CURRICULUM VITAE
E. Laurent Younes

Current Appointments

- Professor, Department of Applied Mathematics and Statistics, Johns Hopkins University, Baltimore.
- Director of the Center for Imaging Science, Johns Hopkins University.
- Core Faculty member of the Institute for Computational Medicine, Johns Hopkins University.
- Core Faculty Member of the Mathematical Institute for Data Science, Johns Hopkins University.

Personal Data

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Education and Training

- 1983-1988: *Ecole Normale Supérieure* (rue d'Ulm), France.
- 1986: *Agrégation in Mathematics* (National Contest for teacher recruitment, rank 4).
- 1989: Ph.D. Université Paris 11. Statistics.
- 1995: *Habilitation à Diriger des Recherches* (Ph.D. advisor certification), University Paris 11.

Previous Positions

- 1990–1998: *Chargé de Recherche*, CNRS, France.
- 1998–2003: *Directeur de Recherche*, CNRS, France.
- 2003–2005: Associate Professor, Department of Applied Mathematics and Statistics, Johns Hopkins University.
- 2014–2020: Chair, Department of Applied Mathematics and Statistics, Johns Hopkins University.
- 2005–present: Professor, Department of Applied Mathematics and Statistics, Johns Hopkins University.

Mentoring

- ***Ph.D. advisees*** (1) Dominique Béréziat, University Paris 11, defended in 1999; (2) Thomas Feldman, ENS de Cachan, defended 2004; (3) Laurent Garcin, ENS de Cachan, defended in 2004;

(4) Sebastien Gadat, ENS de Cachan, defended in December 2004; (5) Joan Glaunès (co-advised with A. Trouvé), ENS de Cachan, defended in 2005; (6) Aastha Jain, Johns Hopkins University, defended in 2011; (7) Felipe Arraté, Johns Hopkins University, defended in 2011; (8) Erdem Yoruk, (co-advised with D. Geman), Johns Hopkins University, defended in 2011; (9) Francisco Sanchez (co-advised with D. Geman), Johns Hopkins University, defended in 2012; (10) Jun Ma, (co-advised with M. Miller), Johns Hopkins University, defended in 2012; (11) Neil Hallonquist (co-advised with D. Geman), Johns Hopkins University, defended in 2015; (12) Valentina Staneva, Johns Hopkins University, defended in 2017; (13) Kamel Lahouel (co-advised with D. Geman), Johns Hopkins University, defended in 2018; (14) Dai-Ni Hsieh, Johns Hopkins University, defended in 2021; (15) Vittorio Loprinzo, Johns Hopkins University, defended in 2022; (16) Yiran Xu (co-advised with D. Geman), Johns Hopkins University, defended in 2022; (17) Daniel Solano (co-advised with J. Darbon), Brown University, defended in 2024; (18) Michele Lohr, Johns Hopkins University, current; (19) Oscar (Yechen) Liu, Johns Hopkins University, current; (20) An Wang (co-advised with D. Geman), Johns Hopkins University, current.

- ***Post-doctoral Mentoring*** (1) Joan Glaunès, Center for Imaging Science (2005-06); (2) Stéphanie Allassonnière, Center for Imaging Science (2007-08); (3) Casey Richardson, Center for Imaging Science (2011-13); (4) Saurabh Jain, Center for Imaging Science (2011-13); Xiaoying Tang, Center for Imaging Science (2014); (5) Sylvain Arguillère, Center for Imaging Science (2016-2017); (6) Ruiyi Zhang, Center for Imaging Science (2019-2021).

Institutional Administrative Appointments

- 1999-2002: Co-Director of the DEA (Master's) program: "Mathematics, Vision, Learning", ENS de Cachan.
- 2001-03: Director of the CNRS Research Group: "GDR: Mathematics for Perceptive and Cognitive Systems".
- 2002-03: Director of the DEA (Master's) program: "Mathematics, Vision, Learning", ENS de Cachan.
- 2009-10: One-month invited professorship, ENS de Cachan.
- 2013-14: One-month invited professorship, ENS de Cachan.
- 2020-present: Director of the Data Science Master's program, Johns Hopkins University.
- 2020-present: Director of the Center for Imaging Science, Johns Hopkins University.

