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Situation

2017-2018 Researcher (CR1 CNRS)
Neurobiology of Cellular Interactions and Neurophysiopathology
INP CNRS-AMU UMR 7051
Team leader “NeuroCyto: the neuronal cytoskeleton in health and disease” (4 permanent positions)
ATIP CNRS emerging team program <http://www.neurocytolab.org>

Education

2006 PhD in neuroscience, Paris VI university, with honors.
Engineer PhD fellowship from CNRS, Jean Langlois PhD prize.
2002 “Molecular Biology of the Cell” Masters (PVI/PVII/PXI), including Pasteur Institute course on cell
biology (with honors).
2002 Engineering diploma from Paris Industrial Physics and Chemistry Engineering School (ESPCI).
Interdisciplinary formation focused on research in physics, chemistry and biology.

Research experience

2012-2016 Researcher (CR2 CNRS) at the Neurobiology et Neurophysiology Marseille Center (CRN2M CNRS-
AMU UMR7286) in the “Axonal Domains Architecture team” (dir. Bénédicte Dargent). Nanoscale
architecture of the axon initial segment.
2006-2012 Post-doctoral fellowship at the Ionic Channels laboratory (INSERM UMR641) in the “Ionic channels
and neuronal polarity” team (dir. Dr. Bénédicte Dargent). Characterization of new AIS components.
2002-2006 PhD at the Neurobiology and cellular diversity laboratory (ESPCI-CNRS UMR 7637) in the team of
Zsolt Lenkei. Neuronal trafficking and targeting of the CB1 cannabinoid receptor.
2001-2002 Master's degree student at the ESPCI Neurobiology lab: intracellular trafficking of the CB1 receptor.

Teaching and mentoring

2018 Master's degree student: Nikki van Bommel, University of Amsterdam (A*MIDEX fellowship).
2017 Course at GABBA PhD program, University of Porto: Advanced imaging in neurobiology.
Master's degree student (M2): Sofia Yousfi. New DNA-PAINT labeling and imaging schemes.
Master's degree student (M2): Angélique Jimenez. Role of actin structures in axonal transport.
2016-2017 Master 2 Neurosciences course: “Photonic imaging in neurobiology” (3h)
2014 Master's degree student (M2): Jean Potier. Nano-architecture of the AIS by super-resolution microscopy.
2013 Master's degree student (M2): Soraya Graoudi. Role of the axon initial segment (AIS) in neuronal polarity.

Scientific activities

- 25 publications in international peer-reviewed journals, 1 book chapter, 12 invited oral communications at conferences, 23 invited seminars and courses. h-index: 15; 1017 citations (23/02/2018, Google Scholar).
- ATIP/AVENIR 2016 emerging team program laureate.
- Member of four PhD committees and two PhD juries (2012-2017).
- Scientific advisory board member of Abbelight, a French startup manufacturing 3D-STORM microscopes.

- Scientific coordinator of the NeuroTimone campus facilities equipment grant (CPER-FEDER 2018-2020, 3.5 M€).
- Reviewing editor: *Frontiers in Molecular Neuroscience*, reviewer: *EMBO Journal*, *Current Biology*, *Cell Reports*, *Frontiers in Cellular Neuroscience*, *Journal of Neurochemistry*, *European Journal of Neuroscience*, *Neuroscience*, *Developmental Neurobiology*, *Journal of Visualized Experiments (JoVE)*, *PLoS ONE*, *Developmental Neurobiology*, *Scientific Reports*.
- Grant proposals reviewing: Human Frontiers Science Project (HFSP), European Research Council (ERC), Biotechnology and Biological Sciences Research Council (BBSRC, UK), Netherlands Organization for Scientific Research (NWO), Research Foundation Flanders (FWO), Lunbeck Foundation (Denmark), “Espoir en tête” (Neurodon/French Brain Research Federation), UFR Paris Sciences et Lettres, Bordeaux Idex.

Selected publications

Culley S, Albrecht D, Jacobs C, Pereira PM, Leterrier C*, Mercer J*, Henriques R*.

Quantitative mapping and minimization of super-resolution optical imaging artifacts.

Nat Methods. 2018 Feb 19. doi: 10.1038/nmeth.4605.

<https://www.nature.com/articles/nmeth.4605>

Berger SL, Leo-Macias A, Yuen S, Khatri L, Pfennig S, Zhang Y, Agullo-Pascual E, Caillol G, Zhu MS, Rothenberg E, Melendez-Vasquez CV, Delmar M, Leterrier C, Salzer JL.

Localized Myosin II Activity Regulates Assembly and Plasticity of the Axon Initial Segment.

