

## Identité / Personal details

Nom et prénom / Name and first name:	SCHANNE-KLEIN Marie-Claire
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## Position actuelle / Current position

Organisme(s) public(s) français / French public organisation(s)

Code RNSR / RNSR code	Organisme / Organisation	Laboratoire / Laboratory	Code unite / Unit code	Code postal / Postcode	Ville / Town
200519254L	Ecole Polytechnique - CNRS - Inserm	Lab. d'optique et biosciences (LOB)	UMR 7645 CNRS U1182 Inserm	91128	Palaiseau

Titre / Function

Directrice de Recherche 1e classe CNRS / Senior Scientist at CNRS

Autres activités / Other activities

*Activités de direction, encadrement, enseignement, activité d'évaluation dans des commissions ou en tant qu'expert scientifique / Executive board, supervision of student, teaching, memberships in panels or individual scientific reviewing activities*

PI of the group " Second Harmonic Generation in Biological Tissues" (1 assistant Professor and 2 PhD students) in the "Advanced microscopies & tissue physiology" team at LOB.

Teaching: part-time associate professor at Ecole polytechnique:

Biophotonics, Nonlinear optics, laser physics for Master students/3rd year engineer students.

Participation to 33 PhD defence committees (15 times as examiner, 4 times abroad)

Recruitment and evaluation panels:

Regular participation to recruitment committees in French Universities

Evaluation committees [HCERES] of Neurophotonics Lab. at Paris 7 Univ. (chairman, 2013) and PhLAM Lab. at Lille Univ. (committee member, 2019)

2003-2007: member of the optical section of the French National University Council [30° section CNU]

2012-2016: member of CoNRS scientific committees in lasers/optics [Section 04] and physics-biology interface [CID54] => evaluation + recruitment of  $\approx$  40 junior scientists and promotion of  $\approx$  40 senior scientists at CNRS

Other scientific committees:

2004-present: Steering Committee of Ecole Polytechnique Library

2007, 2009, 2012, 2014, 2016, 2018: Scientific Committee of OPT-DIAG Conference (Paris)

2008-present: Scientific Committee of Photonique, the SFO journal

2017-present: member of SFO (French optical society) executive board

2017-present: member of Scientific Reports Editorial Board

2019 : program chair of OSA conference "Optics in the Life Sciences: Novel Techniques in Microscopy"

## Positions antérieures / Previous positions

Début / Start date	Fin / End date	Ville / Town	Etablissement / Organisation	Fonction / Function
1991	2001	Palaiseau	Laboratoire d'optique quantique, CNRS - Ecole Polytechnique	Chargée de Recherche CNRS / Junior Scientist at CNRS

## Formation supérieure / Education

2003: Habilitation, Paris-Sud University, France

1989-1992: PhD, Ecole Polytechnique, France

1988-1989: Master of Science "Lasers and Matter", Paris-Sud University, France

1985-1988: Ecole Polytechnique (top-ranked French engineering school)

## Productions scientifiques / Scientific productions

Projets de recherche, prix, distinctions, bourses, etc. / Grants, prizes, awards, fellowships, etc.

Grants

2000: ACI Junior Scientists grant (PI, 30 k€)

2006-2009: ANR grant Transcola (Physiopathology of Human diseases) (Co-PI, 48 k€)

2006-2010: ANR grant Fibropneumo (Physiopathology of Human diseases) (Co-PI, 35 k€)

2006-2010: PI or co-PI of 5 industrial partnerships with L'OREAL-Advanced Research (total: 240k€)

2008: grant from iXcore Foundation (PI, 50 k€)

2008: equipment grant from INSERM (PI, 70 k€)

2010: grant from RTRA-Triangle de la Physique (PI, 1 year post-doc salary)

2012 : equipment grant from CNRS (PI, 25 k€)  
 2011: Research contract with Actelion (Basel, Switzerland) (PI, 24 k€)  
 2012-2019: participation (5%) to France Bio-Imaging project  
 2012-2022: participation (10%) to Equipex Morphoscope  
 2013-2014: "Interdisciplinary" grant from Ecole Polytechnique (PI, 150 k€)  
 2014-2017: ANR grant METIS (co-PI, 132 k€)  
 2017-2018: Défi Imag'In CNRS CoMuNIC (PI, 13 k€)