Conference Organization

- Series of international conferences on *Mathematics and image analysis*, 1997 (Luminy), 1999 (Luminy), 2000 (Paris), 2002 (Paris), 2004 (Paris).
- International workshop: *Stochastic Aspects of Vision*, June 2003, ENS de Cachan.
- IMA workshop; *Shape spaces*, 2006, Minneapolis.
- SAMSI workshop: *The Geometry and statistics of shape spaces,* 2006, NC
- Annapolis workshop on *Shape spaces* (2010).

Editorial activities

- Former Associate Editor of: Pattern Recognition Letters, Journal of Mathematical Imaging and Vision, IEEE Transaction in Image Processing, Annals of Applied Statistics
- Associate Editor of the SIAM Journal of Imaging Science

Participation in Scientific Societies: Fellow of IMS (2015), AMS (2021) and SIAM (2023).

Publications

Books

[1] Laurent Younes. *Introduction to machine learning*. arXiv preprint arXiv:2409.02668, 2024.

[2] Laurent Younes. *Shapes and Diffeomorphisms*. Second Edition. Springer Berlin Heidelberg, 2019.

[3] Laurent Younes. *Shapes and Diffeomorphisms*. First Edition. Springer Berlin Heidelberg, 2010.

[4] Laurent Younes. *Invariance, déformations et reconnaissance de formes*. Springer Science & Business Media, 2003.

Journal articles

[5] Yechen Liu and Laurent Younes. "A continuous scale space of diffeomorphisms". In: *arXiv preprint arXiv:2501.04031* (2025).

[6] Thomas L Athey, Daniel J Tward, Ulrich Mueller, Laurent Younes, Joshua T Vogelstein, and Michael I Miller. "Preserving Derivative Information while Transforming Neuronal Curves". In: *Neuroinformatics* 22.1 (2024), pp. 63–74.

[7] Lanlan Ji, An Wang, Shreyash Sonthalia, Daniel Q Naiman, Laurent Younes, Carlo Colantuoni, and Donald Geman. "CellCover Captures Neural Stem Cell Progression in Mammalian Neocortical Development". In: *bioRxiv* (2024).

[8] Michele Lohr and Laurent Younes. "FineMorphs: Affine-Diffeomorphic Sequences for Regression". In: *Journal of Machine Learning Research* 25.245 (2024), pp. 1–38.

[9] Michael I Miller, Alain Trouvé, and Laurent Younes. "Space-feature measures on meshes for mapping spatial transcriptomics". In: *Medical Image Analysis* 93 (2024), p. 103068.

[10] Kaitlin Stouffer, Xiaoyin Chen, Hongkui Zeng, Benjamin Charlier, Laurent Younes, Alain Trouve, and Michael I Miller. "xIV-LDDMM Toolkit: A Suite of Image-Varifold Based Technologies for Representing and Mapping 3D Imaging and Spatial-omics Data Simultaneously Across Scales". In: *bioRxiv* (2024), pp. 2024–11.

[11] Kaitlin M Stouffer, Alain Trouvé, Laurent Younes, Michael Kunst, Lydia Ng, Hongkui Zeng, Manjari Anant, Jean Fan, Yongsoo Kim, Xiaoyin Chen, et al. "Cross-modality mapping using image varifolds to align tissue-scale atlases to molecular-scale measures with application to 2D brain sections". In: *Nature Communications* 15.1 (2024), p. 3530.

[12] An Wang, Stephanie C Hicks, Donald Geman, and Laurent Younes. "GeneCover: A Combinatorial Approach for Label-free Marker Gene Selection". In: *bioRxiv* (2024), pp. 2024–10.

[13] Laurent Younes, Kwame S Kutten, and J Tilak Ratnanather. "Normal and equivolumetric coordinate systems for cortical areas". In: *MethodsX* (2024), p. 102689.

