harrow, AR, Arneodo, A and **Khalil, A** 2017 *Mammographic evidence of microenvironment changes in tumorous breasts. Medical Physics, 44:1324-1336. doi:10.1002/mp.12120*
 - 17) Gerasimova-Chechkina, E, Toner, B, Marin, Z, Audit, B, Roux, SG, Argoul, F, **Khalil, A**, Gileva, O, Naimark, O, Arneodo, A 2016 *Comparative multifractal analysis of dynamic infrared thermograms and X-ray mammograms enlightens changes in the environment of malignant tumors, Frontiers in Physiology, 7, 336 (15 pages)*
 - 18) Plourde, SM, Marin, Z, Smith, ZR, Toner, BC, Batchelder, KA, **Khalil, A** 2016. *Computational growth model of breast microcalcification clusters in simulated mammographic environments. Computers in Biology and Medicine, 76, 7-13*
 - 19) Richard, CD, Tanenbaum, AB, Audit, B, Arneodo, A, **Khalil, A**, Frankel, WN 2015. *SWDreader: A Wavelet-Based Algorithm Using Spectral Phase to Detect and Characterize Spike-Wave Discharges in Three Genetic Mouse Models of Absence Epilepsy, Journal of Neuroscience Methods, 242, 127-140*
 - 20) Batchelder, KA, Tanenbaum, AB, Albert, S, Guimond, L, Kestener, P, Arneodo, A, **Khalil, A** 2014. *Wavelet-based 3D reconstruction of microcalcification clusters from two mammographic views: New Evidence that fractal tumors are malignant and Euclidean tumors are benign, PLoS One, 9 (9) e107580 (11 pages). DOI: 10.1371/journal.pone.0107580*
 - 21) Gerasimova, E, Audit, B, Roux, SG, **Khalil, A**, Argoul, F, Naimark, O, Gileva, O, Arneodo, A 2014. *Interdisciplinary approach for estimating and differentiating healthy and cancerous breast tissues with a multifractal analysis of skin temperature dynamics, Russian Journal of Biomechanics, 18(1), 79-91.*
 - 22) Gerasimova, E, Audit, B, Roux, SG, **Khalil, A**, Gileva, O, Argoul, F, Naimark, O, Arneodo, A 2014 *Wavelet-based multifractal analysis of dynamic infrared thermograms to assist in early breast cancer diagnosis, Frontiers in Physiology, 5, 176 (11 pages).*
 - 23) Gerasimova, E, Audit, B, Roux, SG, **Khalil, A**, Argoul, F, Naimark, O, Arneodo, A, 2013. *Multifractal Analysis of Dynamic Infrared Imaging of Breast Cancer, Europhysics Letters, 104 (6), 68001 (6 pages)*
 - 24) Wu, Y, Xiao, W, Mu, R, Batuski, D, **Khalil, A**, 2013. *Nearest Neighbor Vector Analysis of SDSS*

- DR5 Galaxy Distribution*, Natural Science, 5 (1), 47-51.
- 25) Goody, MF, Kelly, MW, Reynolds, CJ, **Khalil, A**, Crawford, BD, Henry, CA 2012. *NAD+ Biosynthesis Ameliorates a Zebrafish Model of Muscular Dystrophy*, PLoS Biology, 10 (10), e1001409 (17 pages)
 - 26) Wu, Y, Batuski, D, **Khalil, A**, 2012. *Three-Dimensional Filamentation Analysis of SDSS DR5 Survey*, ISRN Astronomy & Astrophysics, 171829 (7 pages).
 - 27) McAteer, RT, Kestener, P, Arneodo, A, **Khalil, A** 2010. *Automated Coronal Loop Detection using a Wavelet Transform Modulus Maxima Method*, Solar Physics, 262, 387-397.
 - 28) Robitaille, JF, Joncas, G, **Khalil, A** 2010. *Morphological Analysis of HI Features. III. Metric Space Technique Revisited*, Monthly Notices of the Royal Astronomical Society, 405, 636-656.
 - 29) Kestener, P, Conlon, PA, **Khalil, A**, Fennell, L, McAteer, RTJ, Gallagher, PT, Arneodo, A 2010. *Characterising Complexity in Compound Systems: Segmentation in Wavelet-Space*, Astrophysical Journal, 717, 995-1005.
 - 30) Goody, MF, Kelly, MW, Lessard, KN, **Khalil, A**, Henry, CA 2010. *Nrk2b-mediated NAD+ production regulates cell adhesion and is required for muscle morphogenesis in vivo: Nrk2b and NAD+ in muscle morphogenesis*, Developmental Biology, 344, 809-826.
 - 31) Grant, J, Verrill, C, Coustham, V, Arneodo, A, Paladino, F, Monier, K, **Khalil, A** 2010. *Perinuclear distribution of heterochromatin in developing C. elegans embryos*, Chromosome Research, 18, 873-885.
 - 32) **Khalil A**, Aponte, C, Zhang R, Davisson, TH, Dickey, I, Engelman D, Hawkins M, Mason, M 2009. *Image analysis of soft-tissue in-growth and attachment into highly porous alumina ceramic foam metals*, Medical Engineering and Physics, 31, 775-783.
 - 33) Wu, Y, Batuski, D, **Khalil, A** 2009. *Multi-Scale Morphological Analysis of SDSS DR5 Survey Using the Metric Space Technique*, Astrophysical Journal, 707, 1160-1167.
 - 34) Roland, T, **Khalil, A**, Tanenbaum, A, Berguiga, L, Delicheree, P, Bonneviot, L, Elezgaray, J, Arneodo, A, Argoul, F 2009. *Revisiting the physical processes of vapodeposited thin gold films on chemically modified glass by atomic force and surface plasmon microscopies*, Surface Science, 603, 3307-3320.
 - 35) Snow, CJ, Goody, M, Kelly, MW, Oster, EC, Jones, R, **Khalil, A**, and Henry, CA 2008, *Time-lapse analysis and mathematical characterization elucidate novel mechanisms underlying muscle morphogenesis*. PLoS Genetics, 4(10):e1000219 (18 pages).
 - 36) Snow CJ, Peterson, M, **Khalil, A**, Henry C 2008. *Muscle development is disrupted in zebrafish embryos deficient for Fibronectin*, Developmental Dynamics, 237, 2542-2553.
 - 37) **Khalil, A**, Grant, JL, Caddle, LB, Atzema, E, Mills, KD, Arneodo, A 2007. *Chromosome territories have a highly non-spherical morphology and non-random positioning*. Chromosome Research, 15, 899-916.
 - 38) Caddle, LB, Grant, JL, van Hase, J, Denegre, J, Shirley, BJ, Bewersdorf, J, Cremer, C, Arneodo, A, **Khalil, A**, & Mills, KD 2007 *Heterologous chromosome territory neighborhoods promote translocation susceptibility in primary lymphocytes*. Chromosome Research, 15, 1061-1073.
 - 39) **Khalil, A**, Joncas, G, Nekka, F, Kestener, P, & Arneodo, A 2006, *Morphological Analysis of HI Features II: Wavelet-Based Multifractal Formalism*, Astrophysical Journal Supplement Series, 165, 512-550.
 - 40) **Khalil, A**, Joncas, G, & Nekka, F 2004, *Morphological Analysis of HI Features I: Metric Space Technique*, Astrophysical Journal, Vol. 601, 352-364

Refereed Conference Articles:

- 41) Harling, M, Blaszkiewicz, M, Willows, J, Johnson, J, Townsend, K, **Khalil, A**, Tilbury, K. 2020. 3D analysis of the spatial relationships of collagen and nerves in adipose tissue using the Metric Space Technique. In *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXVII*. 112450R (10 pages).
<https://doi.org/10.1117/12.2546918>
- 42) Liu, J, Enderlin, EM, **Khalil, A**, 2019. *Unsupervised glacier terminus detection in satellite imagery using the 2D Wavelet Transform Modulus Maxima (WTMM) segmentation method*. GeoComputation 2019, Queenstown, New Zealand (8 pages).