#### Awards

2019: Silver medal from CNRS

#### **5 publications majeures / 5 most relevant publications**

- |   |   |
|---|---|
| 1 | A.-M. Pena, T. Boulesteix, T. Dartigalongue, and M.-C. Schanne-Klein, "Chiroptical effects in the second harmonic signal of collagens I and IV," <i>J. Am. Chem. Soc.</i> 127, 10314-10322 (2005). DOI: 10.1021/ja0520969   |
| 2 | D. Débarre, W. Suppato, A. M. Pena, A. Fabre, T. Tordjmann, L. Combettes, M. C. Schanne-Klein, and E. Beaurepaire, "Imaging lipid bodies in cells and tissues using third-harmonic generation microscopy," <i>Nat. Methods</i> 3 47 - 53 (2006). DOI: 10.1038/nmeth813  |
| 3 | G. Latour, I. Gusachenko, L. Kowalczyk, I. Lamarre, and M.-C. Schanne-Klein, "In vivo structural imaging of the cornea by polarization-resolved Second Harmonic microscopy," <i>Biomed. Opt. Express</i> 3, 1 (2012). DOI: 10.1364/BOE.3.000001   |
| 4 | S. Bancelin, C. Aimé, I. Gusachenko, L. Kowalczyk, G. Latour, T. Coradin, and M.-C. Schanne-Klein, "Determination of collagen fibril size via absolute measurements of second-harmonic generation signals," <i>Nat. Commun.</i> 5(2014). DOI: 10.1038/ncomms5920  |
| 5 | G. Ducourthial, J.-S. Affagard, M. Schmeltz, X. Solinas, M. Lopez-Poncelas, C. Bonod-Bidaud, R. Rubio-Amador, F. Ruggiero, J.-M. Allain, E. Beaurepaire, and M.-C. Schanne-Klein, "Monitoring dynamic collagen reorganization during skin stretching with fast polarization-resolved SHG imaging.," <i>J. Biophot.</i> , e201800336 (2019). DOI: 10.1002/jbio.201800336 |

#### **Publications des 3 dernières années / Publications in the past 3 years**

Web of Science Data (E-6490-2011) : 113 publications ; h-index : 27 ; 3680 citations

