VICENTE JOSÉ PAROT

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EDUCATION

Harvard University, Massachusetts Institute of Technology *2013 - 2019*
PhD, Biophysics, Harvard University
also graduated in Medical Engineering and Medical Physics, Division of Health Sciences and Technology, MIT
All-optical neurophysiology using high-speed wide-area optical sectioning, supervised by Adam E. Cohen

Pontifical Catholic University of Chile *2008 - 2009*
Magíster en Ciencias de la Ingeniería m/Ing. Eléctrica (Electrical Engineering MS)
School of Engineering; Electrical Engineering Department; Biomedical Imaging Center
Application of the fractional fourier transform to image reconstruction in MRI, supervised by Pablo Irarrázaval
Approved with Maximum Distinction

Pontifical Catholic University of Chile *2003 - 2009*
Ingeniero Civil Electricista (Electrical Engineering professional degree)
School of Engineering; Electrical Engineering Department
Approved with Maximum Distinction

Pontifical Catholic University of Chile *2003 - 2008*
Licenciado en Ciencias de la Ingeniería (Licentiate degree)
School of Engineering

WORK EXPERIENCE

Pontificia Universidad Católica de Chile, Instituto de Ingeniería Biológica y Médica *2020 - Present*
Assistant Professor

Massachusetts General Hospital, Wellman Center for Photomedicine *2020 - Present*
Visiting Researcher, Laboratory of Brett E. Bouma

Massachusetts General Hospital, Wellman Center for Photomedicine *2019 - 2020*
Postdoctoral Fellow, Laboratory of Brett E. Bouma
- Developed an OCT contrast mechanism based on multiple scattering anisotropy.

Harvard University, Department of Chemistry and Chemical Biology *2019*
Postdoctoral Fellow, Laboratory of Adam E. Cohen
- Developed a microsecond selective access scanning system for neural activity imaging.

Broad Institute of Harvard and MIT *Fall 2019*
Engineering Advisor, Optical Profiling Platform
- Assisted with implementation and training for high-throughput optical profiling of cells and tissues.

Harvard University, Department of Chemistry and Chemical Biology *2013 - 2019*
Graduate researcher; Teaching fellow, Laboratory of Adam E. Cohen
- Developed and applied wide area all-optical neurophysiology using high speed optical sectioning.

Mount Auburn Hospital, Harvard Medical School *January 2018*
Departments of Gastroenterology and of Internal Medicine
Introduction to Clinical Medicine II
- Ward team, longitudinal patient care. 6-week full time rotation.

Mount Auburn Hospital, Harvard Medical School *June 2017*
Department of Internal Medicine
Introduction to Clinical Medicine I
- Patient interviewing and physical examination. 4-week full time rotation.

Massachusetts Institute of Technology *2015 - 2016*
Teacher assistant
- HST.590 Biomedical Engineering Seminar Series (Fall 2015, Spring 2016, Fall 2016).

Wellman Center for Photomedicine, Massachusetts General Hospital *July - August 2014*
Rotation student, Laboratory of Benjamin J. Vakoc
- Developed an optical coherence tomography scan system for ultra-widefield *ex vivo* tissue.

Massachusetts Institute of Technology, Madrid-MIT M+Visión Consortium *2011 - 2013*
M+Visión Fellow
- Developed and conducted two research projects with a team of Fellows and collaborators in Madrid and Boston: Wrote proposals and obtained funding; Invented technologies; Designed and performed experiments.
- Improved Molecular Imaging using Multiplexed Positron Emission Tomography (M+PET): Project based at MIT in collaboration with Brigham and Women's Hospital, Boston, Hospital General Universitario Gregorio Marañón, Universidad Carlos III de Madrid, and Universidad Complutense de Madrid.
- Improved Screening for Colorectal Cancer using Advanced Optical Colonoscopy: Project based at MIT, in collaboration with Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, and Hospital Clínico San Carlos, Madrid.