<https://doi.org/10.17608/k6.auckland.9869606.v1>

- 43) Breeding, PW, M Blaszkiewicz, K Townsend, **A Khalil**, and KB Tilbury 2019 *Exploratory investigation of the spatial relationships of collagen and nerves in subcutaneous white adipose tissue (scWAT) using 2-photon microscopy*. In *Multiphoton Microscopy in the Biomedical Sciences XIX* (Vol. 10882, p. 1088218). International Society for Optics and Photonics. (8 pages).
- 44) Gerasimova, E, Toner, B, Marin, Z, Audit, B, Roux, SG, Argoul, F, **Khalil, A**, Gileva, O, Naimark, O, Arneodo, A 2016 *Combining multifractal analyses of digital mammograms and infrared thermograms to assist in early breast cancer diagnosis*, in *AIP Conference Proceedings*, 1760, 020018 (11 pages).
- 45) Gerasimova, E, Audit, B, Roux, SG, **Khalil, A**, Gileva, O, Argoul, F, Naimark, O, Arneodo, A 2014 *A wavelet-based method for multifractal analysis of medical signals: Application to dynamic infrared thermograms of breast cancer*, in *Nonlinear Dynamics of Electronic Systems: Communications in Computer and Information Science*, 438, p. 288-300.
- 46) Dickey, ID, Donahue, DW, Peshlov, B, Nohe, A, **Khalil, A**, Mason, M, Zhang, R, Aponte, C, Davisson, TH, Engelman, D, Hawkins, M 2009. *Pore size modulates strength of soft-tissue in-growth and growth factor expression into novel porous titanium implants*, *Transactions of the Orthopaedic Research Society*, 34, 2213 (1 page).
- 47) **Khalil, A**, Mason, M, Dickey, ID, Zhang, R, Aponte, C, Davisson, TH, Engelman, D, Hawkins, M 2009. *Pore size and morphology modulate patterning of soft-tissue in-growth into porous titanium implants based on novel imaging tools*, *Transactions of the Orthopaedic Research Society*, 34, 478 (1 page).
- 48) **Khalil, A**, Mason, M, Dickey, I, Zhang, R, Aponte, C, Davisson, T, Engelman, D, Hawkins, M 2008, *Pattern of Soft Tissue In-Growth into Porous Implants Based on Novel Imaging Tools*, *Transactions of the Orthopaedic Research Society*, 33, 1877 (1 page).
- 49) Mills, KD, Caddle, LB, **Khalil, A**, Bewersdorf, J. 2006. *Imaging the Cancer Genome: High Resolution Microscopy and Quantitative Analyses*, *Optical Society of America*, paper WB5, (3 pages).
- 50) **Khalil A**, Joncas G, Nekka F 2002. *Exotic Tools for the Morphological Analysis of HI Clouds*, *ASP Conference Proceedings*, Vol. 276, Edited by A. R. Taylor, T.L. Landecker, and A.G. Willis, San Francisco, Astronomical Society of the Pacific, p. 194-197.

Conference Proceedings/Abstracts:

- 51) Batchelder, KA, Cinelli, C, Harrow, AR, **Khalil, A** 2022. *Computational Assessment of Healthy vs. Risky Mammographic Breast Density*. Annual Meeting of the Radiological Society of North America, Chicago, IL.
- 52) Hamilton, J, Wissel, M, Batchelder, KA, Tilbury, K, Brooks, P, **Khalil, A** 2022. *Wavelet-Based Anisotropy Analysis of SHG Imaged Breast Biopsy Tissue Trends with Mammogram BI-RADS Assessment Score*. Annual Meeting of the Biomedical Engineering Society, San Antonio, TX.
- 53) Batchelder, KA, Cinelli, C, Harrow, AR, **Khalil, A** 2022. *Quantitative Visualization of Healthy vs. Risky Mammographic Breast Density. Why Study Mammographic Density?*, Melbourne, Australia.
- 54) Holbrook, J, Kugell, D, McCarthy, M, White, B, **Khalil, A** 2022. *Non-Contact Image Analysis of Breathing Rate Using An Unmanned Aerial Vehicle (UAV)*. 48th Annual Northeast Bioengineering Conference (NEBEC 2022) New York, NY.
- 55) White, B, Glatter, S, **Khalil, A** 2022. *Hybrid Power Spectral and Wavelet Image Roughness Analysis*. 48th Annual Northeast Bioengineering Conference (NEBEC 2022) New York, NY.
- 56) White, B, Glatter, S, **Khalil, A** 2022. *Hybrid Power Spectral and Wavelet Image Roughness Analysis*. 48th Annual Northeast Bioengineering Conference (NEBEC 2022) New York, NY.
- 57) Hamilton, J, Tilbury, K, Brooks, P, **Khalil, A** 2022. *Multiscale Wavelet-Based Anisotropy Analysis of Second Harmonic Generation Images of Pancreatic Cancer*. 48th Annual Northeast Bioengineering Conference (NEBEC 2022) New York, NY.
- 58) White, B, Khalil, A 2021. *Wavelet-Based Automatic Breast Segmentation from Mammograms: Cost Function Optimization*. Annual Meeting of the Biomedical Engineering Society, Orlando, FL.