[14] Nicolas Charon and Laurent Younes. "Shape spaces: From geometry to biological plausibility". In: *Handbook of Mathematical Models and Algorithms in Computer Vision and Imaging: Mathematical Imaging and Vision* (2023), pp. 1929–1958.

[15] Beini Hu, Laurent Younes, Xuan Bu, Chin-Fu Liu, J Tilak Ratnanather, Jane Paulsen, Nellie Georgiou-Karistianis, Michael I Miller, Christopher Ross, and Andreia V Faria. "Mixed longitudinal and cross-sectional analyses of deep gray matter and white matter using diffusion weighted images in premanifest and manifest Huntington's disease". In: *NeuroImage: Clinical* 39 (2023), p. 103493.

[16] Chin-Fu Liu, Laurent Younes, Xiao J Tong, Jared T Hinkle, Maggie Wang, Sanika Phatak, Xin Xu, Xuan Bu, Vivian Looi, Jee Bang, et al. "Longitudinal imaging highlights preferential basal ganglia circuit atrophy in Huntington's disease". In: *Brain communications* 5.5 (2023), fcad214.

[17] Mohamed Omar, Wikum Dinalankara, Lotte Mulder, Tendai Coady, Claudio Zanettini, Eddie Luidy Imada, Laurent Younes, Donald Geman, and Luigi Marchionni. "Using Biological Constraints to Improve Prediction in Precision Oncology". In: *iScience* 26.3 (2023), p. 106108. ISSN: 2589-0042.

[18] Kaitlin M Stouffer, Alain Trouve, Laurent Younes, Michael Kunst, Lydia Ng, Hongkui Zeng, Manjari Anant, Jean Fan, Yongsoo Kim, and Michael I Miller. "A Universal Method for Crossing Molecular and Atlas Modalities using Simplex-Based Image Varifolds and Quadratic Programming". In: *bioRxiv* (2023), pp. 2023–03.

[19] Min Wang, Peter B Barker, Nicola G Cascella, Jennifer M Coughlin, Gerald Nestadt, Frederick C Nucifora Jr, Thomas W Sedlak, Alexandra Kelly, Laurent Younes, Donald Geman, Lena Palaniyappan, Akira Sawa, and Kun Yang. "Longitudinal changes in brain metabolites in healthy controls and patients with first episode psychosis: A 7-Tesla MRS study". In: *Molecular psychiatry* (2023), pp. 1–12.

[20] Dai-Ni Hsieh, Sylvain Arguillère, Nicolas Charon, and Laurent Younes. "Mechanistic Modeling of Longitudinal Shape Changes: equations of motion and inverse problems". In: *SIAM Journal on Applied Dynamical Systems* 21.1 (2022), pp. 80–101.

[21] Vittorio Loprinzo and Laurent Younes. "A generative neural network model for random dot product graphs". In: *arXiv preprint arXiv:2204.07634* (2022).

[22] Kun Yang, Koko Ishizuka, Andrew P Lane, Zui Narita, Yukiko Y Lema, Toshifumi Tomoda, Atsushi Kamiya, Minghong Ma, Donald Geman, Laurent Younes, and Akira Sawa. "Human olfactory neuronal cells through nasal biopsy: molecular characterization and utility in brain science". In: *bioRxiv* (2022), pp. 2022–09.

[23] Dai-Ni Hsieh, Sylvain Arguillère, Nicolas Charon, and Laurent Younes. "Diffeomorphic shape evolution coupled with a reaction-diffusion PDE on a growth potential". In: *Quart. Appl. Math.* 80 (2021), pp. 23–52.

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[26] Sue Kulason, Eileen Xu, Daniel J Tward, Arnold Bakker, Marilyn Albert, Laurent Younes, and Michael I Miller. "Entorhinal and transentorhinal atrophy in preclinical Alzheimer's disease". In: *Frontiers in Neuroscience* 14 (2020), p. 804.

[27] Kamel Lahouel, Laurent Younes, Ludmila Danilova, Francis M. Giardiello, Ralph H. Hruban, John Groopman, Kenneth W. Kinzler, Bert Vogelstein, Donald Geman, and Cristian Tomasetti. "Revisiting the tumorigenesis timeline with a data-driven generative model". In: *Proceedings of the National Academy of Sciences* 117.2 (2020), pp. 857–864. ISSN: 0027-8424.

