

Nathalie Picqué

Curriculum Vitae

Personal and Professional Information

Personal	Picqué Nathalie, Brigitte, Anne. Born on 2. December 1973 at L'Haÿ-les-Roses (France) French citizen
Address	Max-Born Institute for Nonlinear Optics and Ultrafast Spectroscopy Max-Born-str. 2A, 12489 Berlin, Germany Homepage: http://www.frequency-comb.eu Email: nathalie.picque@mpq.mpg.de

Professional Experience

2023-present:	Director, Max-Born Institute for Nonlinear Optics and Ultrafast Spectroscopy, Berlin, Germany Professor of Physics (Full, W3-S), Humboldt University, Berlin.
2011-2023:	Research group leader and senior research scientist, Max-Planck Institute of Quantum Optics (MPQ), Garching, Germany.
2008-2011:	Part-time visiting scientist, MPQ, Laser Spectroscopy Division of Prof. T.W. Hänsch.
2001-present:	Research scientist, Centre National de la Recherche Scientifique (CNRS), France. Tenured in 2002. On unpaid leave since 2018. 2006-2012: Leader of the Laser Spectroscopy research group at Laboratoire de Photophysique Moléculaire, Orsay (4 permanent scientists, plus students & post-docs). 2011-2019: Seconded at MPQ.
1999-2000	Post-doctoral Marie-Curie fellow at European Laboratory for Nonlinear Spectroscopy (LENS), Florence, Italy in the group of Prof. M. Inguscio.

Education

2006	Habilitation degree in Physical Sciences (accreditation to supervise research, highest academic qualification a scholar can achieve by his own pursuit in France). Université Paris-Sud, Orsay, France. Defended on 12/10/2006. Not marked in France.
1998	Doctoral degree in Physics, Université Paris-Sud, France. Defended on 18/12/1998, with the highest distinctions. Advisor: Dr. G. Guelachvili.
1997	Magistère Interuniversitaire de Chimie, Ecole Normale Supérieure, Paris, France.
1996	Master degree (Diplôme d'Etudes Approfondies) in Physics with high distinctions. Majors: Laser physics, quantum mechanics and nonlinear optics. Université Pierre et Marie Curie, France.

Publications

- 78 published articles in peer-reviewed journals, 3 submitted for publication.
- 2 patents.
- 3 books.

- 102 peer-reviewed conference proceedings and peer-reviewed technical digests.

Full list of publications, proceedings, invited talks at <http://frequency-comb.eu/doc/Scientific-Production-Nathalie-Picque.pdf>.

List of peer-review publications at <http://frequency-comb.eu/doc/Publications-Nathalie-Picque.pdf>

Communications to conferences

- 111 invited talks at international and national conferences (including 7 plenary talks and 2 keynote talks).
- 34 invited seminars.
- over 200 contributed talks or posters at international and national conferences (mostly presented by coworkers).

Supervision of young scientists

- Research advisor for seventeen doctoral students. Fifteen have successfully obtained their degree; two are currently working on their thesis.
- Research advisor for twenty-three postdoctoral fellows and eleven long-term visiting senior scholars (stay>3 months).
- Research advisor for fourteen master students.

Of a total of 31 former post-docs and doctoral students, 23 (74%) hold a tenured position in academia or in a government research institution, 3 are post-docs in other research groups, 6 have a R&D position in the industry, 2 have a sales/management position in the industry.

Prizes, awards

2023	Grand Prix Cécile DeWitt-Morette in Physics (French Academy of Sciences).
2022	Breakthrough of the Year in Physical Sciences (Falling Walls Foundation)
2022	Helmholtz Prize in Applied Metrology, with E. Vicentini (Helmholtz Fund, Physikalisch-Technische Bundesanstalt)
2021	Advanced Grant of the European Research Council
2021	Gentner-Kastler Prize in Physics (German Physical Society, French Physical Society)
2019	Fellow (Optica, then Optical Society)
2013	Coblentz Award in Molecular Spectroscopy (Coblentz Society, USA).
2010	Beller Lectureship Award in Physics (American Physical Society).
2010	Amongst the 5 nominees of the “ Femmes en Or ” trophy, category research.
2009	CNRS Excellence Award.
2008	Jean Jerphagnon Prize in Optics (Académie des Technologies, Alcatel-Lucent, CNRS, France-Telecom, Pôle Images et Réseaux, Opticsvalley, Société de l'Electricité, de l'Electronique et des Technologies de l'Information et de la Communication, Société Française d'Optique, Société Française de Physique, Pôle Systématique Paris-Région, Thales).
2008	Innovation Prize (3d rank), Université Paris-Sud.
2007	Bronze medal of CNRS (best young (<40) scientist of the year in the field “Optics and Lasers, Atomic and Molecular Physics, Hot Plasmas” in France).