- 59) White, B, **Khalil, A** 2020. *Wavelet-Based Automatic Breast Segmentation from Mammograms*. Annual Meeting of the Biomedical Engineering Society, San Diego, CA.
- 60) Enderlin, EM, Liu, J, Bollen, K, Muhlheim, R, **Khalil, A** 2020. *Exploring Stability of Greenland's Peripheral Marine-Terminating Glaciers through Analysis of Automated Terminus Position Time Series*. American Geophysical Union Fall Meeting, Online.
- 61) Liu, J, Enderlin, EM, **Khalil, A**, Marshall, HP. 2020. *Southeast Greenland's marine-terminating peripheral glaciers underwent synchronous retreat in 2016 in respond to ocean-forcing*. American Geophysical Union Fall Meeting, Online.
- 62) Toner, B, **Khalil, A** 2020. *Exploratory computational longitudinal analysis of mammographic microenvironment disruption preceding breast tumorigenesis*. Cancer Research, 80 (4 supplement), P6-06-04.
- 63) **Khalil, A** 2020. *Wavelet based multifractal analysis of loss of tissue homeostasis in mammographic breast tissue*. AMS Special Session on Fractal Geometry, Dynamical Systems, and Applications, I. Joint Mathematics Meetings (American Mathematical Society and Mathematical Association of America), Denver, CO. Abstract #1154-92-1315.
- 64) Liu, J, Enderlin, EM, **Khalil, A** 2020. *Investigating spatiotemporal patterns in Greenland glacier terminus changes using automated edge detection in satellite images*. IASC-NAG Workshop on the Dynamics and Mass Budget of Arctic Glaciers & cross-cutting activity, Obergugl, Austria.
- 65) Liu, J, Enderlin, EM, **Khalil, A** 2019. *Greenland Marine Glacier Terminus Mapping in Satellite Imagery using the Automated 2D Wavelet Transform Modulus Maxima (WTMM) Segmentation Method*. American Geophysical Union Fall Meeting, San Francisco, CA.
- 66) Harling, M, Blaszkiewicz, M, Willows, J, Johnson, C, Townsend, K, **Khalil, A**, Tilbury, K 2019. *Optically Exploring Neuropathy in Adipose Tissue*. Annual Meeting of the Biomedical Engineering Society, Philadelphia, PA.
- 67) Liu, J, Enderlin, EM, **Khalil, A** 2019. *Investigating Changes to Greenland's Peripheral Marine-Terminating Glaciers Through Automated Analysis of Satellite Imagery*. University of Maine Climate Change Institute 2019 Annual Meeting.
- 68) Mills, KD, Cyr, A, Maclay, T, Day, M, Hasham, MG, **Khalil, A** 2017. *A small molecule RAD51 inhibitor preferentially affects cells expressing high cytidine deaminase activity*. American Society of Hematology 59th Annual Meeting & Exposition, Atlanta, GA.
- 69) Garrett, AM, Tadenev, ALD, **Khalil A**, Fuerst, PG, Burgess RW 2016. *Dscam promotes self-avoidance in neurodevelopment by masking diverse cell adhesion molecules*. Annual Meeting of the Society for Neuroscience: San Diego, CA.
- 70) Garrett, AM, Tadenev, ALD, **Khalil, A**, Fuerst, PG, Burgess, RW 2015. *Dscams promote self-avoidance by masking adhesion through both PDZ-dependent and -independent mechanisms*. Annual Meeting of the Society for Neuroscience: Chicago, IL.
- 71) Burgess, RW, Garrett, AM, Tadenev, ALD, **Khalil, A**, Fuerst, PG 2014. *Dscams promote self-avoidance by masking adhesion through both MAGI-dependent and -independent mechanisms*. Annual Meeting of the Society for Neuroscience: Washington, DC.
- 72) Richard, CD, **Khalil, A**, Frankel, W 2013. *Novel computational approach to detect absence seizures in mutant mouse strains*. Annual Meeting of the Society for Neuroscience: San Diego, CA.
- 73) Kestener, P, **Khalil, A**, Arneodo, A 2010. *A continuous wavelet-based segmentation tool to analyze multifractal properties of quiet and active regions from solar magnetogram data*. In ADA6, Astronomical Data Analysis Conference, Monastir, Tunisia.
- 74) Wu, Y, Batuski, D, **Khalil, A** 2010. *Properties of Density Field Clusters from the SDSS*, Bulletin of the American Astronomical Society, 42, 385.
- 75) Wu, Y, Batuski, D, **Khalil, A** 2009. *Application of the Metric Space Technique in 2D and 3D to SDSS DR5*, Bulletin of the American Astronomical Society, 41, 449.
- 76) Wu, Y, Batuski, D, **Khalil, A** 2007. *New statistical methods to analyze the Sloan Digital Sky Survey Data*, Joint New England Sections of the American Physics Society and AAPT Spring Meeting.
- 77) Wu, Y, Batuski, D, **Khalil, A** 2007. *New Statistical Methods to Determine the Fractal Dimension of Structures Evident in the SDSS, WMAP, and 2MASS Surveys*, Bulletin of the American

Astronomical Society, 39, 804.

- 78) Wu, Y, Batuski, D, & **Khalil, A** 2006. *New statistical methods to analyze the SDSS DR5 galaxy distribution*, Bulletin of the American Astronomical Society, 38, 1000.

Books

- 79) Wu, Y and **Khalil, A** 2009. *The Evolution of the Universe*. VDM Verlag, (76 pages).
 80) Wu, Y, Batuski, D, and **Khalil, A** 2008. *The Fractal Structure of the Universe*. VDM Verlag, (80 pages).

Industry Reports

- 81) **Khalil, A**, Mason, MD 2008. *Image Analysis of Soft-Tissue In-Growth into Artificial Bone Implants: Part II: PSF and SLM Implants*, Stryker Orthopaedics, (4 pages).
 82) **Khalil, A**, Mason, MD 2006. *Image Analysis of Soft-Tissue In-Growth into and Attachment to Alumina Ceramic Foam for Canines*, Stryker Orthopaedics, (14 pages).

Data Sets

- 83) Liu, J, Enderlin, E, **Khalil, A**, Marshall, HP 2021 *Dataset for Time Series of Terminus Position for Glaciers Along the Periphery of Southeast Greenland* [Data set].
https://doi.org/10.18122/cryogars_data.1.boisestate

HONORS

- Received the **Faculty Mentor Impact Award** at the University of Maine in 2022.
- Corresponding author of a paper (Plourde et al. Computers in Biology and Medicine 2016) that was given the **honors status**. Out of ~1,500 papers submitted to this journal in 2016, ~300 were accepted for publication, and amongst the top-ranked 80 out of the 300, ours was listed as **meritorious** and ranked 38:
https://umaine.edu/compumaine/wp-content/uploads/sites/495/2019/09/CBM_Honored_Papers_2016_Plourde_et_al_highlight_green.pdf
- Our breast cancer research was highlighted in an article by Lindsay Tice from the Sun Journal in Lewiston, Maine, on cutting-edge research being done right here in Maine, describing "10 of the most promising projects in Maine":
<https://www.sunjournal.com/2017/05/14/miracles-from-maine/>
- Co-author of paper (Gerasimova et al. Europhysics Letters 2013 104 (6), 68001) that was highlighted by the Europhysics News:
http://www.europhysicsnews.org/index.php?option=com_content&view=article&id=492%3Amultifractal-analysis-of-breast-cancer-ir-thermograms-vol-45-no2&catid=121%3Avol-45-no2-highlights&Itemid=321&lang=en_GB.utf8%2C+en_GB.UT
- Co-author of a paper (Goody et al. PLoS Biology 2012 10 (10), e1001409) that was:
- 1) Recommended by Faculty of 1000: <http://f1000.com.prxy4.ursus.maine.edu/prime/717962603>
 - 2) Highlighted by a PLoS Biology Synopsis:
<http://www.plosbiology.org/article/info%3Adoi%2F10.1371%2Fjournal.pbio.1001410>
 - 3) Highlighted in a PLoS Biologue:
<http://blogs.plos.org/biologue/2012/10/23/muscular-dystrophy-and-vitamins/>
- Co-author of a paper (Snow et al. PLoS Genet 2008 4 (10) :e1000219) that was recommended by Faculty of 1000: "*I like this paper because it is a **tour de force of quantitative analysis** of cell behaviors in vivo. It represents perfectly the direction in which morphogenesis studies need to go. The authors combine **rigorous** application of traditional methods for quantifying cell behavior and also*

introduce a **very promising new mathematical approach** that allows rapid and large-scale comparisons of cell shapes (for example, Isotropy).”