[28] Laurent Younes. "Diffeomorphic Learning". In: *Journal of Machine Learning Research* 21.220 (2020), pp. 1–28. URL: `http://jmlr.org/papers/v21/18-415.html`.

[29] Dai-Ni Hsieh and Laurent Younes. "Piecewise Rigid Motion in Diffeomorphism Groups with Strong Right-Invariant Metrics". In: *Mathematics Of Shapes And Applications* 37 (2019), p. 97.

[30] Sue Kulason, Daniel J Tward, Timothy Brown, Chelsea S Sicat, Chin-Fu Liu, J Tilak Ratnanather, Laurent Younes, Arnold Bakker, Michela Gallagher, Marilyn Albert, and "for the Alzheimer's Disease Neuroimaging Initiative" Miller Michael I. "Cortical thickness atrophy in the transentorhinal cortex in mild cognitive impairment". In: *NeuroImage: Clinical* 21 (2019), p. 101617.

[31] Kamel Lahouel, Donald Geman, and Laurent Younes. "Coarse-to-fine multiple testing strategies". In: *Electronic Journal of Statistics* 13.1 (2019), pp. 1292–1328.

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[44] Sylvain Arguillere, Emmanuel Trélat, Alain Trouvé, and Laurent Younes. "Registration of multiple shapes using constrained optimal control". In: *SIAM Journal on Imaging Sciences* 9.1 (2016), pp. 344–385.

[45] Andreia V Faria, J Tilak Ratnanather, Daniel J Tward, David Soobin Lee, Frieda van den Noort, Dan Wu, Timothy Brown, Hans Johnson, Jane S Paulsen, Christopher A Ross, Laurent Younes, Michael Miller, "PREDICT-HD Investigators, and Coordinators of the Huntington Study Group". "Linking white matter and deep gray matter alterations in premanifest Huntington disease". In: *NeuroImage: Clinical* 11 (2016), pp. 450–460.

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[51] Donald Geman, Michael Ochs, Nathan D Price, Cristian Tomasetti, and Laurent Younes. "An argument for mechanism-based statistical inference in cancer". In: *Human genetics* 134.5 (2015), pp. 479–495.

[52] Pamela B Mahon, David S Lee, Huong Trinh, Daniel Tward, Michael I Miller, Laurent Younes, Patrick E Barta, and J Tilak Ratnanather. "Morphometry of the amygdala in schizophrenia and psychotic bipolar disorder". In: *Schizophrenia research* 164.1-3 (2015), pp. 199–202.

[53] Michael I Miller, J Tilak Ratnanather, Daniel J Tward, Timothy Brown, David S Lee, Michael Ketcha, Kanami Mori, Mei-Cheng Wang, Susumu Mori, Marilyn S Albert, Laurent Younes, and "the BIOCARD Research Team". "Network neurodegeneration in Alzheimer's disease via MRI based shape diffeomorphometry and high-field atlasing". In: *Frontiers in bioengineering and biotechnology* 3 (2015), p. 54.

[54] Michael I Miller, Alain Trouvé, and Laurent Younes. "Hamiltonian systems and optimal control in computational anatomy: 100 years since D'Arcy Thompson". In: *Annual review of biomedical engineering* 17 (2015), pp. 447–509.

[55] Michael I Miller, Laurent Younes, J Tilak Ratnanather, Timothy Brown, Huong Trinh, David S Lee, Daniel Tward, Pamela B Mahon, Susumu Mori, Marilyn Albert, and "The BIOCARD Research Team". "Amygdalar atrophy in symptomatic Alzheimer's disease based on diffeomorphometry: the BIOCARD cohort". In: *Neurobiology of aging* 36 (2015), S3–S10.