Neuron. 2018 Feb 7;97(3):555-570.e6. doi:10.1016/j.neuron.2017.12.039.

[http://www.cell.com/neuron/fulltext/S0896-6273\(17\)31187-X](http://www.cell.com/neuron/fulltext/S0896-6273(17)31187-X)

Huang CY, Zhang C, Ho TS, Osés-Prieto J, Burlingame AL, Lalonde J, Noebels JL, Leterrier C, Rasband MN. α II Spectrin Forms a Periodic Cytoskeleton at the Axon Initial Segment and Is Required for Nervous System Function.

J Neurosci. 2017 Nov 22;37(47):11311-11322. doi: 10.1523/JNEUROSCI.2112-17.2017.

<http://www.jneurosci.org/content/early/2017/10/16/JNEUROSCI.2112-17.2017>

The nano-architecture of the axonal cytoskeleton.

Leterrier C*, Dubey P, Roy S*.

Nature Reviews Neuroscience, 2017 Nov 3. doi: 10.1038/nrn.2017.129

<https://www.nature.com/articles/nrn.2017.129>

Nanoscale Architecture of the Axon Initial Segment Reveals an Organized and Robust Scaffold.

Leterrier C*, Potier J, Caillol G, Debarnot C, Rueda Boroni F, Dargent B.

Cell Reports, 2015 Dec 29;13(12):2781-93. doi: 10.1016/j.celrep.2015.11.051

[http://www.cell.com/cell-reports/abstract/S2211-1247\(15\)01382-0](http://www.cell.com/cell-reports/abstract/S2211-1247(15)01382-0)

Ganguly A, Tang Y, Wang L, Ladit K, Loi J, Dargent B, Leterrier C, Roy S.

A dynamic formin-dependent deep F-actin network in axons.

The Journal of Cell Biology, 2015 Aug 3;210(3):401-17. doi: 10.1083/jcb.201506110

<http://jcb.rupress.org/content/210/3/401.abstract>

Current collaborations and partnerships

- Subhojit Roy (UW Madison, USA): mechanisms of actin transport in axons.
- Ricardo Henriques (MRC LMCB, UCL, London, UK): New image analysis methods for super-resolution.
- Sandrine Lévêque-Fort (ISMO, Orsay, Fr): new super-resolution imaging approaches.
- Matthew Rasband (Baylor College of Medicine, Houston, USA): nanoscale architecture of axonal spectrins.
- James Salzer (New York University, USA): myosins at the axon initial segment.
- Zsolt Lenkei (ESPCI, Paris): implementation of super-resolution microscopy.
- Industrial partnership with Abbelight: highly multiplexed STORM.
- Industrial partnership with Nikon Instruments: N-STORM reference and demo center at INP imaging facility.

Complete list of publications (* corresponding author)**Preprints**

- 2017 Processive movement of actin by biased polymerization: a new paradigm of axonal transport.
Chakrabarty N, Dubey P, Tang Y, Ganguly A, Ladit K, Leterrier C, Jung P, Roy S.
bioRxiv, 2017 Nov 9. doi: 10.1101/212449