<http://www.f1000biology.com/article/id/1142870/evaluation>

GRANTS AND FUNDING

Title	Funding Agency	Role	Amount Awarded	Start Date	Duration (months)
I-Corps: Customer discovery for breast cancer detection technology	National Science Foundation	PI	\$50,000	6/1/2022	12
Computational assessment of tumor-associated mammographic breast tissue disruption: Towards a pre-detection diagnostic method	National Institute of General Medical Sciences through the DRIVEN Acceleration Fund	PI	\$24,750	9/21/2021	12
MammoWAVED: Mammography Wavelet-based Assessment for Visualization and Early Detection of breast cancer	Maine Technology Institute	PI	\$25,000	9/1/2021	6
Coupling Advanced Computational Analyses of Mammography and SHG Imaging for Early Detection of Breast Cancer Tissue Microenvironment Disruptions Accompanying Tumorigenesis	National Cancer Institute	PI	\$418,484	9/1/2020	36
MRI: Acquisition of a high-performance computing instrument to support deep learning, modeling / simulation, and visualization for STEM	National Science Foundation	Senior Personnel	\$350,000	10/1/2019	36
Imaging and computational analysis of human pancreatic cancer tissue samples	Maine Medical Center Research Institute	Co-PI	\$15,000	7/1/2019	6
Leveraging the Power of Diffuse Optical Imaging	UMaine Medicine Infrastructure Grant Award	Co-PI	\$100,000	6/1/2019	12
Diagnosing Breast Cancer through Biophysical Disruptions of Tissue Microenvironment	UMaine Medicine NIH Incentive Program Award	PI	\$5,000	6/1/2019	3
Novel Bone Strength Diagnostic Instrument Development and Normative Data Collection Study	NASA	Co-PI	\$14,977	10/17/2018	12
Integrating Computing into Science Teaching and Learning in Grades 6–8: A Diverse Partnership to Develop an Evidence-Guided Model to Serve Rural Communities	National Science Foundation	Senior Personnel	\$1,250,000	7/1/2018	36
G-alpha Control of the Cytoskeleton During Gradient Tracking	National Institutes of Health (R15)	Co-PI	\$424,462	7/1/2018	36
Quantification and Analysis of Greenland Glacier and Ice Cap discharge Using Automated Landsat Terminus Change Time Series and NASA Data Products	NASA	Co-PI	\$296,579	7/1/2018	36
MRI: Acquisition of a Digital light sheet microscope Leica TCS SP8 DLS: Bringing Light-Sheet Microscopy to Maine for Research and STEM education	National Science Foundation	Co-PI	\$497,479	9/1/2017	36
Wavelet leaders vs. the Wavelet Transform Modulus Maxima method	UMaine Faculty Research Fund	PI	\$8,000	6/1/2017	1.5
NVIDIA GPU Grant Program: One Titan X Pascal graphics card	NVIDIA Corporation	PI	Est. ~\$1,500	3/14/2017	12
Longitudinal Analysis of Mammographic Breast Lesions and their Microenvironment	Maine Cancer Foundation	PI	\$172,515	7/1/2014	42
Two-dimensional projection of three-dimensional fractal geometrical clusters	UMaine Faculty Research Fund	PI	\$7,500	6/1/2014	1.5

On the Early Detection of Breast Cancer	UMaine Faculty Research Fund	PI	\$14,300	1/1/2013	12
3D MammoComp: Next-Generation Computational Analysis of Breast Tomosynthesis	Maine Cancer Foundation	PI	\$82,843	7/1/2012	12
Three-Dimensional Computational Modeling of Chromosomal Decondensation Growth in Normal and Cancerous Cell Development	UMaine High-End Instrumentation Research Award	PI	\$5,000	1/1/2012	6
Travel award to attend EMBL conference in Heidelberg, Germany	UMaine Bangor Savings Bank Faculty Development Fund	PI	\$1,500	10/15/2011	1
Cyber-infrastructure Investment for Development, Economic Growth and Research	Maine Technology Institute	Co-PI	\$250,000	6/1/2010	24
Computational Pathology: 3D Chromosome Structure in Normal and Neoplastic Cells	Maine Cancer Foundation	PI	\$79,990	7/1/2010	12
Automated Computational Characterization of Mammographic Breast Lesions	UMaine Faculty Research Funds	PI	\$7,500	6/1/2010	1.5
Three-Dimensional Computational Analysis of Chromosome Territories	UMaine Faculty Research Funds	PI	\$16,365	1/1/2010	12
Multi-Scale Characterization of Galaxy Distributions Using the Metric Space Technique	Maine Space Grant Consortium	Co-PI	\$420	11/15/2009	N/A
Sleep, Arousal, and Spontaneous Movement in Opioid Exposed Infants	National Institutes of Health (R21)	Co-PI	\$337,000	6/30/2009	24
Strengthening Biotechnology and Supporting the STEM Education Initiative in Maine	Maine Technology Institute	Co-PI	\$883,160	6/23/2009	60
Wavelet-Based Image Analysis of Mammograms	Maine Cancer Foundation	PI	\$73,552	7/1/2008	12
Wavelet-Based Image Analysis of Mammograms	UMaine Junior Faculty Research Fellowship	PI	\$7,500	4/15/2008	6
Artificial Bone Implant Research	Stryker Orthopaedics	PI	\$53,715	7/1/2007	12
MRI: Acquisition of a Sub-Micron Resolution X-Ray Computed Tomography System	National Science Foundation	Co-PI	\$580,000	8/15/2006	24
Artificial Bone Implant Research	Stryker Orthopaedics	Co-PI	\$155,844	7/1/2006	12
Departmental Research Award in Astrophysics	Universite Laval, Quebec	PhD Student	\$1,000	1/1/2003	4
Ph.D. Research Scholarship	Universite Laval, Quebec	PhD Student	\$58,000	9/1/2000	48
Graduate Student Research Award	Concordia University, Montreal	MS Student	\$900	1/1/1998	4
Graduate Research Scholarship	Concordia University, Montreal	MS Student	\$23,000	9/1/1996	24
Second Language Grant for Post-Collegiate Education	Quebec Provincial Government	BS Student	\$1,000	9/1/1994	12
Second Language Grant for Post-Collegiate Education	Quebec Provincial Government	BS Student	\$1,000	9/1/1993	12

THESIS SUPERVISION

Supervised Doctoral Theses

- 1) Wu, Yongfeng, Ph.D. Astrophysics 2010. '*Multi-Scale Three-Dimensional Analysis of Galaxy Distributions Using the Metric Space Technique*' (Co-chair with Dr. David Batuski).
- 2) Richard, Christian, Ph.D. Functional Genomics 2014. '*A Wavelet-Based Phenotyping Algorithm Characterizing Seizure Morphology And Frequency Variation In Genetic Models Of Absence Epilepsy*' (Co-chair with Dr. Wayne Frankel).
- 3) Toner, Brian, Ph.D. Computer Science 2019. '*A Longitudinal Study of Mammograms Utilizing the Automated Wavelet Transform Modulus Maxima Method*'.

- 4) Batchelder, Kendra, I.Ph.D. Computational Biomedicine 2023 (expected). '*Longitudinal analysis of mammographic microenvironment tissue disruption accompanying tumorigenesis*'.
- 5) Seekins, Tyler, Ph.D. Chemical Engineering 2023 (expected). '*Computer vision for paper fiber quantification*'. (Co-chair with Dr. Douglas Bousfield).
- 6) Juybari, Jeremy, Ph.D. Electrical and Computer Engineering 2024 (expected). '*Computational analysis of patient-matched mammogram and pathological tissue samples*'. (Co-chair with Dr. Yifeng Zhu).
- 7) Miner, Jordan, Ph.D. Biomedical Engineering 2025 (expected). '*Quantitative imaging of culture and native breast tissue sample*'. (Co-chair with Dr. Karissa Tilbury).
- 8) Joshua Hamilton, Ph.D. Biomedical Engineering 2026 (expected). '*Multiscale anisotropy analysis of cancer microenvironment tissue*'.