[56] Anja Soldan, Corinne Pettigrew, Yi Lu, Mei-Cheng Wang, Ola Selnes, Marilyn Albert, Timothy Brown, J Tilak Ratnanather, Laurent Younes, Michael I Miller, and "the BIOCARD Research Team". "Relationship of medial temporal lobe atrophy, APOE genotype, and cognitive reserve in preclinical A lzheimer's disease". In: *Human brain mapping* 36.7 (2015), pp. 2826–2841.

[57] Xiaoying Tang, Dominic Holland, Anders M Dale, Laurent Younes, Michael I Miller, and "the Alzheimer's Disease Neuroimaging Initiative". "Baseline shape diffeomorphometry patterns of subcortical and ventricular structures in predicting conversion of mild cognitive impairment to Alzheimer's disease". In: *Journal of Alzheimer's Disease* 44.2 (2015), pp. 599–611.

[58] Xiaoying Tang, Dominic Holland, Anders M Dale, Laurent Younes, Michael I Miller, and Alzheimer's Disease Neuroimaging Initiative. "The diffeomorphometry of regional shape change rates and its relevance to cognitive deterioration in mild cognitive impairment and A lzheimer's disease". In: *Human brain mapping* 36.6 (2015), pp. 2093–2117.

[59] Vijay Vedula, Richard George, Laurent Younes, and Rajat Mittal. "Hemodynamics in the left atrium and its effect on ventricular flow patterns". In: *Journal of biomechanical engineering* 137.11 (2015), p. 111003.

[60] Sylvain Arguillere, Emmanuel Trélat, Alain Trouvé, and Laurent Younes. "Shape deformation and optimal control". In: *ESAIM: Proceedings and Surveys* 45 (2014), pp. 300–307.

[61] Michael I Miller, Laurent Younes, and Alain Trouvé. "Diffeomorphometry and geodesic positioning systems for human anatomy". In: *Technology* 2.01 (2014), pp. 36–43.

[62] Allison M Murawski, Saumya Gurbani, Jamie S Harper, Mariah Klunk, Laurent Younes, Sanjay K Jain, and Bruno M Jedynak. "Imaging the evolution of reactivation pulmonary tuberculosis in mice using 18F-FDG PET". In: *Journal of Nuclear Medicine* 55.10 (2014), pp. 1726–1729.

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[64] Valentina Staneva and Laurent Younes. "Modeling and estimation of shape deformation for topology-preserving object tracking". In: *SIAM Journal on Imaging Sciences* 7.1 (2014), pp. 427–455.

[65] Xiaoying Tang, Dominic Holland, Anders M Dale, Laurent Younes, Michael I Miller, and Alzheimer's Disease Neuroimaging Initiative. "Shape abnormalities of subcortical and ventricular structures in mild cognitive impairment and Alzheimer's disease: detecting, quantifying, and predicting". In: *Human brain mapping* 35.8 (2014), pp. 3701–3725.

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[68] Laurent Younes, J Tilak Ratnanather, Timothy Brown, Elizabeth Aylward, Peg Nopoulos, Hans Johnson, Vincent A Magnotta, Jane S Paulsen, Russell L Margolis, Roger L Albin, Michael I Miller, and Christopher A Ross. "Regionally selective atrophy of subcortical structures in prodromal HD as revealed by statistical shape analysis". In: *Human brain mapping* 35.3 (2014), pp. 792–809.

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Invited Talks

- **Departmental Seminars:** *Seminar of the Department of Statistics*, ETH Zentrum, Zurich, 1989; *System Research Center Seminar*, University of Maryland, 1990; *Department of Mathematics Seminar, University Rome 2*, Rome, Italy, 1990; *Department of Mathematics Seminar, Sun-Yat-Tse University*, Taiwan, 1991; *Department of Computer Science, Brown University*, 1999; *Center for Imaging Science Seminar*, Johns Hopkins University, Baltimore, USA, 1999; *Department of Mathematics Seminar*, University of Maryland, Baltimore County, 2004; *University of Pennsylvania*,

2006; *University of Maryland College Park*, 2007; *NIST*, 2007; *North Carolina State University*, 2007; *Invited seminar at NCSU*, 2007. *Department of Mathematics, Georgetown University*, 2007. *University of Pennsylvania*, 2008; *Department of Mathematics, ETH Zurich*, 2009; *Department of Statistics, University of Chicago,* 2009; *Department of Biostatistics, UNC Chapel Hill*, 2012; *Biomedical Research Imaging Center Seminar, UNC Chapel Hill*, 2012; *Department of Biostatistics, Duke University*, 2012; *Department of Probability, National Taiwan University*, 2013; *Simon Frazer University*, Vancouver, 2015; *Department of Mathematics, Houston University*, 2018.