Pontifical Catholic University of Chile, School of Engineering *2010 - 2011*
Adjunct teacher
- IEE2103 Signals and Systems (semesters 2-2010, 1-2011)
  Teacher evaluation survey, average rating of teacher's work: 62.63/100 and 65.19/100 respectively.

Pontifical Catholic University of Chile, Biomedical Imaging Center *2008 - 2011*
Research assistant, Laboratory of Pablo Irarrázaval
- Applied the Fractional Fourier Transform to Image Reconstruction in MRI.

Pontifical Catholic University of Chile, School of Engineering *2004 - 2009*
Teacher assistant
- IEE3773 Magnetic Resonance Laboratory (semester 2-2009)
- IEE3763 Image Formation (semester 1-2009)
- IEE2712 Digital Systems (semester 2-2007)
- IEE2102 Signal Analysis (semester 1-2007)
- IIC1102 Introduction to Programming (semesters 1-2004, 1-2005, 1-2006)

Columbia University, Department of Biological Sciences *July 2008*
Visiting researcher, Laboratory of Julio M. Fernandez
- Implemented an extended Kalman filter to estimate contour length of proteins under Atomic force microscopy force-clamp.

Columbia University, Department of Biological Sciences *December 2007 - January 2008*
Professional intern, Laboratory of Julio M. Fernandez
- Implemented an FPGA-based digital control system for Atomic force microscopy force spectroscopy.

Pontifical Catholic University of Chile, Department of Computer Science *August - December 2004*
Research assistant, National TI Survey ENTI 2004
- Implemented a tool to generate an annual report on Chilean IT industry based on survey data.

VOLUNTEERING AND SOCIAL WORK

Pontifical Catholic University of Chile *2002 - 2007*
Volunteer. Participated in multiple instances of social welfare services to underserved communities in Chile, including building construction and repair, teaching, religious missions and counseling. Full time activity of 2 weeks duration in 6 occasions.

Pontifical Catholic University of Chile, Engineering Student Association Board *2006*
Financing Secretary. Elected with a group of 8 students to direct the Engineering Student Association. I organized fundraising for 2006, towards social, educational and recreational activities. Part-time activity during one year, with 30% time dedication.

***Guerra de Chatarra* INDURA contest**, Pontifical Catholic University of Chile *2005*
Head Organizer of a yearly students-run Junkyard Wars competition. Team leader, fundraising campaign, rules revision, committees appointment, judges appointment.

JOURNAL PUBLICATIONS

[15] S.-Y. Lee, **V. J. Parot**, B. E. Bouma, and M. Villiger, "Reciprocity-induced symmetry in the round-trip transmission through complex systems", *APL Photonics*, vol. 5, p. 106104, Oct. 2020. https://doi.org/fc27.

[14] L. Z. Fan, S. Kheifets, U. L. Böhm, H. Wu, K. D. Piatkevich, M. E. Xie, **V. Parot**, Y. Ha, K. E. Evans, E. S. Boyden, A. E. Takesian, and A. E. Cohen, "All-Optical Electrophysiology Reveals the Role of Lateral Inhibition in Sensory Processing in Cortical Layer 1", *Cell*, vol. 180, pp. 1–15, Jan. 2020. http://doi.org/dkdd.

[13] Y. Adam, J. J. Kim, S. Lou, Y. Zhao, M. E. Xie, D. Brinks, H. Wu, M. A. Mostajo-Radji, S. Kheifets, **V. Parot**, S. Chettih, K. J. Williams, B. Gmeiner, S. L. Farhi, L. Madisen, E. K. Buchanan, I. Kinsella, D. Zhou, L. Paninski, C. D. Harvey, H. Zeng, P. Arlotta, R. E. Campbell, and A. E. Cohen, "Voltage imaging and optogenetics reveal behaviour-dependent changes in hippocampal dynamics", *Nature*, vol. 569, no. 7756, p. 413, 2019. http://doi.org/gfz7h3.