Supervised Masters Theses

- 1) Wu, Yongfeng, M.S. Astrophysics 2007. '*New Statistical Methods to Get the Fractal Dimension of Bright Galaxies Distributions from the Sloan Digital Sky Survey Data*' (Co-Chair with Dr. David Batuski).
- 2) Robitaille, Jean-François, M.S. Astrophysics 2008. '*Analyse Métrique de Structure HI dans le Plan Galactique*' (Co-Chair with Dr. Gilles Joncas, Université Laval, Canada).
- 3) Grant, Jeremy, M.A. Mathematics 2008. '*Wavelet-Based Segmentation of Fluorescence Microscopy Images in Two and Three Dimensions*'.
- 4) Potter, Matthew, M.A. Mathematics 2010. '*Prime Modulo and Pascal's Triangle As Seen With Fractal Geometry*'.
- 5) Mooers, Kendra, M.A. Mathematics 2013. '*Characterization of Mammographic Breast Lesions And Their Microenvironment: An Application of a Wavelet-Based Multifractal Formalism*'.
- 6) Cox, Derrick, M.A. Mathematics 2014. '*Computational Analysis of Mammographic Breast Tissue Using the Metric Space Technique*'.
- 7) Toner, Brian, M.A. Mathematics 2015. '*The Geometric Properties of Cells Exhibiting Huntington's Disease*'.
- 8) Connerly-Marin, Zachary, M.A. Mathematics 2017. '*Automated tracking of marine extremophiles from 3D digital holographic microscopy*'.
- 9) Juybari, Jeremy, M.A. Mathematics 2020. '*A Method to Reclaim Multifractal Statistics from Saturated Images*'. (Co-chair with Dr. David Bradley)
- 10) Liu, Julia, M.S. Earth Sciences 2020. '*Automated Terminus Detection For Greenland's Peripheral Marine-Terminating Glaciers*'. (Co-chair with Dr. Elynn Enderlin)
- 11) Varney, Hannah, M.S. Biomedical Engineering 2021. '*Segmentation and Statistical Analysis of Imaged and Simulated 3D Chromosome Territories*'.
- 12) Jarvis, Katherine, M.S. Biochemistry 2021. '*Mathematical modeling of signaling pathways in yeast*'. (Co-chair with Dr. Josh Kelley)
- 13) Hamilton, Josh, M.S. Biomedical Engineering 2022. '*Anisotropy analysis of collagen architecture in pancreatic and breast tumor tissue slides*'. (Co-chair with Dr. Karissa Tilbury)
- 14) Raza, Madison, M.S. Biomedical Engineering 2023 (expected). '*Mammographic tissue microenvironment assessment using the Metric Space Technique*'.
- 15) McCarthy, Margaret, M.S. Biomedical Engineering 2023 (expected). '*Quantitative visualization of mammographic tissue microenvironment disruption*'.
- 16) White, Basel, M.S. Biomedical Engineering 2023 (expected). '*Power spectral analyses of mammographic tissue microenvironment*'.

Supervised Honors Theses

- 1) Dewey, Hannah, B.A. Honors Mathematics 2014. '*Wavelet-Based Multifractal Analysis of Brain Images*'.
- 2) Ossanna, Elliot, B.A. Honors Mathematics 2015. '*Fractal Dimension of Residues Sets Within Pascal's Triangle Under Square-Free Moduli*'.
- 3) Plourde, Shayne, B.A. Honors Mathematics 2015. '*Modeling the Growth of Breast Microcalcifications in Mathematically-Generated Breast Tissue Environments Using an Agent-Based Model*'.
- 4) Canning, Dexter, B.A. Honors Mathematics 2019. '*Wavelet-Based Mammographic Analysis of*

Normal and Tumorous Tissue Microenvironment’.

- 5) Abay, Betelhem, B.S. Biomedical Engineering 2020. ‘*Exploration of The Relationship Between The Fractal Dimension Of Microcalcification Clusters And The Hurst Exponent Of Background Tissue Disruption In Mammograms.*
- 6) White, Basel, B.S. Biomedical Engineering 2021. ‘*Automated segmentation of breast tissue from mammograms.*’

SEMINARS AND PRESENTATIONS

Keynote and Invited Seminars & Presentations:

- 1) November 2022: IDEXX – UMaine Research Exchange, Idexx Laboratories, Westbrook, ME
Invited talk: Imaging software for cancer risk assessment
- 2) July/August 2021: EXPLO: Learning Through Exploration, Colby College, Waterville, ME
Invited talks (set of 3 talks): *From Mathematics, to Astrophysics, to Biomedicine: A 25-year Journey in 1 Hour.*
- 3) June 2021: Laboratoire Ondes et Matieres d’Aquitaine, Universite de Bordeaux, France
Invited talk: *Loss of mammographic tissue homeostasis in breast carcinomas*
- 4) January 2021: Bioscience Association of Maine (BIOME) Virtual Coffee Hour
Invited talk: *Novel computational technology to pre-detect breast cancer: Moving towards commercialization*
- 5) October 2020: SFtools-bigdata: The close structural connection between gas and young stars focus on current and new tools of data analysis, Université Grenoble Alpes, France
Invited talk: *Overview of applications of the 2D Wavelet Transform Modulus Maxima method*
- 6) March 2020: National Cancer Institute, Div. of Cancer Epidemiology and Genetics, Rockville, MD
Invited talk: *Characterization of loss of tissue homeostasis in mammographic breast tumor microenvironment*
- 7) November 2019: UMaine Medicine Microscopy Symposium
Invited talk: *Image analysis for x-ray, 3D holography, DIC, confocal, widefield, 2-photon fluorescence and Second Harmonic Generation Microscopies*
- 8) October 2019: The Jackson Laboratory Seminar Series
Invited talk: *Computational Engineering at CompuMAINE*
- 9) September 2019: IDEXX Artificial Intelligence / Machine Learning Annual Symposium, IDEXX Laboratories, Westbrook, ME
Keynote talk: *Loss of tissue homeostasis in breast tumor microenvironment*
- 10) January 2019: Centre de Recherche Mathématiques, Université de Montréal, QC, Canada
Invited talk: *Loss of tissue homeostasis in breast tumor microenvironment*
- 11) January 2019: Linguistique des Rives, École Secondaire de Terrebonne, QC, Canada
Invited talk: *From Mathematics, to Astrophysics, to Biomedicine: A 25-year Journey in 3 Hours.*
- 12) November 2018: Pi Mu Epsilon Career Day, University of Maine, Orono, ME
Invited talk: *A career as an applied mathematician*
- 13) April 2017: UMaine Marches for Science, University of Maine, Orono, ME
Invited speech: *The Need for Fundamental Science*
- 14) January 2016: Department of Chemical/Biological Engineering, University of Maine, Orono, ME
Invited talk: *Fractal Analysis of Mammographic Breast Lesions and Characterization of Loss of Tissue Homeostasis in Tumor Microenvironment*
- 15) January 2016: EPSCoR RII Track-2 Organization Symposium, Landmark College, Putney, VT
Invited talk: *The CompuMAINE Laboratory: Overview of Past and Current Activities*
- 16) November 2015: Department of Physics and Astronomy, University of Maine, Orono, ME
Invited Talk: *Fractal Analysis of Mammographic Breast Lesions and Characterization of Loss of Tissue Homeostasis in Tumor Microenvironment*
- 17) February 2015: Graduate School of Biomedical Sciences and Engineering, University of Maine, Orono, ME
Invited Talk: *The CompuMAINE Laboratory*