- **Conferences and Workshops:** AMS conference, *Spatial statistics and imaging*, Brunswick, USA, 1988; *Stochastics*, Oberwolfach, Germany, 1990; *Stochastic models and imaging*, Beowulf, Germany, 1990; *Markov random fields and related topics*, Academia Sinica, Taipei, 1991; *Theoretical aspects of neural networks*, Paris, 1992; *Curves, images, massive computation*, Oberwolfach, Germany, 1993; *Numerical probability*, Paris, 1993; *Neuromimetic networks*, Lyon, France, 1994; *Prague Statistical Conference*, Prague, 1994; *International Statistical Institute*, Beijing, China, 1995; *Signal processing*, University of Cergy-Pontoise, France, 1995; *Image analysis workshop of the Centre de Recherches Mathématiques*, Montreal, Canada, 1998; SPIE conference, *Bayesian inference for inverse problems*, San Diego, USA, 1998; *ECCV 2000*, Dublin, Ireland, 2000; Numerical analysis conference, *CANUM 2000*, Port d'Albret, France, 2000; *Institute for Mathematics and its Applications*, Minneapolis, USA, 2000; SEE conference, *Le traitement d'images à l'aube du XXIème siècle,* Paris, 2002; *SIAM conference on imaging*, Boston, USA, 2002; *NPCONF*, Crete, 2002; *Workshop on Mathematical Imaging*, Mittag–Leffler Institute, Stockholm, 2003; *GBM conference*, IPAM, Lake Arrowhead, CA, 2003; *Medical imaging summer school*, IPAM, Los Angeles, CA, 2004; *Workshop on Visual Recognition,* MSRI, Berkeley, CA, 2005; *Statistical Inference on Shape Manifolds*, Palo-Alto, CA, 2005; *The Geometry of Shape Spaces*, IMA, MN, 2006 (co-organizer); *Challenges and Opportunities in Image Understanding*, Washington DC, 2007; *AFOSR workshop*, University of Maryland, 2007; *The Geometry and statistics of shape spaces*, SAMSI, 2007 (co-organizer); *Workshop in honor of D. Holm 65th birthday*, D2Hfest, EPFL Lausanne, 2007; *SIAM conference in imaging*, San Diego, 2008; *IPAM workshop: Mathematics of Brain Imaging*, Los Angeles, 2008; *Workshop on statistics and geometry of shape*, Bonn, 2008; *Workshop on Random Fields and Stochastic Geometry,* Banff, 2009; *ONR workshop*, IMA, 2009; *SAMSI Workshop* 2010; Oberwolfach Workshop *Trends in Mathematical Imaging and Surface Processing*, 2011; CIRM Workshop *Workshop on Geometric Flows*, Luminy 2011; Dagstuhl workshop *Innovations for Shape Analysis: Models and Algorithms*, 2011; *Equadiff Conference*, Loughborough University, UK, 2011; Newton Institute Workshop *Analytic and Geometric Methods in Medical Imaging*, 2011; *Third Tsinghua Sanya International Mathematics Forum conference*, Sanya, China, 2013; *Joint Statistical Meeting*, Montreal, 2013; *ONR Workshop*, IMA, 2013; *14th Annual Winter School in eScience* Geilo, Norway, 2014; *Joint Mathematical Meetings*, Baltimore 2014; *Mathematical Biology Institute workshop: Morphogenesis, Regeneration, and the Analysis of Shape*, Ohio State, 2014; *SIAM Imaging Science Conference*, Hong-Kong, 2014; *Shape Analysis Meeting*, Imperial College, London, June 01, 2014; *SIAM Conference on Computational Science and Engineering*, Salt Lake City, 2015; *Classic and Stochastic Geometric Mechanics, EPFL*, 2015; *Joint Statistical Meetings* Seattle, 2015. *SSIMA Imaging Summer School*, Romania, 2015; *Neuroscience summer school*, SAMSI, 2015; *Joint Statistical Meetings*, Seattle, 2015; *Sta-*