[12] **V. J. Parot***, C. Sing-Long*, Y. Adam, U. L. Böhm, L. Z. Fan, S. L. Farhi, and A. E. Cohen, "Compressed hadamard microscopy for high-speed optically sectioned neuronal activity recordings", *Journal of Physics D: Applied Physics*, vol. 52, no. 14, p. 144001, 2019. http://doi.org/c2gs. * equal contribution.

[11] S. L. Farhi*, **V. J. Parot***, A. Grama, M. Yamagata, A. S. Abdelfattah, Y. Adam, S. Lou, J. J. Kim, R. E. Campbell, D. D. Cox, and A. E. Cohen, "Wide-area all-optical neurophysiology in acute brain slices", *Journal of Neuroscience*, pp. 0168–19, 2019. http://doi.org/c38x. * equal contribution.

[10] S. Lou, Y. Adam, E. N. Weinstein, E. Williams, K. Williams, **V. Parot**, N. Kavokine, S. Liberles, L. Madisen, H. Zeng, and others, "Genetically targeted all-optical electrophysiology with a transgenic cre-dependent optopatch mouse", *Journal of Neuroscience*, vol. 36, no. 43, pp. 11059–11073, 2016. http://doi.org/bxmq.

 [9] E. Lage, **V. Parot**, S. C. Moore, A. Sitek, J. M. Udías, S. R. Dave, M.-A. Park, J. J. Vaquero, and J. L. Herraiz, "Recovery and normalization of triple coincidences in PET", *Medical Physics*, vol. 42, no. 3, pp. 1398–1410, 2015. http://doi.org/864.

 [8] J. Cal-González, E. Lage, E. Herranz, E. Vicente, J. M. Udias, S. C. Moore, M.-A. Park, S. R. Dave, **V. Parot**, and J. L. Herraiz, "Simulation of triple coincidences in PET", *Physics in Medicine and Biology*, vol. 60, no. 1, pp. 117–136, 2015. http://doi.org/863.

 [7] N. J. Durr, G. González, and **V. Parot**, "3D imaging techniques for improved colonoscopy", *Expert Review of Medical Devices*, vol. 11, no. 2, pp. 105–107, 2014. http://doi.org/wwv.

 [6] **V. Parot**, D. Lim, G. González, G. Traverso, N. S. Nishioka, B. J. Vakoc, and N. J. Durr, "Photometric stereo endoscopy", *Journal of Biomedical Optics*, vol. 18, no. 7, pp. 076017–076017, 2013. http://doi.org/wws.

 [5] J. L. Honorato, **V. Parot**, C. Tejos, S. Uribe, and P. Irarrazaval, "Chemical species separation with simultaneous estimation of field map and T 2* using a k-space formulation", *Magnetic Resonance in Medicine*, vol. 68, no. 2, pp. 400–408, 2012. http://doi.org/fx46sg.

 [4] C. Arrieta, S. Uribe, J. Ramos-Grez, A. Vargas, P. Irarrazaval, **V. Parot**, and C. Tejos, "Quantitative assessments of geometric errors for rapid prototyping in medical applications", *Rapid Prototyping Journal*, vol. 18, no. 6, pp. 431–442, 2012. http://doi.org/wwt.

 [3] **V. Parot**, C. Sing-Long, C. Lizama, C. Tejos, S. Uribe, and P. Irarrazaval, "Application of the fractional Fourier transform to image reconstruction in MRI", *Magnetic Resonance in Medicine*, vol. 68, no. 1, pp. 17–29, 2012. http://doi.org/d5bspx.

 [2] P. Irarrazaval, C. Lizama, **V. Parot**, C. Sing-Long, and C. Tejos, "The fractional Fourier transform and quadratic field magnetic resonance imaging", *Computers & Mathematics with Applications*, vol. 62, no. 3, pp. 1576–1590, 2011. http://doi.org/ccmwnx.

 [1] V. I. Fernandez, P. Kosuri, **V. Parot**, and J. M. Fernandez, "Extended Kalman filter estimates the contour length of a protein in single molecule atomic force microscopy experiments", *Review of Scientific Instruments*, vol. 80, no. 11, p. 113104, 2009. http://doi.org/bmtccf.

