Marc Guillon

Born: 24/06/1979

Saints-Pères Paris Institute for Neurosciences (SPPIN)
CNRS UMR8003
University Paris Descartes
75270 Paris Cedex 06

- **EDUCATION**

2015 ***Venia Legendi,*** (or "Habilitation") diploma to supervise PhD student
Title: "super-resolution imaging in biological media".

2007 **PhD in optomechanics** for astronomy instrumentation : Optical trapping and binding: feasibility study of a "laser trapped mirror"
Research performed at the Laboratory of Exoplanetary and Stellar Interferometry (FRE2215) headed by Pr. Antoine Labeyrie and hosted by the Haute-Provence Observatory (France).
Aix-Marseille University, Marseille, France
Advisor: Pr. Antoine Labeyrie

2004 **Master: Lasers and Matter**
University Paris XI, Orsay, France

2000-2004 **Ecole Normale Supérieure de Cachan**

2003 **"Agrégation"** passed, French competitive exam for teaching

- **CURRENT POSITION(S)**

2019 – **Junior member of the *Institut Universitaire de France*** (Academic Institute of France)
Selection by an international jury to distinguish university professors for their research excellence

2008 – **Associate Professor**
Permanent researcher/professor university position with 192 hours of yearly teaching duties.
Current laboratory: Saints-Pères Paris Insitute for Neurosciences
Until 2018: Research performed in the Wavefront Engineering Group (Headed by V. Emiliani) at the Neurophysiology and New Microscocpy Laboratory and then at the Neurophotonics laboratory
University Paris Descartes, Paris, France

2018 – 2019 **Visiting professor** at Laboratory Kastler Brossel in the group "optical imaging in biological and complex media" headed by Pr. Sylvain Gigan.
Ecole Normale Supérieure, Paris, France

- **FELLOWSHIPS**

2007 – 2008 **Postdoc,** University of Dundee, School of Engineering, Applied Physics Department, First working with Dr. D. McGloin and Pr. Kishan Dholakia on aerosol optical tweezing with a super-continuum laser source in the Optical Manipulation Group (St Andrews, UK); before Dr. McGloin found the Applied Optical Manipulation group at the university of Dundee where I studied thermo-optical multistability of optically tweezed droplets by stimulated Raman scattering.
Dundee, UK

- **TRACK RECORD**
  - 27 peer-reviewed publications including 17 as senior author and/or corresponding author
  - 10 invitations in international conferences
  - 543 citations, h-index: 14 (on 06/2019, source google scholar)

- **SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS**

2019 – PhD: Payvand Arjmand
PI of the granted project about ultrafast compressed microscopy.

2014 – 2017 PhD: Marco Pascucci
PI of the granted project about super-resolution STED microscopy through multimode optical fibers.
University Paris Descartes, Paris, France

2011 – 2014 Postdoc: Marcel Lauterbach
PI of the first year granted project which allowed M. Lauterbach to successfully apply for a two-year Marie-Curie people program to combine super-resolution STED microscopy with computer generated holography to perform holographic photostimulation of dendritic spines with nanoscopic structural monitoring. I published three articles with ML in the frame of this post-doctoral internship\ cite{Lauberbach_SR_,Guillon_JOSA,Lauterbach_holography}
University Paris Descartes, Paris, France

2013 – 2016 participation to PhD supervision of Oscar Hernandez
University Paris Descartes, Paris, France
Currently: Postdoc with Mark Schnitzer at Stanford University

2014 – 2015 participation to PhD supervision of Osnath Assayag
Ecole supérieure de Physique et de Chimie Industrielle, Paris, France
Currently: Research engineer at intelligent imaging innovation (3i)

2010 – 2013 participation to PhD supervision of Clément Lafargue
Ecole normale supérieure de Cachan, Cachan, France
Currently : Assistant professor at Ecole Normale Supérieure, Cachan, France

2010 – 2019 Several Master students
mostly from University Paris Descartes, Paris, France

- **TEACHING ACTIVITIES**

2016 – **Nanophotonics** course, Master Erasmus Mundus "Monabiphot" headed by Ecole Normale Supérieure Paris Saclay.