tistical Analysis of Manifold Data and Beyond, University of Nottingham, UK., 2016; *Geometric Analysis in Control and Vision Theory*, Voss, Norway, 2016; *SIAM conference in Imaging Science*, Albuquerque, 2016; *ISNPS 2016*, Avignon, France, 2016; *SSIMA 2016*, University of Bucharest, 2016; *Mathematics of Shape and Applications*, University of Singapore, 2016; *Biomedical Imaging and Computer Vision*, University of Singapore, 2016; *New Trends in Applied Geometric Mechanics*, ICMAT, Madrid, 2017; *SIAM conference on Imaging Science*, Pittsburgh, 2017; *Applications-Driven Geometric Functional Data Analysis*, Florida State University, 2017; *Shape analysis and computational anatomy*, Isaac Newton Institute for Mathematics, Cambridge, UK, 2017; *Flows, mappings and shapes*, Isaac Newton Institute for Mathematics, Cambridge, UK, 2017; *Nonlinear Data: Theory and Algorithms*, Mathematics Research Institute Oberwolfach, Germany, 2018; *Elastic Functionals and Shape Data Analysis*, Harvard University; 2018; *Euclidean, Discrete and Algebraic Geometric Methods*, Dagstuhl, Germany, 2018; *Morphometrics, Morphogenesis and Mathematics*, Harvard University, 2018. *Geometry and Statistics in Data Science*, Institute Henri Poincaré, Paris, 2022; *Mathematical Imaging and Surface Processing*, Oberwolfach, 2022; *Mathematical Methods for Exploring and Analyzing Morphological Shapes across Biological Scales*, Banff, 2023; *Joint Mathematics Meetings: Special Session on the Geometry of the Shape Space*, San Francisco, 2024; *Joint Mathematics Meetings: SIAM Session on Model- and Data-Driven Approaches in Motion Analysis*, San Francisco, 2024.

- **Lecture Series and Tutorials:** Tutorial *Image deformation and warping*, *ECCV 2000*; *Amudson Lectures Series*, three lectures, University of Houston, 2011; Tutorial, *SSIMA, Romania*, 2015; *SAMSI, Computational Neuro-science*, 2015.

Extramural Sponsorship

- CNRS grants: Mathematics and Information Theory, 2001 (funding: 8000 euros, P.I.) and 2002 (funding: 8000 euros, co-investigator), 2004 (funding: 10000 euros, co-investigator).
- Grants for the CNRS Research Group Mathematics for Perceptive and Cognitive Systems: 2001 (funding: 11000 euros, P.I.), 2002 (funding: 11000 euros, P.I.).
- *Co-investigator* **:** NIH: Conte Center/Mapping Abnormal Neurodevelopment in Schizophrenia, J. Czernansky, P.I. (ended 2009).
- *Co-principal investigator* **:** NSF: ITR Triage and the Automated Annotation of Large Image Data Sets, D. Geman, P.I. (NCE ending 2010).
- *Principal investigator:* NSF: FRG: The geometry, mechanics and statistics of the infinite-dimensional manifold of shape (ended 2009).
- *Co-investigator:* NIH: Microimaging of Mouse Brain Development, S. Mori, P.I. (ended 2009).
- *Co-investigator:* NIH P41 RR015241-06, The Resource of Quantitative Functional MIR, P. van Zijl, P.I. (ending 2011).
- *Co-principal investigator:* NSF, Small-sample Network Inference in Computational Vision and Biology, D. Geman, P.I. (ending 2010).
- *Co-principal investigator:* NIH, Cardio-Vascular Research Grid, R. Winslow, PI (Awarded, budget unknown) NCBC: The National Center for Computational-Based Medicine, R. Winslow, P.I. (ending

2010).