CONFERENCE PRESENTATIONS

[25] S.-Y. Lee, **V. J. Parot**, B. E. Bouma, and M. Villiger, "Computational spectral memory enhancement in transmission through complex optical media", in *Adaptive Optics and Wavefront Control for Biological Systems VII*, vol. 11652, p. 116520D, International Society for Optics and Photonics, Mar. 2021.

[24] **V. J. Parot**, T. M. Cannon, M. Villiger, N. Uribe-Patarroyo, and B. E. Bouma, "Multiple scattering anisotropy contrast using localization-diverse OCT", in *Biomedical Applications of Light Scattering XI*, vol. 11657, p. 116570A, International Society for Optics and Photonics, Mar. 2021.

[23] **V. J. Parot***, S. Nichols*, G. Testa-Silva, and A. E. Cohen, "Microsecond Timescale Selective Access Two-photon Targeting for Functional Measurements in Tissue", in *Optics and the Brain*, p. BTu1C.6, Optical Society of America, Apr. 2020. * equal contribution.

[22] **V. J. Parot**, S. L. Farhi, C. Sing-Long, A. Grama, M. Yamagata, A. Abdelfattah, Y. Adam, S. Lou, J. J. Kim, R. E. Campbell, D. D. Cox, and A. E. Cohen, "Wide-area all-optical neurophysiology mapping using Hadamard microscopy", in *Society for Neuroscience*, p. LLL59, 2018.

[21] **V. J. Parot**, S. L. Farhi, C. Sing-Long, A. Grama, M. Yamagata, A. Abdelfattah, Y. Adam, S. Lou, J. J. Kim, R. E. Campbell, D. D. Cox, and A. E. Cohen, "Wide-area all-optical neurophysiology in acute brain slices using Hadamard microscopy", in *GRC Lasers in Medicine and Biology*, 2018.

[20] **V. J. Parot**, S. L. Farhi, A. Grama, M. Yamagata, A. Abdelfattah, Y. Adam, S. Lou, J. J. Kim, R. E. Campbell, D. D. Cox, and A. E. Cohen, "Wide Area Profiling of Neuronal Function Using Hadamard Microscopy", in *OSA Optics and the Brain*, p. BW2C.3, 2018.

[19] **V. Parot**, S. L. Farhi, Y. Adam, S. Lou, J. J. Kim, and A. E. Cohen, "Optical sectioning of brain tissue with Hadamard microscopy", in *HHMI Scientific Meeting*, 2017.

[18] **V. Parot**, Y. Adam, S. L. Farhi, S. Lou, S. Kheifets, and A. E. Cohen, "Rejecting scattered light using orthogonally encoded structured illumination", in *SPIE Photonics West*, pp. 10070–37, 2017.

[17] **V. Parot** and A. E. Cohen, "Simplified models of cardiac dynamics: Can we predict risk of arrhythmia?", in *Broad Institute - ISF Symposium*, 2016.

[16] J. L. Herraiz, S. C. Moore, **V. Parot**, S. R. Dave, M.-A. Park, S. Yoo, W. Lee, H. Kim, and E. Lage, "A prompt-gamma correction method for non-standard PET radionuclides based on the detection of triple coincidences", in *IEEE NSS/MIC*, 2014.

[15] N. J. Durr, **V. J. Parot**, G. Traverso, W. P. Puricelli, B. J. Vakoc, N. S. Nishioka, and G. Gonzalez, "Imaging Colonic Surface Topography With Photometric Stereo Endoscopy", in *GRC Lasers in Medicine and Biology*, 2014.

[14] N. J. Durr, **V. J. Parot**, G. Traverso, W. P. Puricelli, B. J. Vakoc, N. S. Nishioka, and G. Gonzalez, "Imaging Colonic Surface Topography With Photometric Stereo Endoscopy", *Gastrointestinal Endoscopy*, vol. 79, p. AB459, May 2014.