2008 – Associate professor at university Paris Descartes – **General physics**, Optics, Mecanics, Microscopy, University Paris Descartes, Faculty of fundamental and biomedical sciences, Paris, France
Responsible for experimental works in physics in the BcS program of the Biomedical institute (University Paris Decartes)

2009, 2016 **Summer-schools** for the Erasmus Mundus Master program "Monabiphot"

2004 – 2007 Teaching assistant at Aix-Marseille University – **General Physics**, Mechanics, Aix-Marseille University, Marseille, France

- **INSTITUTIONAL RESPONSIBILITIES**

2010 – Member of the international student programs office, University Paris Descartes, Paris, France

- **COMMISSIONS OF TRUST**

2016 – Elected at Scientific Advisory Board, University Paris Descartes, Paris, France
2012 – 2016 Elected at Scientific Advisory Board, University Paris Descartes, Paris, France

- **GRANTS**

2018 Young researcher grant from the French National Agency (ANR JCJC), 300k€. Project: SpeckleSTED. PI: M. Guillon
2014 Ile-de-France C'nano PhD funding 100k€. Project FiberSTED. PI: M. Guillon
2014 University funding 150k€. Project NanoBioSTED. PI. F. Montel
2010 Ile-de-France C'nano postdoc funding 50k€. Project Nanoscopy. PI: M. Guillon

Publications in peer-reviewed international journals:

- 27 peer-reviewed publications including 17 as senior author and/or corresponding author
- 543 citations, h-index: 14 (on 06/2019, source google scholar)

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1. J. Gateau, F. Claude, G. Tessier, M. Guillon, Topological transformations of speckles, **Optica**, in press. (2019)
2. M. Pascucci, S. Ganesan, A. Tripathi, O. Katz, V. Emiliani, M. Guillon, *Compressive three-dimensional super-resolution microscopy with speckle-saturated fluorescence excitation,* **Nat. Commun. 10(1),** 1327 (2019)
3. C. Liu, P. Berto, S.I.F. Esparza, M. Guillon, G. Tessier, *Spatially and temporally reconfigurable temperature control at the microscale,* **ACS Photonics** 6 (2), 422 (2019).
4. P. Berto, M. Guillon, P. Bon, *Wrapping-free numerical refocusing of scalar electromagnetic fields,* **Appl. Opt. 57(22),** 6582-6586 (2018)
5. P. Berto, H. Rigneault, M. Guillon, *Wavefront sensing with a thin diffuser,* **Opt. Lett. 42(24)** 5117-5120 (2017)
6. M. Guillon, B. Forget, A.J. Foust, V. De Sars, M. Ritsch-Marte, V. Emiliani, *Vortex-free phase profiles for uniform patterning with computer-generated holography,* **Opt. Express 25(11),** 12640-12652 (2017)
7. J. Gateau, H. Rigneault, M. Guillon, *Complementary speckle patterns: deterministic interchange of intrinsic vortices and maxima through scattering media,* **Phys. Rev. Lett. 118,** 043903 (2017); (arXiv:1607.06722)
8. N. Michalski, J.D. Goutman, S.M. Auclair, J.B. de Monvel, M. Tertrais, A. Emptoz, A. Parrin, S. Nouaille, M. Guillon, M. Sachse, D. Ciric, A. Bahloul, J.P. Hardelin, R.B. Sutton, P. Avan, S.S. Krishnakumar, J.E. Rothman, D. Dulon, S. Safieddine, C. Petit, *Otoferlin acts as a Ca2+ sensor for vesicle fusion and vesicle pool replenishment at auditory hair cell ribbon synapses,* **eLife 6e31013** (2017)
9. R. Conti, O. Assayag, V. de Sars, M. Guillon, V. Emiliani, *Computer generated holography with intensity-graded patterns,* **Front. Cell. Neurosci. 10:236** (2016)
10. M. Lauterbach, M. Guillon, C. Desnos, D. Khamsing, Z. Jaffal, F. Darchen and V. Emiliani, *Superresolving dendritic spine morphology with STED microscopy under holographic photostimulation,* **Neurophotonics 3(4),** 041806 (2016)
11. M. Pascucci, G. Tessier, V. Emiliani, M. Guillon, *Super-resolution imaging of optical vortices in a speckle pattern,* **Phys. Rev. Lett. 116,** 093904 (2016).
12. Ariadna Martinez-Marrades, Ph.D.; Léo Greusard; Yannick De Wilde; Natalie Bardou; Stéphane Collin; Marc Guillon; Gilles Tessier, *Characterization of plasmonic nanoantennas by Holographic Microscopy and Scanning Near-field Microscopy,* **Opt. Commun.** 359, 455-459 (2016)