- *Principal investigator:* ONR, Diffeomorphic Models of Shape Evolution (ending 2010).
- *Co-investigator:* NIH, NCBC: 3D Shape Analysis for Computational Anatomy M. Miller, P.I. (ending 2013).
- *Principal investigator:* NSF, Numerical Computation of Geodesics in the Framework of Metamorphosis (ending 2013).
- *Co-principal Investigator:* NIH, MR Microimaging of Mouse Brain Development, S. Mori, P.I. (ending 2014).
- *Co-principal Investigator:* NSF, RI: Medium: Active Scene Interpretation by Entropy Pursuit, D. Geman, P.I. (ending 2014).
- *Co-principal Investigator:* NIH, Resource for Quantitative Functional MRI: TRD 4, P. van Zijl, P.I. (ending 2014).
- *Co-principal Investigator:* NSF, Coarse-to-fine Testing for Genetic Associations, D. Geman, P.I. (ending 2015).
- *Co-principal Investigator:* DARPA, Hierarchical Representations for the Evaluation of a Sensed Data, S. Geman, P.I. (ending 2015).
- *Principal investigator:* ONR, Constrained Diffeomorphic Shape Evolution (ending 2015).
- *Co-principal Investigator:* NSF, Geometry and Statistics on Spaces of Dynamical Systems for Pattern Recognition in High-Dimensional Time Series R. Vidal, P.I. (ending 2016).
- *Co-Investigator:* NIH, PREDICT-ADFTD: Multimodal Imaging Prediction of AD/FTD and Differential Diagnosis, ending 2024.
- *Co-Investigator:* NIH, Preclinical AD Consortium (ending 2023).
- *Co-Investigator:* NIH, Biomarkers for Older Controls at Risk for Dementia (BIOCARD): The BIOCARD Cohort (ending 2024).
- *Co-Investigator:* NIH, MRI Resource for Physiologic, Metabolic and Anatomic Biomarkers (ending 2025).
- *Co-principal Investigator:* NSF, Collaborative Research: SCH: Integrated Analysis of Single-Cell and Spatially Resolved Omics Data (ending 2025).
- *Principal Investigator:* NSF, Large-scale models and algorithms in diffeomorphic shape and image registration (ending 2026).

Teaching

- **Undergraduate courses** in mathematics at University Paris Dauphine, 1986 -1990 (1986–1989: Introduction to statistics, 1990 : *Linear algebra*.
- **Graduate courses** in the DEA (Master's) program "Statistics and models" at University Paris Sud, 1991–1995, (1991 and 1992: *Image analysis*, 1993–1995: *Markov random fields*
- **Graduate course** in the DEA (Master's) program "Mathematics and artificial intelligence", ENS de Cachan, 1996–1998, (*Curve deformations and shape recognition*)
- **Graduate courses** in the DEA (Master's) program "Mathematics, vision, learning", ENS de Cachan, 1999–2001 (1999: *Statistical image models* , 2000 and 2001: *Information theory*, 2002:

Analysis of deformations)

- **Undergraduate course** in the Department of Applied Mathematics and Statistics, Johns Hopkins University: *Probability and Statistics for the Biological Sciences and Engineering* (2004-05); Introduction to Statistics (2014-15).
- **Graduate courses** in the Department of Applied Mathematics and Statistics, Johns Hopkins University: *Deformation analysis* (2003–04); *Statistical Inference* (2004-05); *Robust and non-parametric statistics* (2003-04, 2017-18); *Mathematical image analysis* (2004-05, 2006-07, 2008-09) ; *Shape and Differential Geometry* (2005-06, 2007-08, 2014-15, 2022-23); *Machine Learning* (2005-06, 2006-07, 2007-08, 2008-09, 2018-21); *Graphical Models* (2007-08, 2008-09); Mathematical Foundations of Computational Anatomy (2019-20, 2023-24); Optimization in Data Science (2022-23); Introduction to Control Theory (2023-24).