#### International peer-reviewed journals:

1. A. Benoit, G. Latour, M.-C. Schanne-Klein, and J.-M. Allain, "Simultaneous microstructural and mechanical characterization of human corneas at increasing pressure," *J. Mech. Behav. Biomed. Mater.* 60, 93-105 (2016). DOI: 10.1016/j.jmbbm.2015.12.031
2. G. Latour, L. Robinet, A. Dazzi, F. Portier, A. Deniset-Besseau, and M.-C. Schanne-Klein, "Correlative nonlinear optical microscopy and infrared nanoscopy reveals collagen degradation in altered parchments," *Sci. Rep.* 6, 36344 (2016). DOI: 10.1038/srep26344
3. C. Teulon, A. Tidu, F. Portier, G. Mosser, and M.-C. Schanne-Klein, "Probing the 3D structure of cornea-like collagen liquid crystals with polarization-resolved SHG microscopy," *Opt. Express* 24, 16084-16098 (2016). DOI: 10.1364/OE.24.016084
4. N. Vuillemin, P. Mahou, D. Débarre, T. Gacoin, P.-L. Tharaux, M.-C. Schanne-Klein, W. Supatto, and E. Beaurepaire, "Efficient second-harmonic imaging of collagen in histological slides using Bessel beam excitation," *Sci. Rep.* 6, 29863 (2016). DOI: 10.1038/srep29863
5. R. Genthial, E. Beaurepaire, M.-C. Schanne-Klein, F. Peyrin, D. Farlay, C. Olivier, Y. Bala, G. Boivin, J.-C. Vial, D. Débarre, and A. Gourrier, "Label-free imaging of bone multiscale porosity and interfaces using third-harmonic generation microscopy.," *Sci. Rep.* 7, 3419 (2017). DOI: 10.1038/s41598-017-03548-5
6. D. Ghoubay-Benallaoua, C. d. Sousa, R. Martos, G. Latour, M.-C. Schanne-Klein, E. Dupin, and V. Borderie, "Easy xeno-free and feeder-free method for isolating and growing limbal stromal and epithelial stem cells of the human cornea," *Plos One* 12, e0188398 (2017). DOI: 10.1371/journal.pone.0188398
7. K. Grieve, D. Ghoubay, C. Georgeon, G. Latour, A. Nahas, K. Plamann, C. Crotti, R. Bocheux, M. Borderie, T.-M. Nguyen, F. Andreiuolo, M.-C. Schanne-Klein, and V. Borderie, "Stromal striae: a new insight into corneal physiology and mechanics," *Sci. Rep.* 7, 13584 (2017). DOI: 10.1038/s41598-017-13194-6
8. S. A. Hussain, C. Milián, C. Crotti, L. Kowalczyk, F. Alahyane, Z. Essaïdi, A. Couairon, M.-C. Schanne-Klein, and K. Plamann, "Cell Viability and Shock Wave Amplitudes in the Endothelium of Porcine Cornea exposed to Ultrashort Laser Pulses," *Graefes Arch. Clin. Exp. Ophthalmol.* 255, 945-953 (2017). DOI: 10.1007/s00417-017-3583-3
9. C. Jayyosi, J.-S. Affagard, G. Ducourthial, C. Bonod-Bidaud, B. Lynch, S. Bancelin, F. Ruggiero, M.-C. Schanne-Klein, J.-M. Allain, K. Bruyère-Garnier, and M. Coret, "Affine kinematics in planar fibrous connective tissues: an experimental investigation," *Biomechanics and Modeling in Mechanobiology* 16, 1459-1473 (2017). DOI: 10.1007/s10237-017-0899-1

10. B. Lynch, S. Bancelin, C. Bonod-Bidaud, J.-B. Guesquin, F. Ruggiero, M.-C. Schanne-Klein, and J.-M. Allain, "A novel microstructural interpretation for the biomechanics of mouse skin derived from multiscale characterization," *Acta Biomater.* 50, 302-311 (2017). DOI: 10.1016/j.actbio.2016.12.051
11. B. Lynch, C. Bonod-Bidaud, G. Ducourthial, J.-S. Affagard, S. Bancelin, S. Psilodimitrakopoulos, F. Ruggiero, J.-M. Allain, and M.-C. Schanne-Klein, "How aging impacts skin biomechanics: a multiscale study in mice.," *Sci. Rep.* 7, 13750 (2017). DOI: 10.1038/s41598-017-13150-4
12. F. Portier, C. Teulon, A. Nowacka-Perrin, F. Guenneau, M.-C. Schanne-Klein, and G. Mosser, "Stabilization of collagen fibrils by gelatin addition: a study of collagen/gelatin dense phases," *Langmuir* 33, 12916-12925 (2017). DOI: 10.1021/acs.langmuir.7b02142
13. A. Tidu, D. Ghoubay-Benallaoua, C. Teulon, S. Asnacios, K. Grieve, F. Portier, M.-C. Schanne-Klein, V. Borderie, and G. Mosser, "Highly concentrated collagen solutions leading to transparent scaffolds of controlled three-dimensional organizations for corneal epithelial cell colonization," *Biomater. Sci.* 6, 1492-1502 (2018). DOI: 10.1039/C7BM01163F