- 18) May 2013: Maine Cancer Consortium Annual Meeting, Jackson Laboratory, Bar Harbor, ME
Panel Discussion: *Cutting-Edge Cancer Research in Maine* (invited as one of four cancer research experts from Maine)
- 19) November 2012: Breast Cancer and Leukemia International Consortium, École Normale Supérieure de Lyon, France
Invited Talk: *Breast Cancer and Leukemia: On-Going Projects from The CompuMAINE Lab*
- 20) August 2012: Signal Processing and Image Analysis Interest Group, The Jackson Laboratory, Bar Harbor, ME
Invited Talk: *Fractals in Mammograms and Wavelets in Chromosomes: Signal Processing, Image Analysis and Modeling*
- 21) April 2012: University of Maine School of Biology and Ecology Colloquium Series
Invited Talk: *Fractals in Mammograms and Wavelets in Chromosomes*
- 22) April 2012: Maine Biological and Medical Scientific Symposium, Salisbury Cove, ME
Invited Talk: *Biomedical Image and Signal Processing, Analysis, and Modeling*
- 23) November 2011: Medical Research Council, Imperial College London, England
Invited Talk: *Computational Analysis of Chromosome Territories*
- 24) November 2011: Kirchhoff Institute for Physics, University of Heidelberg, Germany
Invited Talk: *3D Modeling of Chromosome Territories*
- 25) June 2011: Maine Cancer Foundation Annual Meeting, Portland, ME
Invited Presentation Display: *Breast Cancer: Wavelet-Based Image Analysis of Mammograms*
Invited Presentation Display: *Computational Pathology: 3D Structure of Chromosome Territories during Progression to Malignancy*
- 26) August 2010: SuperMe: UMaine Research Experience for Undergraduates, Orono, ME
Invited Talk: *Fractals and Wavelets*
- 27) February 2010: Maine Aquaculture and Innovation Center Annual Meeting, UMaine, Orono, ME
Invited Talk: *Automated Image Analysis of Seabird Activity*
- 28) June 2009: Maine Cancer Foundation Annual Meeting, Portland, ME
Invited Presentation Display: *Breast Cancer: Wavelet-Based Image Analysis of Mammograms*
- 29) November 2008: The Jackson Laboratory, Bar Harbor, ME
Invited Talk: *Signal Processing and Image Analysis with the WTMM Method*
- 30) June / July 2008: Graduate School of Mathematical and Computational Methods for the Sciences, University of Heidelberg, Germany
Invited Seven-Part Lecture Series (14 hours): *The Wavelet Transform Modulus Maxima Method: Image Analysis Lecture Series*
- 31) July 2008: Kirchhoff Institute for Physics, University of Heidelberg, Germany
Invited Talk: *Wavelet-Based Characterization of Chromosome Territories*
- 32) July 2008: Laboratoire Joliot-Curie, Ecole Normale Supérieure de Lyon, France
Invited Talk: *Morphological Analysis of Slow and Fast Muscle Cells in Zebrafish Embryos*
- 33) June 2008: Department of Applied Physical Chemistry, University of Heidelberg, Germany
Invited Talk: *Image Analysis with the Wavelet Transform Modulus Maxima Method*
- 34) May 2008: Pizza Pi, Department of Mathematics, University of Maine, Orono, ME
Invited Talk: *Building a bridge to nowhere and everywhere*
- 35) May 2008: First Annual Meeting of the Graduate School of Biomedical Sciences, University of Maine, Orono, ME
Invited Talk: *Breast Cancer: Wavelet-Based Characterization of Microcalcification Clusters*
- 36) March 2008: Department of Radiology, University of California, San Francisco, CA
Invited Talk: *Wavelet-Based Image Analysis*
- 37) October 2007: McGill University, Department of Biomedical Engineering, Montreal, Canada
Invited Talk: *Wavelet-Based Characterization of Chromosome Territories*
- 38) May 2007: Functional Imaging of the Cell Nucleus, Lyon, France
Keynote Talk: *Wavelet-Based Characterization of Chromosome Territories*
- 39) August 2005: Third Annual Meeting of the NSF - IGERT Functional Genomics Ph.D. Program, University of Maine, Orono, ME
Invited talk: *2D and 3D Signal Processing Tools for Bio-Medical Image Analysis*

- 40) March 2005: Department of Mathematics and Statistics, University of Maine
Invited talk: *Wavelets and Fractals: From Astrophysics to Bio-Medical Image Analysis*
- 41) February 2005: Department of Physics and Astronomy, University of Maine
Invited talk: *Wavelets and Fractals: From Astrophysics to Bio-Medical Image Analysis*
- 42) January 2005: Department of Spatial Information Science and Engineering, University of Maine
Invited talk: *Wavelets and Fractals: From Astrophysics to Bio-Medical Image Analysis*
- 43) November 2000: International Symposium on the Applications of Fractal Techniques in Biology and Medicine, Montréal, Canada
Invited talk: Morphological Analysis of Molecular Clouds: A Multi-Tool Analysis

Other Presentations

- 44) November 2022: Annual Meeting of the Radiological Society of North America, Chicago, IL.
Oral talk: *Computational Assessment of Healthy vs. Risky Mammographic Breast Density.*
- 45) September 2022. Why Study Mammographic Density?, Melbourne, Australia.
Oral talk: *Quantitative Visualization of Healthy vs. Risky Mammographic Breast Density.*
- 46) December 2019: San Antonio Breast Cancer Symposium, San Antonio, TX
Poster: *Exploratory computational longitudinal analysis of mammographic microenvironment disruption preceding breast tumorigenesis.*
- 47) April 2019: 46th Maine Biological and Medical Sciences Symposium, MDI Laboratory, ME
Poster: The CompuMAINE Laboratory
- 48) April 2017: 44th Maine Biological and Medical Sciences Symposium, MDI Laboratory, ME
Poster: *Wavelet-Based Particle Tracking in Unreconstructed, Off-Axis Holograms*
- 49) April 2016: 43rd Maine Biological and Medical Sciences Symposium, MDI Laboratory, ME
Talk: The CompuMAINE Lab
- 50) June 2015: Maine Technology Institute TechWalk 2015, Portland, ME
Presentation: The CompuMAINE Lab
- 51) September 2012: Department of Physics and Astronomy, University of Maine, Orono, ME
Talk: *The CompuMAINE Laboratory*
- 52) April 2012: Maine Biological and Medical Scientific Symposium, Salisbury Cove, ME
Poster: *SWDfinder: A Computational Tool for the Detection of Absence Seizures in Seizure-Prone Mice*
Poster: *Successful Discrimination Between Benign vs. Malignant Breast Lesions Using a Wavelet-Based Multifractal Method*
Poster: *3D Structural Analysis and Modeling of Chromosome Territories*
- 53) March 2012: University of Maine Graduate School of Biomedical Sciences Student Reception, Orono, ME
Talk: *Computational Image Processing in Biomedicine.*
- 54) September 2010: University of Maine Graduate School of Biomedical Sciences Annual Meeting, Orono, ME
Poster: *Probabilistic Modeling of 2D Foci Counts with Respect to Radial Distribution*
Poster: *Enhanced 3D Segmentation of Fluorescence Microscopy Images*
- 55) February 2010: University of Maine Graduate School of Biomedical Sciences Student Reception, Orono, ME
Poster: *Pore size and morphology modulate patterning of soft-tissue in-growth into porous titanium implants based on novel imaging tools*
Poster: *2D and 3D Signal Processing Tools for Bio-Medical Image Analysis*
- 56) September 2009: University of Maine Graduate School of Biomedical Sciences Annual Meeting, Orono, ME
Poster: *Pore size and morphology modulate patterning of soft-tissue in-growth into porous titanium implants based on novel imaging tools*
Poster: *2D and 3D Signal Processing Tools for Bio-Medical Image Analysis*
- 57) August 2009: Nano and Micro Technology Workshop, Mount Desert Island Biological Lab, Salisbury Cove, ME
Talk: *Multifractal analysis of actigraphy signals*