[13] G. González, **V. Parot**, W. Lo, B. J. Vakoc, and N. J. Durr, "Feature space optimization for virtual chromoendoscopy augmented by topography", *MICCAI*, vol. 17, no. Pt 1, pp. 642–649, 2014.

[12] N. J. Durr, G. González, D. Lim, G. Traverso, N. S. Nishioka, B. J. Vakoc, and **V. Parot**, "System for clinical photometric stereo endoscopy", in *Advanced Biomedical and Clinical Diagnostic Systems XII*, vol. 8935, p. 89351F, International Society for Optics and Photonics, Feb. 2014.

[11] **V. Parot**, J. L. Herraiz, S. R. Dave, J. M. Udías, S. C. Moore, M.-A. Park, J. J. Vaquero, and E. Lage, "A New Approach for Multiplexed PET Imaging", in *IEEE NSS/MIC*, p. M03.5, 2013.

[10] E. Lage, **V. Parot**, S. R. Dave, J. M. Udías, S. C. Moore, and A. Sitek, "Recovery of Multi-interaction Photon Events to Improve the Performance of PET Scanners", in *IEEE NSS/MIC*, p. M18.44, 2013.

[9] J. L. Herraiz, E. Lage, **V. Parot**, S. R. Dave, J. M. Udias, J. J. Vaquero, A. Muñoz-Martin, and L. M. Fraile, "Production of positron-gamma emitters for multiplexed PET (mPET) imaging", in *IEEE NSS/MIC*, p. M16.26, 2013.

[8] J. Cal-González, E. Herranz, E. Vicente, J. M. Udías, S. R. Dave, **V. Parot**, E. Lage, and J. L. Herraiz, "Simulation of triple coincidences in PET", in *IEEE NSS/MIC*, p. M13.2, 2013.

[7] J. L. Honorato, **V. Parot**, C. Tejos, S. Uribe, and P. Irarrazaval, "Chemical species separation with simultaneous estimation of field map & T2* using a k-space formulation", in *ISMRM*, p. 220, 2012.

[6] C. Arrieta, S. Uribe, **V. Parot**, P. Irarrazaval, C. Sing-Long, and C. Tejos, "Cardiac Image Segmentation Using Level Sets with Preserved Topology", in *ISMRM*, p. 1188, 2011.

[5] J. P. Stockmann, G. Galiana, **V. Parot**, L. Tam, and R. T. Constable, "Scalable Anti-Aliasing Image Reconstruction Using the Fractional Fourier Transform", in *ISMRM*, p. 2867, 2011.

[4] J. P. Stockmann, G. Galiana, **V. Parot**, L. Tam, and R. T. Constable, "The Variable-Order Fractional Fourier Transform: A New Tool for Efficient Reconstruction of Images Encoded by Linear and Quadratic Gradients with Reduced Sensitivity to Calibration Errors", in *ISMRM*, p. 744, 2011.

[3] C. Sing-Long, **V. Parot**, C. Lizama, S. Uribe, C. Tejos, and P. Irarrazaval, "Analysis of Quadratic Field Distortions Using the Fractional Fourier Transform", in *ISMRM*, p. 143, 2010.

[2] **V. Parot**, C. Sing-Long, C. Lizama, S. Uribe, C. Tejos, and P. Irarrazaval, "Reconstruction Method for Non-Homogeneous Magnetic Fields Using the Fractional Fourier Transform", in *ISMRM*, p. 2939, 2010.

[1] V. I. Fernandez, P. Kosuri, **V. Parot**, and J. M. Fernandez, "Kalman Filter Estimates of the Contour Length of an Unfolding Protein in Single-Molecule Force Spectroscopy Experiments", *Biophysical Journal*, vol. 96, p. 36a, Feb. 2009.

INTELLECTUAL PROPERTY

[7] A. E. Cohen, S. Nichols, **V. J. Parot**, and H. Davis, "High-speed optical targeting systems and methods", US PPA No. 63/013,240, Apr. 2020.

[6] A. E. Cohen and **V. J. Parot**, "Widefield, high-speed optical sectioning", WO2018140773A1, Aug. 2018.

