Cesar Augusto VALADES CRUZ, PhD

Nationality: French and Mexican Birthdate: 27/11/1985

My research experience ranges from construction/running of advanced optical microscopes to processing/analyzing imaging data together with cell biology applications, as well as, machine learning, data handling, high-content imaging, and visualization of 3D+time data.

>>> PROFESSIONAL EXPERIENCE <<<

Associate researcher – Algal Growth and Development TEAM with Prof. Zhang Cheng-Cai 02/2023 – Current
Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan, China
My research focus on the study of the growth and differentiation of cyanobacterial cells using advance microscopy and machine learning algorithms.

Postdoctoral researcher – Team SERPICO Paris with Dr. C. Kervrann and Dr. J. Salamero 01/2022 – 01/2023
French National Institute for Research in Digital Science and Technology (Inria) & CNRS-Institut Curie, Paris, France
Project: Polarization Microscopy for Imaging of Membrane Organization (PoMIMO).
LabEx Cell(n)Scale collaborative project between Inria and Curie Institute. Implementation of polarization module in a STORM-TIRFM (PolarSTORM) system at Curie Institute. Developing of image analysis workflow of biomolecules tracking and estimating spatial high-resolution maps of molecular mobility.

Postdoc/Engineer –Inria and startup Biotech Myriade 01/2021 – 12/2021
Project: Improvement of tracking and size estimation of virus and extracellular vesicles.
Collaboration between SERPICO Team and the Biotech startup Myriade. I develop mathematical models and image processing tools to improve the tracking and size estimation of virus and extracellular vesicles in VideoDrop.

Inria Starting Research Position – Team SERPICO Paris 04/2019 – 12/2020
French National Institute for Research in Digital Science and Technology (Inria) & CNRS-Institut Curie, Paris, France
Project: Acquisition, analysis, and visualization of 3D Dynamic cellular imaging of endocytosis/recycling mechanisms in the membrane during cell migration using machine learning.
I work in novel machine learning methods of image processing able to detect the main regions of interest, and automatic quantification of molecular interactions and cell processes. In addition, I collaborate in the development of machine learning-driven navigation and interaction techniques for 3D+Time data enabling the analysis of localized intra-cellular events (endocytosis and exocytosis) and cell processes (migration, division, etc.).

Postdoctoral researcher – Team of Prof. Ludger JOHANNES Curie Institute, Paris, France 01/2016 – 03/2019
Project: Advanced cellular imaging of endocytosis. Development of 3D image processing and quantification methods to study different modes of endocytosis, using advanced high spatio-temporal resolution imaging and single particle tracking. In addition, I was also responsible of setting up a Lattice Light Sheet Microscope on the PICT-IBiSA imaging facility at Curie Institute, which is part of the France BioImaging National Infrastructure.

University Lecturer Monterrey Institute of Technology and Higher Education, Mexico 01/2015 – 12/2015
Teaching Physics, mathematics, and differential equations.

Research Engineer – CNRS Institut Fresnel, Marseille, France 12/2013 – 04/2014
Responsible of developing image processing and quantification methods for super-resolution microscopy (dSTORM).

Ph. D with Dr. Sophie BRASSELET and Dr. Pablo LOZA-ALVAREZ
Institut Fresnel, Marseille, France & Institute of Photonic Sciences, Barcelona, Spain 12/2010 – 07/2014
Thesis: Polarized Super-Resolution Fluorescence Microscopy. Implementation of a novel method of super resolution microscopy, in combination with a polarized detection to study molecular orientation behaviors, to report structural information at the single molecule and at nanometric spatial scale.