- 58) June 2009: Physics of Complexity, Ecole Normale Superieure de Lyon, France
Poster: *Pattern of soft-tissue in-growth into porous implants based on novel imaging tools*
Poster: *Pore size and morphology modulate patterning of soft-tissue in-growth into porous titanium implants based on novel imaging tools*
Poster: *2D and 3D Signal Processing Tools for Bio-Medical Image Analysis*
- 59) March 2009: 55th Annual Orthopaedic Research Society Meeting, Las Vegas, NV
Poster: *Pore size and morphology modulate patterning of soft-tissue in-growth into porous titanium implants based on novel imaging tools*
- 60) March 2008: 54th Annual Orthopaedic Research Society Meeting, San Francisco, CA
Poster: *Pattern of soft-tissue in-growth into porous implants based on novel imaging tools*
- 61) February 2008: Institute for Molecular Biophysics Annual Meeting, Bar Harbor, ME
Poster: *Enhanced 3D Segmentation of Fluorescence Images*
- 62) February 2008: Institute for Molecular Biophysics Annual Meeting, Bar Harbor, ME
Talk: *Biomedical Image Analysis and Modeling*
- 63) June 2007: Frontiers in Microscopy II: Imaging From Single Molecules to Whole Organisms and Its Application, Bar Harbor, ME
Poster: *2D and 3D Signal Processing Tools for Bio-Medical Image Analysis*
- 64) March 2007: Frontiers in Probe Development, Bar Harbor, ME
Poster: *2D and 3D Signal Processing Tools for Bio-Medical Image Analysis*
- 65) July 2006: 4th Annual Meeting of the Functional Genomics PhD Program, UMaine, Orono, ME
Poster: *2D and 3D Signal Processing Tools for Bio-Medical Image Analysis*
- 66) July 2006: Frontiers in Microscopy, Bar Harbor, ME
Poster: *2D and 3D Signal Processing Tools for Bio-Medical Image Analysis*
- 67) March 2006: Frontiers in Bio-membranes: Experiments and Theory, Bar Harbor, ME
Poster: *2D and 3D Signal Processing Tools for Bio-Medical Image Analysis*
- 68) September 2005: Annual Scientific Advisory Board Meeting for the Institute for Molecular Biophysics, The Jackson Laboratory, Bar Harbor, ME
Talk: *On the Development and Use of Rigorously Well-Defined, Quantitative, and Objective Image Analysis Tools: Keeping Up with Technological Advancements*
- 69) July 2005: 3rd Annual Meeting of the Functional Genomics PhD Program, UMaine
Poster: *2D and 3D Signal Processing Tools for Bio-Medical Image Analysis*
- 70) May 2005: International Galactic Plane Survey Consortium (IGPS) Meeting, Toronto, Canada
Talk: *Fractals & Wavelets: New Projects and Early Results*
- 71) May 2004: International Galactic Plane Survey Consortium (IGPS) Meeting, Penticton, Canada
Talk: *Wavelet-Based Multifractal Formalism: Anisotropy... at all scales*
- 72) March 2004: Scientific Meeting of the Centre de recherche de l'Observatoire du Mont-Mégantic, Lac-Estérel, QC, Canada
Talk: *Modélisation de la structure anisotrope du HI à grande échelle*
- 73) September 2003: Annual Meeting of the Québec Astrophysics Graduate Students from Universities Laval, McGill, and de Montréal, Montréal, Canada
Talk: *Analyse de la structure du milieu interstellaire*
- 74) June 2003: Society of Industrial and Applied Mathematics (SIAM) meeting, Montréal, Canada
Talk: *Morphological Analysis of Galactic Neutral Hydrogen*
- 75) May 2003: Association Francophone pour l'Avancement des Sciences (ACFAS) 76th Annual Meeting, Rimouski, QC, Canada
Talk: *Analyse de la structure du milieu interstellaire*
Poster: *L'introduction du spectre de mesures de Hausdorff pour la caractérisation de structures de même dimension fractale*
- 76) April 2003: International Galactic Plane Survey Consortium (IGPS) Meeting, Québec, Canada
Talk: *Morphological Analysis of Galactic Neutral Hydrogen*
- 77) March 2003: Scientific Meeting of the Centre de recherche de l'Observatoire du Mont-Mégantic, Lac-Delage, QC, Canada
Talk: *Analyse morphologique de l'hydrogène neutre à grande échelle*

- 78) September 2002: Annual Meeting of the Québec Astrophysics Graduate Students from Universities Laval, McGill, and de Montréal, Montréal, Canada
Talk: Analyse morphologique de l'hydrogène neutre
- 79) March 2002: Fractal 2002, Complexity and Fractals in Nature 7th Interdisciplinary Conference, Grenada, Spain
Poster: Morphological Analysis of Astrophysical Clouds
- 80) October 2001: "Seeing Through the Dust" International Conference, Penticton, BC, Canada
Talk: Exotic Tools for the Morphological Analysis of Neutral Hydrogen Clouds
- 81) September 2001: Annual Meeting of the Québec Astrophysics Graduate Students from Universities Laval, McGill, and de Montréal, Québec, Canada
Talk: Multifractales et Ondelettes

CONFERENCES AND SYMPOSIA ATTENDED

- 1) November 2022: Radiological Society of North America Annual Meeting, Chicago, IL
- 2) September 2022: Why Study Mammographic Density, Melbourne, Australia (attended virtually)
- 3) October 2020: SFtools-bigdata: The close structural connection between gas and young stars focus on current and new tools of data analysis, Université Grenoble Alpes, France (held virtually)
- 4) October 2020: Why Study Mammographic Density, Melbourne, Australia (held virtually)
- 5) December 2019: San Antonio Breast Cancer Symposium, San Antonio, TX
- 6) November 2019: UMaine Medicine Microscopy Symposium, Orono, ME
- 7) September 2019: 11th Annual Meeting of the GSBSE, University of Maine, Orono, ME
- 8) September 2019: 5th Annual AI/Machine Learning Symposium, IDEXX Labs, Westbrook, ME
- 9) April 2019: 46th Maine Biological and Medical Sciences Symposium, Salisbury Cove, ME
- 10) November 2018: Pi Mu Epsilon Career Day, University of Maine, Orono, ME
- 11) September 2018: 10th Annual Meeting of the GSBSE, University of Maine, Orono, ME
- 12) February 2018: Mindstorm Annual Event, IDEXX Labs, Westbrook, ME
- 13) September 2017: 9th Annual Meeting of the GSBSE, University of Maine, Orono, ME
- 14) April 2017: 44th Maine Biological and Medical Sciences Symposium, Salisbury Cove, ME
- 15) April 2017: UMaine Marches for Science, University of Maine, Orono, ME
- 16) April 2016: 43rd Maine Biological and Medical Sciences Symposium, Salisbury Cove, ME
- 17) January 2016: EPSCoR RII Track-2 Organization Symposium, Landmark College, Putney, VT
- 18) September 2015: 8th Annual Meeting of the GSBSE, University of Maine, Orono, ME
- 19) June 2015: Maine Technology Institute TechWalk 2015, Portland, ME
- 20) September 2014: 7th Annual Meeting of the GSBSE, University of Maine, Orono, ME
- 21) September 2013: 6th Annual Meeting of the GSBSE, University of Maine, Orono, ME
- 22) May 2013: Maine Cancer Consortium Annual Meeting, The Jackson Laboratory, Bar Harbor, ME
- 23) November 2012: Breast Cancer and Leukemia International Consortium, Lyon, France
- 24) September 2012: 5th Annual Meeting of the GSBS, University of Maine, Orono, ME
- 25) April 2012: 39th Maine Biological and Medical Sciences Symposium, Salisbury Cove, ME
- 26) December 2011: EMBO Molecular Medicine Conference: Molecular Insights for Innovative Therapies, Heidelberg, Germany
- 27) September 2011: 4th Annual Meeting of the GSBS, University of Maine, Orono, ME
- 28) June 2011: Maine Cancer Foundation Annual Meeting, Portland, ME
- 29) September 2010: 3rd Annual Meeting of the GSBS, University of Maine, Orono, ME
- 30) September 2009: 2nd Annual Meeting of the GSBS, University of Maine, Orono, ME
- 31) August 2009: Nano and Micro Technology Workshop, Salisbury Cove, ME
- 32) June 2009: Maine Cancer Foundation Annual Meeting, Portland, ME
- 33) June 2009: Physics of Complexity, Lyon, France
- 34) March 2009: 55th Annual Orthopaedic Research Society Meeting, Las Vegas, NV
- 35) September 2008: 1st Annual Meeting of the GSBS, University of Maine, Orono, ME
- 36) March 2008: 54th Annual Orthopaedic Research Society Meeting, San Francisco, CA
- 37) February 2008: Institute for Molecular Biophysics Annual Meeting, Bar Harbor, ME