Peer-reviewed articles

- 2018 Culley S, Albrecht D, Jacobs C, Pereira PM, Leterrier C*, Mercer J*, Henriques R*.
Quantitative mapping and minimization of super-resolution optical imaging artifacts.
Nat Methods. 2018 Feb 19. doi: 10.1038/nmeth.4605.
- Berger SL, Leo-Macias A, Yuen S, Khatri L, Pfennig S, Zhang Y, Agullo-Pascual E, Caillol G, Zhu MS, Rothenberg E, Melendez-Vasquez CV, Delmar M, Leterrier C, Salzer JL.
Localized Myosin II Activity Regulates Assembly and Plasticity of the Axon Initial Segment.
Neuron. 2018 Feb 7;97(3):555-570.e6. doi:10.1016/j.neuron.2017.12.039.
- Leterrier C*.
The axon initial segment: an updated viewpoint.
J Neurosci. 2018 Jan 29. pii: 1922-17. doi: 10.1523/JNEUROSCI.1922-17.2018.
- 2017 Leterrier C*, Dubey P, Roy S*.
The nano-architecture of the axonal cytoskeleton.
Nature Reviews Neuroscience, 2017; 18(12):713-726. doi: 10.1038/nrn.2017.129
- Huang CY, Zhang C, Zollinger DR, Leterrier C, Rasband MN.
An α II spectrin based cytoskeleton protects large diameter myelinated axons from degeneration.
The Journal of Neuroscience, 2017; 37(47):11323-11334. doi: 10.1523/jneurosci.2113-17.2017.
- Huang CY, Zhang C, Ho TS, Osés-Prieto J, Burlingame AL, Lalonde J, Noebels JL, Leterrier C, Rasband MN.
 α II spectrin forms a periodic cytoskeleton at the axon initial segment and is required for nervous system function.
The Journal of Neuroscience, 2017; 37(47):11311-11322. doi: 10.1523/jneurosci.2112-17.2017.
- Ganguly A, Han X, Das U, Wang L, Loi J, Gitler D, Caillol G, Leterrier C, Yates J, Roy S.
Hsc70 chaperone activity is required for the cytosolic slow axonal transport of synapsin.
The Journal of Cell Biology, 2017 Jul 3;216(7):2059-2074. doi: 10.1083/jcb.201604028
- Leterrier C, Clerc N, Rueda-Boroni F, Montersino A, Dargent B, Castets F.
Ankyrin G membrane partners drive the establishment and maintenance of the axon initial segment.
Frontiers in Cellular Neuroscience, 2017 11:6. doi: 10.3389/fncel.2017.00006
- Yoshimura T, Stevens S, Leterrier C, Stankewich M, Rasband MN.
Developmental changes in expression of β VI-spectrin splice variants at axon initial segments and nodes of Ranvier.
Frontiers in Cellular Neuroscience, 2017 10:304. doi: 10.3389/fncel.2016.00304
- 2016 Leterrier C*.
The axon initial segment, 50 years later: a nexus for neuronal organization and function.
Current Topics in Membranes, 2016;77:185-233. doi: 10.1016/bs.ctm.2015.10.005

- 2015 Leterrier C*, Potier J, Caillol G, Rueda Boroni F, Debarnot C, Dargent B.
Nanoscale architecture of the axon initial segment reveals an organized and robust scaffold.
Cell Reports, 2015 Dec 29;13(12):2781-93. doi: 10.1016/j.celrep.2015.11.051
- Ganguly A, Tang Y, Wang L, Laditka K, Loi J, Dargent B, Leterrier C, Roy S.
A dynamic formin-dependent deep F-actin network in axons.
The Journal of Cell Biology, 2015 Aug 3;210(3):401-17. doi: 10.1083/jcb.201506110
- 2014 Hien YE, Montersino A, Castets F, Leterrier C, Filhol-Cochet O, Vacher H, Dargent B.
CK2 accumulation at the axon initial segment depends on sodium channel Nav1.
FEBS Letters, 2014 Aug 7. pii: S0014-5793(14)00581-X. doi: 10.1016/j.febslet.2014.07.032
- Leterrier C*, Dargent B.
No Pasaran! Role of the axon initial segment in the regulation of protein transport and the maintenance of axonal identity.
Seminars in Cell and Developmental Biology, 2014 Mar;27:44-51. doi: 10.1016/j.semcdb.2013.11.001
- 2013 Simon AC, Loverdo C, Gaffuri AL, Urbanski M, Ladarre D, Carrel D, Rivals I, Leterrier C, Benichou O, Dournaud P, Szabo B, Voituriez R, Lenkei Z.
Activation-dependent plasticity of polarized GPCR distribution on the neuronal surface.
Journal of Molecular and Cellular Biology, 2013 Aug;5(4):250-65. doi: 10.1093/jmcb/mjt014
- 2011 Carrel D, Simon A, Emerit MB, Rivals I, Leterrier C, Biard M, Hamon M, Darmon M, Lenkei Z.
Axonal targeting of the 5-HT1B serotonin receptor relies on structure-specific constitutive activation.
Traffic, 2011 Nov;12(11):1501-20. doi: 10.1111/j.1600-0854.2011.01260.x
- Leterrier C, Vacher H, Fache MP, d'Ortoli SA, Castets F, Autillo-Touati A, Dargent B.
End-binding proteins EB3 and EB1 link microtubules to ankyrin G in the axon initial segment.
Proceeding of the National Academy of Sciences, 2011 May 24;108(21):8826-31.
doi:10.1073/pnas.1018671108
- Leterrier C, Brachet A, Dargent B, Vacher H.
Determinants of voltage-gated sodium channel clustering in neurons.
Seminars in Cell and Developmental Biology, 2011 Apr;22(2):171-7. doi: 10.1016/j.semcdb.2010.09.014
- 2010 Brachet A, Leterrier C, Irondelle M, Fache MP, Racine V, Sibarita JB, Choquet D, Dargent B.
Ankyrin G restricts ion channel diffusion at the axonal initial segment before the establishment of the diffusion barrier.
The Journal of Cell Biology, 2010 Oct 18;191(2):383-95. doi: 10.1083/jcb.201003042
- Leterrier C, Brachet A, Fache MP, Dargent B.
Voltage-gated sodium channel organization in neurons: Protein interactions and trafficking pathways.
Neuroscience Letters, 2010 Dec 10;486(2):92-100. doi: 10.1016/j.neulet.2010.08.079
- Cossec JC, Simon A, Marquer C, Moldrich RX, Leterrier C, Rossier J, Duyckaerts C, Lenkei Z, Potier MC.
Clathrin-dependent APP endocytosis and Abeta secretion are highly sensitive to the level of plasma membrane cholesterol.
Biochimica and Biophysica Acta, 2010 Aug;1801(8):846-52. doi: 10.1016/j.bbali.2010.05.010
- 2009 Le Verche V, Kaindl AM, Verney C, Csaba Z, Peineau S, Olivier P, Adle-Biassette H, Leterrier C, Vitalis T, Renaud J, Dargent B, Gressens P, Dournaud P.
The somatostatin 2A receptor is enriched in migrating neurons during rat and human brain development and stimulates migration and axonal outgrowth.
PLoS One, 2009;4(5):e5509. doi: 10.1371/journal.pone.0005509