13. D. Li, K. Hérault, K. Zylbersztejn, M.A. Lauterbach, M. Guillon, M. Oheim, N. Ropert, *Astrocyte VAMP3 vesicles undergo Ca^{2+}-independent cycling and modulate glutamate transporter trafficking*, **J. Physiol. 593.13,** 2807–2832 (2015)
14. O. Hernandez, M. Guillon, E. Papagiakoumou, V. Emiliani, *Zero-order suppression for two-photon holographic excitation*, **Opt. Lett. 39**(20), 5953-5956 (2014)
15. M. Bretou, O. Jouannot, P. Pierobon, I. Fanget, N. Larochette, P. Gestraud, M. Guillon, V. Emiliani, S. Gasman, C. Desnos, A.-M. Lennon-Duménil and F. Darchen, *Cdc42 controls the dilation of the exocytotic fusion pore by regulating membrane tension*, **Mol Biol Cell,** E14-07-1229 (2014)
16. M. Guillon, M. A. Lauterbach, *quantitative confocal spiral phase contrast*, **J. Opt. Soc. Am. A 31**(6), 1215-1225 (2014) selected for publication in the **Virtual Journal for Biomedical Optics 9**(8), 1215 (2014)
17. M. A. Lauterbach, M. Guillon, A. Soltani, and V. Emiliani, *STED microscope with spiral phase contrast*, **Sci. Rep. 3** , 2050 (2013)
18. E. Ronzitti, M. Guillon, V. de Sars, and V. Emiliani, *LCoS nematic SLM characterization and modeling for diffraction efficiency optimization, zero and ghost orders suppression*, **Opt. Exp. 20** (16) 17843-17855 (2012)
19. S. Yang, E. Papagiakoumou, M. Guillon, V. de Sars, C.-M. Tang, and V. Emiliani. *Three-dimensional holographic photostimulation of the dendritic arbor*, **J. Neur. Eng. 8**, 046002 (2011).
20. M. Guillon, R. Miles, J.P. Reid, D. McGloin, *Thermo-optical resonance locking of an optically trapped salt-water micro-droplet*, **New J. of Phys. 11,** 103041 (2009)
21. R. Miles, M. Guillon, L. Mitchem, D. McGloin, J.P. Reid, *the influence of resonant absorption and heating on the equilibrium size of aqueous-solute aerosol droplet*, **Phys. Chem. Chem. Phys. 11,** 7312 (2009)
22. M. Guillon, K. Dholakia, D. McGloin, *Optical trapping and spectral analysis of aerosols with a supercontiuum laser source*, **Opt. Exp. 16,** 7655-7664 (2008).
23. M. Guillon, B. Stout, O. Moine, *Reply to comment*, **Phys. Rev. Lett. 100**, 199404 (2008).
24. M. Guillon, B. Stout, *Optical trapping and binding in air: Imaging and spectroscopic analysis*, **Phys. Rev. A 77,** 023806 (2008).
25. M. Guillon, O. Moine, B. Stout, *Erratum: Longitudinal optical binding of high contrast microdroplets in air*, **Phys. Rev. Lett. 99,** 079901 (2007).
26. M. Guillon, O. Moine, B. Stout, *Longitudinal optical binding of high contrast microdroplets in air*, **Phys. Rev. Lett. 96,** 143902: 1-4 (2006).
27. M. Guillon, *Field enhancement in a chain of optically bound dipoles*, **Opt. Exp. 14,** 3045-3055 (2006).