>>> EDUCATION <<<

12/2010 – 07/2014 **Erasmus Mundus PhD in Photonics Engineering, Nanophotonics and Biophotonics**
Mentión Très honorable. Sobresaliente. Cum Laude.
Aix-Marseille University, France & Polytechnic University of Catalonia, Spain

08/2008 – 07/2010 **Erasmus Mundus M. Sc. in Biophotonics for telecommunications and biotechnologies** **GPA: 14.4/20 "Magna Cum Laude"**
Ecole Normale Superieure de Cachan, France & Complutense University of Madrid, Spain

08/2009 – 12/2011 **MEng. in Quality Systems and Productivity.** **GPA: 90.7/100**
Monterrey Institute of Technology and Higher Education, Mexico

08/2003 – 05/2008 **B. S. in Mechatronics Engineering.** **GPA: 92/100 "With honors"**
Monterrey Institute of Technology and Higher Education, Toluca, Mexico

>>> SKILLS <<<

Computational Languages & Tools: MATLAB, Python, C/C++, LabVIEW, Java, ImageJ/FIJI, Icy, IMARIS, GPU programming, Parallel computing, TensorFlow, Keras, Machine Learning, R, Prism, Microsoft Excel, Zen celldiscover, IDEAS(ImageStream) **Languages:** English, Spanish and French.

>>> ONGOING PROJECTS & COLLABORATIONS <<<

2022 **Project POMIMO: Polarization Microscopy for Imaging of Membrane Organization.** Create a new imaging approach that will have the potential to be applied to the topics where the spatial and molecular organization of lipids/proteins defines both the structure and function of assemblies in reconstituted systems and in living cells.

2019 **Project NAVISCOPE: image-guided navigation and visualization of large data sets in live cell imaging and microscopy.** INRIA IPL project, initiated to implement novel machine-learning methods able to detect the main regions of interest, and automatic quantification of sparse sets of molecular interactions and cell processes during navigation to save memory and computational resources.

2019 **Project BioImageIT: open-source integrator for Image DATA management and analysis.** Ongoing project of the Serpico TEAM in the frame of the NRI (National Research Infrastructure – France BioImaging) and dissemination toward the 18 Imaging Facilities that constitute the Core of the Infrastructure.

2019 **Project: Ultrastructure imaging of actin assemblies imaged by polarized light sheet microscopy.** Ongoing collaboration in the frame of France BioImaging R&D program for image processing of polarized light sheet microscopy data with Dr. Sophie Brasselet, Institut Fresnel.

2017 **Project ANR: Data Assimilation and Lattice LIght Sheet imaging for endocytosis/exocytosis pathway modeling in the whole cell (DALLISH).** Collaboration to investigate endocytosis pathways in the whole cell using 3D single particle tracking.

>>> FELLOWSHIPS & DISTINCTIONS <<<

2020-2024 Member of the Mexican National Research System (SNI 1)
2010-2014 Erasmus Mundus Fellowship for PhD
2008-2010 Mexican National Council of Science and Technology (CONACyT) fellowship for Master
2008-2010 Erasmus Mundus Fellowship for Master

>>> PUBLICATIONS <<<

First author publications

[1] Prigent S.*, **Valades-Cruz C.A.***, Leconte L.*, Maury L., Salamero J., Kervrann C. BioImageIT: Open-source framework for integration of image data-management with analysis. **Nature Methods** (2022)

[2] Vaz Rimoli C.*, **Valades-Cruz C.A.***, Curcio V., Mavrakis M., Brasselet S. 4polar-STORM polarized super-resolution imaging of actin filament organization in cells. **Nature Communications** (2022)

[3] Shaban H.*, **Valades-Cruz C. A.***, Savatier J., Brasselet S. Polarized super-resolution structural imaging inside amyloid fibrils using Thioflavine T. **Scientific Reports** (2017)

[4] **Valades-Cruz C. A.***, Shaban H.*, Kress A., Bertaux N., Monneret S., Mavrakis M., Savatier J., Brasselet S. Quantitative nanoscale imaging of orientational order in biological filaments by polarized superresolution microscopy. **PNAS** (2016)

Corresponding author publications

[1] Prigent S. ✉, **Valades-Cruz C.A.** ✉, Leconte L, Salamero J., Kervrann C. STracking: a free and open-source python library for particle tracking and analysis. **Bioinformatics** (2022)

Other publications

[1] Lemaigre C., Ceuppens A., **Valades-Cruz C. A.**, Ledoux B., Vanbeneden B., Hassan M., Zetterberg F. R., Nilsson U. J., Johannes L., Wunder C., Renard H-F., Morsomme P. N-BAR and F-BAR proteins – Endophilin-A3 and PSTPIP1 – control clathrin-independent endocytosis of L1CAM. **Traffic** (2023)