- 2008 Bréchet A, Fache MP, Brachet A, Ferracci G, Baude A, Irondelle M, Pereira S, Leterrier C, Dargent B. Protein kinase CK2 contributes to the organization of sodium channels in axonal membranes by regulating their interactions with ankyrin G. *The Journal of Cell Biology*, 2008 Dec 15;183(6):1101-14. doi: 10.1083/jcb.200805169
- Vitalis T, Lainé J, Simon A, Roland A, Leterrier C, Lenkei Z. The type 1 cannabinoid receptor is highly expressed in embryonic cortical projection neurons and negatively regulates neurite growth in vitro. *European Journal of Neuroscience*, 2008 Nov;28(9):1705-18. doi: 10.1111/j.1460-9568.2008.06484.x
- 2006 Leterrier C, Lainé J, Darmon M, Boudin H, Rossier J, Lenkei Z. Constitutive activation drives compartment-selective endocytosis and axonal targeting of type 1 cannabinoid receptors. *The Journal of Neuroscience*, 2006 Mar 22;26(12):3141-53. doi: 10.1523/JNEUROSCI.5437-05.2006
- 2004 Leterrier C, Bonnard D, Carrel D, Rossier J, Lenkei Z. Constitutive endocytic cycle of the CB1 cannabinoid receptor. *The Journal of Biological Chemistry*, 2004 Aug 20;279(34):36013-21. doi: 10.1074/jbc.M403990200

Invited communications at conferences

- 2018 The nanoscale architecture of the axon.
7th French Cell Adhesion Club Symposium (Strasbourg, Fr).
- 2017 The axonal cytoskeleton at the nanoscale.
Royal Netherlands Academy of Arts and Sciences colloquium “Cell Biology of the Axon: Progress Made and Promises Ahead” (Amsterdam, Netherlands).
- The axonal cytoskeleton at the nanoscale.
7th Single Molecule Localization Microscopy Symposium (London, UK).
- The axonal cytoskeleton at the nanoscale.
IUBMB Focused Meeting: Emerging concepts of the neuronal cytoskeleton (Puerto Varas, Chile).
- Super-resolution imaging of the neuronal architecture with STORM and DNA-PAINT.
Papendal 8, Nikon European User Meeting (Rome, It).
- 2016 Symposium: Neuronal Cytoskeleton 2.0: A Revised View of an Ancient Edifice.
46th Society for Neuroscience meeting (San Diego, USA).
- 2015 Interplay between the cytoskeleton and scaffolds at the axon initial segment.
ASCB Subgroup on the Neuronal Cytoskeleton (San Diego, USA).
- Using super-resolution microscopy to decipher the molecular architecture of neuronal scaffolds.
EMBO Endocytosis Meeting (Mandelieu, Fr).
- Nanoscale architecture of the axon initial segment reveals an organized and robust scaffold.
Satellite symposium, 12e French Society for Neuroscience Meeting (Montpellier, Fr).
- 2012 Neuronal EB3 and EB1 link microtubules to ankyrin G: consequence for the structure and function of the axon initial segment.
10th ENP Dutch Neuroscience Meeting (Lunteren, Netherlands).

- 2009 Clustering of proteins in axonal subdomains: molecular and cellular mechanisms
Replacing Dr. Dargent, 9th European Glial Cell Meeting (Paris, Fr).
 Live cell imaging of protein trafficking toward the axonal initial segment
 Zeiss LSM User Meeting (Pasteur Institute, Paris, Fr).