Patents

- MICROSCOPE FOR HIGH SPATIAL RESOLUTION IMAGING A STRUCTURE OF INTEREST IN A SAMPLE, EP12305509, submitted May 7th, 2012, PCT EP2013059230, submitted May 3rd, 2013.
- OPTICAL SYSTEM COMPRISING A SPATIAL LIGHT MODULATOR, EP14305253, submitted Feb. 24th, 2014, PCT EP2015/053855, submitted Feb. 24th, 2015.

International conferences :

- M. Guillon, Manipulating critical points of random light for super-resolution microscopy, 5th International conference on angular angular momentum (ICOAM), Ottawa, Canada (2019) ***(Invited presentation)***
- T. Wu, M. Guillon, H. Rigneault, G. Tessier, P. Bon, P. Berto, Wavefront Sensing with a thin diffuser: application to super-localization, Digital Holography and three-dimensional imaging MB5S, Bordeaux, France (2019)
- M. Pascucci, S. Ganesan, A. Tripathi, O. Katz, V. Emiliani, M. Guillon, Compressive 3D super-resolution imaging with speckles, French-Israel Symposium on Non-linear and Quantum Optics 15 (Frisno 15), Aussois, France (2019)
- P. Berto, T. Wu, H. Rigneault, M. Guillon, Wavefront sensing with a thin diffuser, French-Israel Symposium on Non-linear and Quantum Optics 15 (Frisno 15), Aussois, France (2019)
- M. Guillon, Using optical vortices in speckles for compressed 3D super-resolution imaging, Biophotonics and Optical Angular Momentum (BIOAM), Palaiseau, France (2018) ***(Invited presentation)***
- S. Sivankutty, D. Kogan, V. Tsvirkun, G. Bouwmans, E.R. Andresen, M. Guillon, M. Alonso, D. Oron, H. Rigneault, Non-interferometric calibration of the phase transmission matrix in lensless endoscopy, SPIE BIOS, San Francisco, USA (2019)
- M. Guillon, Compressed three-dimensional imaging with speckles, EOSAM, Delft, Netherlands (2018) ***(Invited presentation)***
- M. Pascucci, G. Tessier, V. Emiliani, M. Guillon, Sub-diffraction imaging of phase singularities in a high-NA speckle optical field, Conference on Lasers and Electro-Optics (CLEO) Europe, Munich, Germany (2017)
- J. Gateau, H. Rigneault, M. Guillon, Deterministic generation of complementary speckle patterns through scattering media, European Conference on Biomedical Optics (ECBO), Munich, Germany (2017)
- J. Gateau, H. Rigneault, M. Guillon, Deterministic generation of complementary speckle patterns through opaque media, French-Israel Symposium on Non-linear and Quantum Optics (Frisno 14), Ein Gedi, Israel (2017)
- M. Pascucci, V. Emiliani, M. Guillon, Super-resolution speckle imaging, French-Israel Symposium on Non-linear and Quantum Optics (Frisno 14), Ein Gedi, Israel (2017)
- M. Guillon, J. Gateau, M. Pascucci, H. Rigneault, V. Emiliani, Saturated Negatives of speckle patterns and Complementary speckle patterns for super-resolution imaging, Optics and Singularities (Optis), Cachan, France (2016) ***(Invited presentation)***
- M. Guillon, J. Gateau, M. Pascucci, H. Rigneault, V. Emiliani, Saturated Negatives and Complementary speckle patterns, Biophotonics and Optical Angular Momentum (BIOAM), Palaiseau, France (2016) ***(Invited presentation)***
- M. Guillon, J. Gateau, M. Pascucci, H. Rigneault, V. Emiliani, Super-resolution imaging of optical vortices in a high-NA speckle pattern, Computational Optical Sensing and Imaging (COSI), Heidelberg (2016) ***(Invited presentation)***
- Marco Pascucci, Gilles Tessier, Valentina Emiliani, Marc Guillon, Super-resolution STED imaging of optical vortices in a high-NA speckle pattern, Brain In Focus conference, Rungstedgaard, Denmark (2016)
- M. Guillon, Optical field singularities for super-resolution imaging, BioNanoPhotonics conference, Cardiff, UK (2015) ***(invited presentation)***
- M. Guillon, *Optical phase singularities and super-resolution imaging,* Games of Light with Meta-Molecules: Communicating, sensing and imaging, Cachan, France, (June 2015).