[2] Prigent S., Nguyen H-N., Leconte L., **Valades-Cruz C. A.**, Hajj B., Salamero J., Kervrann C. SPITFIR(e): a supermaneuverable algorithm for fast denoising and deconvolution of 3D fluorescence microscopy images and videos. **Scientific Reports** (2023)

[3] Forrester A., Rathjen S., Garcia-Castillo M. D., Bachert C., Couhert A., Tepshi L., Pichard S., Martinez J., Munier M., Sierocki R., Renard H.F., **Valades-Cruz C.A.**, Dingli F., Loew D., Lamaze C., Cintrat J.C., Linstedt A., Gillet D., Barbier J., Johannes L. Functional Dissection of the Retrograde Shiga Toxin Trafficking Inhibitor Retro-2. **Nature Chemical Biology** (2020)

[4] Renard H-F, Tyckaert F., Lo Giudice C., Hirsch T., **Valades-Cruz C.A.**, Lemaigre C., Shafaq-Zadah M., Wunder C., Wattiez R., Johannes L., van der Bruggen P., Alsteens D., Morsomme P. Endophilin-A3 and Galectin-8 control the clathrin-independent endocytosis of CD166. **Nature Communications** (2020)

[5] Briane V, Vimond M, **Valades-Cruz CA**, Salomon A, Wunder C, Kervrann C. A sequential algorithm to detect diffusion switching along intracellular particle trajectories. **Bioinformatics** (2020)

[6] Salomon A., **Valades-Cruz C. A**., Leconte L., Kervrann C. Dense Mapping of Intracellular Diffusion and Drift from Single-Particle Tracking Data Analysis, ICASSP 2020 - 2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Barcelona, Spain, 2020, pp. 966-970.

[7] Torrino S., Shen W., Blouin C., Kailasam Mani S., Viaris de Lesegno C., Bost P., Grassard A., Köster D., **Valades-Cruz C. A.**, Chambon V., Johannes L., Pierobon P., Soumelis V., Coirault C., Vassilopoulos S., Lamaze C. EHD2 is a mechanotransducer connecting caveolae dynamics with gene transcription. **J Cell Biol.** (2018)

[8] Banerjee A., Grazon C., Pons T., Bhatia D., **Valades-Cruz C. A.**, Johannes L., Krishnan Y., Dubertret B. A Novel Type of Quantum Dot–Transferrin Conjugate Using DNA Hybridization Mimics Intracellular Recycling of Endogenous Transferrin. **Nanoscale** (2018)

Preprints and submitted manuscripts

[*] **Valades-Cruz C. A.***, Barth R. *, Abdellah M.*, Shaban H. A. Genome-wide analysis of the dynamic and biophysical properties of chromatin and nuclear proteins in living cells with Hi-D. bioRxiv (2022) [Under revision in Nature Protocols].

[*] Papereux S.*, Leconte L.*, **Valades-Cruz C. A.*,** Liu T., Dumont J., Chen Z., Salamero J., Kervrann C., Badoual A. DeepCristae, a CNN for the restoration of mitochondria cristae in live microscopy images. bioRxiv (2023) [Under revision in Communications Biology].

[*] MacDonald E., Forrester A., **Valades-Cruz C. A.**, Madsen T. D., Hetmanski J., Dransart E., Ng Y., Godbole R., Shp A. A., Leconte L., Chambon V., Ghosh D., Pinet A., Bhatia D. D., Lombard B., Loew D., Larsen M. R., Leffler H., Lefeber D., Clausen H., Caswell P. T., Shafaq-Zadah M., Mayor S., Weigert R., Wunder C., Johannes L. Growth factor-induced desialylation for the fast control of endocytosis. bioRxiv (2023)

Reviews, Perspectives & Comments

[1] **Valades-Cruz C. A**. et al. Challenges of intracellular visualization using virtual and augmented reality. **Frontiers in Bioinformatics** (2022)

[2] Johannes L., **Valades-Cruz C. A.** The final twist in endocytic membrane scission. **Nature Cell Biology** (2021)

Review assignments journals: Bioinformatics, PLOS Computational Biology, Journal of Physical Chemistry Letters & Biological Imaging.