- 38) June 2007: Frontiers in Microscopy II: Imaging From Single Molecules to Whole Organisms and Its Application, Bar Harbor, ME
- 39) May 2007: Functional Imaging of the Cell Nucleus, Lyon, France
- 40) March 2007: Frontiers in Probe Development, Bar Harbor, ME
- 41) July 2006: 4th Annual Meeting of the Functional Genomics Program, Orono, ME
- 42) July 2006: Frontiers in Microscopy, Bar Harbor, ME
- 43) March 2006: Frontiers in Bio-membranes: Experiments and Theory, Bar Harbor, ME
- 44) September 2005: Annual Meeting for the Institute for Molecular Biophysics, Bar Harbor, ME
- 45) August 2005: 3rd Annual Meeting of the Functional Genomics Program, Orono, ME
- 46) May 2005: International Galactic Plane Survey Consortium (IGPS) Meeting, Toronto, Canada
- 47) May 2004: International Galactic Plane Survey Consortium (IGPS) Meeting, Penticton, Canada
- 48) March 2004: Scientific Meeting of the Centre de recherche de l'Observatoire du Mont-Mégantic, Lac-Estérel, QC, Canada
- 49) September 2003: Annual Meeting of the Québec Astrophysics Graduate Students from Universities Laval, McGill, and de Montréal, Montréal, Canada
- 50) June 2003: Society of Industrial and Applied Mathematics (SIAM) meeting, Montréal, Canada
- 51) May 2003: Association Francophone pour l'Avancement des Sciences (ACFAS) 76th Annual Meeting, Rimouski, QC, Canada
- 52) April 2003: International Galactic Plane Survey Consortium (IGPS) Meeting, Québec, Canada
- 53) March 2003: Scientific Meeting of the Centre de recherche de l'Observatoire du Mont-Mégantic, Lac-Delage, QC, Canada
- 54) September 2002: Annual Meeting of the Québec Astrophysics Graduate Students from Universities Laval, McGill, and de Montréal, Montréal, Canada
- 55) March 2002: Fractal 2002, Complexity and Fractals in Nature 7th Interdisciplinary Conference, Grenada, Spain
- 56) October 2001: "Seeing Through the Dust" International Conference, Penticton, BC, Canada
- 57) September 2001: Annual Meeting of the Québec Astrophysics Graduate Students from Universities Laval, McGill, and de Montréal, Québec, Canada
- 58) November 2000: International Symposium on the Applications of Fractal Techniques in Biology and Medecine, Montréal, Canada

REFeree / REVIEWER / EDITORIAL POSITIONS

Journal Peer-Reviews (36 different journals)

➔ Academic Radiology; Analytical Methods; Applied and Computational Harmonic Analysis; Astrophysical Journal; Biomedical Optics Express; Biomedical Signal Processing and Control; BMC Cell Biology; BMC Molecular Biology; BMC Systems Biology; British Journal of Health Informatics and Monitoring; Cancers; Computers in Biology and Medicine; Computer Methods and Programs in Biomedicine; Current Medical Imaging; Current Medical Imaging Reviews; Cytometry Part A; Frontiers in Neuroengineering; IEEE-Access; IET Signal Processing; International Journal of Nanomedicine; Journal of Clinical Medicine; Journal of Histochemistry and Cytochemistry; Journal of Imaging; Journal of Personalized Medicine; Journal of Statistical Mechanics; Medical Engineering & Physics; Medical Physics; Methods; Monthly Notices of the Royal Astronomical Society; Nanotechnology: Science and Applications; Nonlinear Processes in Geophysics; Physica A; PLoS Computational Biology; PLoS One; Symmetry; TEST.

Grant Proposals Reviewed

- 1) Review of funding proposals submitted to MITACS (Canada).
- 2) Review of funding proposals submitted to the Maine Cancer Foundation (US).
- 3) Review of funding proposals submitted to Agence Nationale de Recherche (France).
- 4) Review of funding proposals submitted to Fonds National de la Recherche Scientifique (Belgium).

COURSES TAUGHT

Biological and Medical Image Analysis I and II, Calculus, Chemical Engineering Analysis, Computational Methods in Biology and Genetics, Computational Methods in Biomedical Engineering, Differential Equations, Fractals and Wavelets I and II, Fractal Geometry, Fuzzy Logic, History of Mathematics, Introduction to Analysis I and II, Linear Algebra, Mathematics for Engineers, Mathematics for Geographical Information Systems.

MUSIC

1982 – 1987: Conservatoire de musique de Rimouski, QC, Canada
→ Classical training: music theory, music history, solfege, music dictation
→ Instruments: piano, bassoon, and percussions, choir
→ Several concerts as a musician (solo, duo, symphonic, and choir)
1988 – present: Guitar (self-taught)

SPORTS

As an athlete:

- 1990-1993: Member of the Rimouski AA collegiate basket-ball team
- 1992: Member of the Eastern-Quebec 3 vs. 3 senior basket-ball championship-winning team
- 1991: Captain of the Eastern-Quebec juvenile basket-ball championship-winning team
- 1990: Captain of the Eastern-Quebec high school basket-ball championship-winning team
- 1989: Member of the Eastern-Quebec high school basket-ball runner-up team
- 1988: Member of the Eastern-Quebec high school basket-ball championship-winning team

Referee:

- 1989-1993: Basket-ball referee (highest level: Quebec-Metro AA)
- 1986-1993: Soccer referee (highest level: Quebec Cup)

Coach:

- 1986-1991: Volunteer youth basket-ball coach
- 1986-1991: Volunteer youth soccer coach

Sports administrator:

- 1998: President of the Rimouski 3 vs. 3 basket-ball league
- 1991-1992: President and publicist for the Rimouski senior basket-ball league
- 1991-1993: Lead organizer for several basket-ball tournaments, including a 60+ team 3 vs. 3 tournament in 1992.

LEISURE TIME

Gardening, reading, hiking, traveling, fishing, hunting, playing music, woodworking, and artisanal maple syrup production.