- Marco Pascucci, Marcel Lauterbach, Valentina Emiliani, Marc Guillon, Subdiffraction imaging of phase singularities in a high-NA speckle optical field, French-Israel Symposium on Non-linear and Quantum Optics 13 (Frisno 13), Aussois, France (2015)
- M. Guillon, M. Lauterbach, V. Emiliani, Quantitative confocal phase contrast imaging in a STED microscope, French-Israel Symposium on Non-linear and Quantum Optics 13 (Frisno 13), Aussois, France (2015)
- M. Lauterbach, M. Guillon, A. Soltani, V. Emiliani, *STED microscope with spiral phase contrast*, European Optical Society Annual Meeting, Paris, France, May 2014.
- M. Guillon, *Quantitative spiral phase contrast imaging in a stimulated emission depletion microscope, International Conference on Optical Angular Momentum,* Glasgow, June 2013. ***(Invited presentation)***
- M. Guillon, M. Lauterbach, A. Soltani, V. Emiliani, *High sensitivity phase contrast Imaging in a Stimulated Emission Depletion Microscope,* European Conferences on Biomedical Optics, Munich, May 2013.
- M. Lauterbach, M. Guillon, A. Soltani, V. Emiliani, *STED microscope with phase contrast*, European Optical Society Annual Meeting, Aberdeen, Scotland, UK, 25-28 Sept. 2012.
- M. Lauterbach, M. Guillon, V. Emiliani, *STED microscope with phase contrast,* Annual meeting of the german biophysical society, Göttingen, Germany, 23-26 Sept. 2012.
- M. Guillon, *Optimization of nematic spatial light modulators for photo-activation of neurons,*SPIE Organic Photonics and Electronics, Liquid Crystals XVI, San Diego, Aug . 2012. ***(Invited presentation)***
- M. Guillon, *Resonant locking of the size of an optically tweezed droplet,* Advances in Molecular Non-linear Optics AMARIS 10, Cachan, France, May 2010.
- D. McGloin, M. Guillon, D. Rudd, D.R. Brunham, M.D. Summers, J. Firmin, J.R. Butler, J.B. Willis, L. Mitchem, H. Meresman, J.P. Reid, A. Sheridan, *Towards airborne optofluidics,* International Symposium on Optomecatronic ISOT 2009, Istanbul, Turkey, Sept. 2009.
- M.Guillon, K. Dholakia, D. McGloin, *Aerosol tweezing with a super-continuum laser beam,* Prov. SPIE (Aug. 2008)
- M. Guillon, B. Stout (speaker), *Optical binding force characterization of double-droplet systems,* PIERS Beijing (Mars 2007). ***(Invited presentation)***
- M. Guillon, *Optical trap shaping for binding force study and optimization,* SPIE Proceedings, San Jose **6483,** 648302 (Jan. 2007). ***(Invited presentation)***
- M. Guillon, A. Labeyrie, B. Stout, *Optically bound double droplet microcavity,* E.O.S. Paris (Oct. 2006).
- M.Guillon, *Optical binding in air*, PIERS Proceedings, Cambridge, USA, 437-441 (Mars 2006). ***(Invited presentation)***
- M.Guillon, *Optical trapping in rarefied media: towards laser-trapped space telescopes,* SPIE Proceedings **5930,** 593062 (Août 2005).
- A.Labeyrie, M. Guillon (speaker), J.-M. Fournier, *Optics of "Laser Trapped Mirrors" for large telescopes and hypertelescopes in space,* SPIE Proceedings **5899,** 589932 (Août 2005). ***(Invited presentation)***