#### Proceedings and abstracts

1. K. Plamann, S. A. Hussain, F. Alahyane, A. Couairon, C. Crotti, Z. Essaïdi, L. Kowalczyk, C. Milián i Enrique, and M.-C. Schanne-Klein, "Cell Viability and Shock Wave Amplitudes in the Endothelium of Porcine Cornea exposed to Ultrashort Laser Pulse," *Invest. Ophthalmol. Vis. Sci.* 57, 1207 (2016).
2. C. Teulon, I. Gusachenko, G. Latour, and M.-C. Schanne-Klein, "Forward versus backward polarization-resolved SHG imaging of collagen structure in tissues," in *Proc. SPIE 9712 - Photonics West-BIOS, Proceedings SPIE (SPIE, 2016)*, 9712-18.
3. V. M. Borderie, D. Ghoubay, C. Georgeon, R. Bocheux, G. Latour, T. M. Nguyen, F. Andreiuolo, M. C. Schanne-Klein, J. A. Sahel, and K. Grieve, "Banding patterns: exploring a new feature in corneal stroma organization," *Invest. Ophth. Vis. Sci.* 58 (2017).
4. B. Lynch, S. Bancelin, C. Bonod-Bidaud, F. Ruggiero, M.-C. Schanne-Klein, and J.-M. Allain, "Evolution of the Skin Microstructural Organization During a Mechanical Assay," in *Mechanics of biological systems and materials*, S. A. T. C.S. Korach, P. Zavattieri, ed. (Conference Proceedings of the Society for Experimental Mechanics Series, Orlando, USA, 2017), pp. 45-52.
5. L. Robinet, S. Thao, M.-C. Schanne-Klein, and G. Latour, "The influence of manufacturing and alterations on skin-based artifacts as characterized by nonlinear optical microscopy," in *ICOM-CC 18th Triennial Conference Preprints*, (J. Bridgland, 2017), art. 1609.
6. C. Teulon, G. Latour, I. Gusachenko, G. Ducourthial, S. Bancelin, C. Bonod-Bidaud, F. Ruggiero, J.-S. Affagard, B. Lynch, A. Benoit, J.-M. Allain, and M.-C. Schanne-Klein, "Polarization-resolved Second Harmonic Imaging of collagen organization in connective tissues - Application to biomechanics," in *OSA Technical Digest (2017)*, paper NW3C.2.

#### Book chapters

1. S. Bancelin, B. Lynch, Christelle Bonod-Bidaud, P. Dokladal, F. Ruggiero, J.-M. Allain, and M.-C. Schanne-Klein, "Combination of Traction Assays and Multiphoton Imaging to Quantify Skin Biomechanics," in *Collagen: Methods and Protocols*, I. Sagi and N. A. Afratis, eds. (Springer Science, in press).
2. J.-M. Allain, B. Lynch, M.-C. Schanne-Klein, "Multiscale Characterization of Skin Mechanics Through in Situ Imaging" in *Skin Biophysics -- From Experimental Characterisation to Advanced Modelling*, G. Limbert, ed. (Springer Nature, in press).

#### **Valorisation**

*brevet, licence, création d'entreprise, développement de logiciel, base de données, prototype, etc. / patent, creation of a start-up, software development, database, prototype, etc.*

#### Brevets:

- 1 - E. Beaurepaire, N. Olivier, D. Débarre, M.-C. Schanne-Klein and J.-L. Martin, "Procédé et système de microscopie non-linéaire cohérente à modulation de volume focal pour sonder la nanostructuration de matériaux organisés", FR0854347 (27/06/2008) - Extension internationale : WO2009FR51236 ; US200913001258 ; PCT/FR2009/051236 (2009)
2. Schanne-Klein, M.-C., E. Beaurepaire, M. Strupler, D. Débarre, N. Olivier, and P. Mahou, "Microscopie optique non-linéaire quantitative utilisant un faisceau mis en forme", FR1162056 (dépôt le 20/12/2011) - Extension internationale : EP20120816697 ; WO 2013093275 (2012)
3. E. Beaurepaire, M.-C. Schanne-Klein, N. Vuillemin, W. Supatto, and P. Mahou, " Microscopie optique non-linéaire quantitative", FR1651850 (dépôt le 04/03/2016) - Extension internationale : PCT/EP2017/055058 (03/03/2017)