Invited seminars, workshops and courses

- 2018 Advanced microscopy for understanding the neuronal cytoskeleton
 “Mechanobiology of Polarized Cells” Summer School (Les Houches, Fr).
 The nanoscale architecture of the axon.
 IBDM (Marseille, Fr).
 The nanoscale architecture of the axon.
 MNF Seminar series, Weizmann Institute (Rehovot, Israel).
- 2017 dSTORM & DNA-PAINT: From theory to practice.
 GDR Imabio Groupe Échantillons, Hôpital Cochin (Paris, Fr).
 The axonal cytoskeleton at the nanoscale.
 Institut de la Vision (Paris, Fr).
 The axonal cytoskeleton at the nanoscale.
 Utrecht University (Utrecht, NL).
 DNA-PAINTing the cell architecture.
 Chan-Zuckerberg Initiative imaging workshop (San Francisco, USA).
 The axonal cytoskeleton at the nanoscale.
 University of Wisconsin (Madison, USA).
 The axonal cytoskeleton at the nanoscale.
 i3S (Porto, Portugal)
 Super-resolution imaging of the neuronal architecture with STORM and DNA-PAINT.
 GDR ImaBio, Super-resolution day (Paris, Fr).
- 2016 Probing nuts and bolts of the axon initial segment down to the nanoscale.
 Baylor College of Medicine (Houston, USA).
 Using super-resolution microscopy to map the molecular architecture of the axon.
 GIN (Grenoble, Fr).
 Mapping the neuronal cytoskeleton with super-resolution microscopy.
 CIML (Marseille, Fr).
 Instructor: FENS CAJAL Advanced Neuroscience Training “Neuronal Cell Biology: Cytoskeleton and Trafficking” (Bordeaux School of Neuroscience, Fr).
- 2015 Using super-resolution to map the molecular architecture of neuronal scaffolds.
 CRBM (Montpellier, Fr).
 Using super-resolution to map the molecular architecture of neuronal scaffolds.
 Fer à Moulin Institute (Paris, Fr).
 Unraveling the architecture of the Axon Initial Segment with super-resolution microscopy.
 PR2I “Contrast, Resolution, Labels”, CERIMED (Marseille, Fr).
- 2014 Unraveling the architecture of the Axon Initial Segment with super-resolution microscopy.

CoreBio PACA scientific meeting, CIML (Marseille, Fr).

Unraveling the architecture of the Axon Initial Segment with super-resolution microscopy.

Nikon super-resolution day, ImaGif (Gif/Yvette, Fr).

Workshop: Using super-resolution microscopy to define the architecture of a neuronal compartment.

MiFoBio (Functional Microscopy in Biology school, Seignosse, Fr).

2006 Intracellular trafficking and pharmacology of the CB1 cannabinoid receptor.
Integrative Biology Institute scientific meeting, IFR83 (Paris, Fr).

2005 How to visualize a neuronal receptor?
Jean Langlois PhD prize, ESPCI (Paris, Fr).

2004 Intracellular trafficking of the CB1 cannabinoid receptor.
Exo-endocytosis club meeting, IJM (Paris, Fr).

Oral communications

2015 Leterrier C, Potier J, Rueda Boroni F, Chabbert D, Dargent B. *Talk selected from abstract*
Nanoscale architecture of the axon initial segment reveals an organized and robust scaffold.
Neuronal Trafficking in Physiology and Disease (Janelia Research Center, USA).

2014 Leterrier C, Potier J, Rueda Boroni F, Dargent B. *Talk selected from abstract*
Unraveling the architecture of the Axon Initial Segment with super-resolution microscopy.
4th Single Molecule Localization Microscopy Symposium (London, UK)
Leterrier C, Potier J, Rueda Boroni F, Dargent B. *Talk selected from abstract*
Unraveling the molecular architecture of the Axon Initial Segment with localization microscopy.
11th Exocytosis-endocytosis Club Meeting (Pornichet, Fr).

2012 Leterrier C, Vacher H, Anglès d'Ortoli S, Fache MP, Castets F, Autillo-Touati A, Dargent B.
Talk selected from abstract
EB3 and EB1 link microtubules to ankyrin G at the axon initial segment
EMBO Workshop "Cell Biology of the Neuron" (Heraklion, Crete).

2010 Brachet A, Leterrier C, Choquet D, Dargent B. *Talk selected from abstract*
Ankyrin G and protein kinase CK2 restrict sodium channel diffusion at the axonal initial segment
before the establishment of the diffusion barrier.
21st Ion Channel Meeting (Giens, Fr).