[5] E. M. Lage, J. L. Herraiz, and **V. J. Parot**, "Multiplexable emission tomography", US20150185339A1, July 2015.

[4] J. L. Herraiz, E. M. Lage, **V. J. Parot**, and S. R. Dave, "System and method to improve image quality of emission tomography when using advanced radionuclides", US Pat. No. 10215864, Feb. 2019.

[3] E. M. Lage, J. L. Herraiz, **V. J. Parot**, and S. R. Dave, "Inter-detector scatter enhanced emission tomography", US Pat. No. 10390775, Aug. 2019.

[2] E. M. Lage, J. L. Herraiz, **V. J. Parot**, and S. R. Dave, "Normalization correction for multiple-detection enhanced emission tomography", US Pat. No. 10502846, Dec. 2019.

[1] N. J. Durr, **V. J. Parot**, D. Lim, and G. G. Serrano, "Photometric stereo endoscopy", US20150374210A1, Dec. 2015.

INVITED TALKS

2020-06-01	Centro de Imágenes Biomédicas, Pontificia Universidad Católica de Chile
2020-04-28	Wellman Center for Photomedicine Research Seminar, Massachusetts General Hospital
2019-10-18	Translational Biophotonics Cluster, Northeastern University
2019-10-15	New England Biomedical Optics Symposium, Wellman Center for Photomedicine, Massachusetts General Hospital
2018-10-05	Harvard Biophysics retreat
2017-02-25	Harvard Photonics conference
2017-01-27	Advanced imaging methods symposium, University of California, Berkeley
2016-10-27	New England Biomedical Optics Symposium, Wellman Center for Photomedicine, Massachusetts General Hospital
2016-09-23	Harvard Biophysics retreat
2010-11-24	V Taller de Análisis Funcional y Ecuaciones de Evolución, Universidad de Santiago, Chile

AWARDS

2019	Deutsch Fellowship, Optical Society of America
2019	Martha L. Gray Prize for Excellence in Research, Massachusetts Institute of Technology, Division of Health Sciences and Technology
2018	Young Scientist Development Award, Harvard Brain Initiative
2013	Chilean Science and Technology Commission (CONICYT), Beca Chile Scholar
2012	Chilean Fulbright commission, Fulbright Scholar (declined)
2009	Pontifical Catholic University of Chile, Maximum Distinction, Master of Science in Engineering
2009	Pontifical Catholic University of Chile, Maximum Distinction, Electrical Engineer
2003	Pontifical Catholic University of Chile, Honors Scholarship
2003	University of Chile - DEMRE, Highest National Score Award: PAA Math 2002, 831 pts.
2003	University of Chile - DEMRE, Highest National Score Award: PCE Math 2002, 860 pts.
	Only test taker in >200,000 to score both maximums.

OTHER SKILLS

Laboratory	Animal surgery and dissection; primary tissue culture; acute brain slice preparation; patch-clamp.
Hardware	Optical design; custom microscopy; electronics; machining.
Software	Office and image processing; modeling and simulation; hardware control; MATLAB, C/C++, C#, Java, Python, Mathematica, Igor, Assembler, VHDL, LabVIEW, LaTeX, SolidWorks. Experience in Mac, Linux and Windows environments.
GRE	General Revised Verbal reasoning: 160 (83%), Quantitative reasoning: 168 (97%), Analytical writing: 3.0 (11%), 2012.
Languages	Spanish: Native; English: TOEFL iBT 114 (30+30+26+28), 2012.

OTHER EXPERIENCES

SmartAir: pressure controlled cushion for prevention of pressure ulcers in reduced mobility people. Third place in Spaulding Hospital $150K Innovation Challenge ([website](#))	*2018*
Private Tutor (School and undergraduate levels; Math, Physics, C/C++, Win32, Java, C#)	*2004 - 2010*
Field Engineer at Santo Domingo, Dominican Republic. Consulting project, TEKemi. 2 weeks duration.	*2010*