- 1999** **Individual Marie-Curie post-doctoral fellowship.**
1998 **Rao Prize** for the best student talk at the 1998 International Symposium on Molecular Spectroscopy (Columbus, USA).

Scientific Interests

Laser frequency combs. Precision measurements. Molecular spectroscopy. Precision spectroscopy. Ultrafast optics. Phase imaging. Quantum sensing. Dimensional metrology.

Main scientific achievements

- Initiated the field of frequency-comb spectroscopy, spectroscopy over broad spectral bandwidths with optical frequency combs (simultaneously and independently to one or two other scientists, outside Europe). This has become one of the most implemented applications of frequency combs, with currently >100 groups actively contributing.
- First interferometry with two frequency combs at long coherence times, enabling first dual-comb high-resolution spectroscopy (simultaneously and independently to one other group outside Europe).
- First dual-comb interferometer achieving a million-fold improvement in the recording time and the sensitivity of Fourier transform spectrometers.
- First Fourier transform spectroscopy with a laser frequency comb.
- First nonlinear dual-comb spectroscopy. First dual-comb action spectroscopy.
- First Doppler-free multiplex (broadband) dual-comb spectroscopy: demonstration of a 100-fold improvement of the resolution of Fourier transform spectrometers and frequency scale calibration to an atomic clock. This will merge frequency metrology and spectroscopy.
- First ultraviolet dual-comb spectroscopy.
- First dual-comb interferometry at the single-photon level.
- First digital holography with a dual-comb interferometer.
- First mid-infrared Kerr comb generation.
- First mid-infrared octave-spanning frequency-comb broadening on a photonic chip.

Grants

More than 15 Meuros through research grants since 2003.
 Principal investigator (or co-principal investigator) of research projects granted e.g. by: Agilent Technologies Foundation (USA), Cluster of Excellence Munich Center for Quantum Science and Technology, CNRS, Defense Advanced Research Projects Agency (USA), EADS Foundation, European Quantum Flagship, European Community (Eureka/Eurostars program), European Research Council (Advanced Grant), European Innovative Training Network (Marie Skłodowska-Curie Actions, EU), French National Grant Agency, Ile-de-France Region, Max Planck Society, Munich Center for Advanced Photonics, Université Paris-Sud.

Committees, boards and other academic services

Editorial board:

- 2020-** Deputy Editor, Optica (Optica, formerly Optical Society).
2016-2020 Associate Editor, Optica (Optical Society).
2016-2021 Editorial board, Applied Physics B (Springer).
2018 Guest Editor, special issue of Journal of Molecular Spectroscopy (Elsevier) on Frequency Comb Spectroscopy.

- 2016** Guest Editor, special issue of Applied Physics B for the 75th birthday of T.W. Hänsch.
- 2009- 2012** Editorial board, Journal of Molecular Spectroscopy (Elsevier).

Conference organization:

- 2023-** Steering Committee, CLEO/EQEC Europe.
- 2023** Co-chair of the Topical Meeting on Frequency Combs at the 2023 European Optical Society Annual Meeting, Dijon, France.
- 2018** Co-organizer of the mini-symposium “Frequency comb spectroscopy” at the 73rd meeting of the International Symposium on Molecular Spectroscopy, Urbana-Champaign, Illinois.
- 2017** Co-chair of the 2017 meeting on Optics and Photonics for Energy & the Environment of the Optical Society (OSA), Boulder, USA.
- 2016** Co-chair of the 2016 meeting on Fourier Transform Spectroscopy of the OSA, Leipzig, Germany.
- 2011- 2017** Program committee, Topical meeting on Fourier Transform Spectroscopy, OSA.

Prize committee:

- 2024** Chair, EPS-QEOD Prize For Research In Laser Science And Applications.
- 2023** Quantum Electronics and Optics Prizes committee, European Physical Society.
- 2023** Breakthrough in Physical Sciences committee, Falling Walls Foundation.
- 2020-2021** Chair, Ellis R. Lippincott Award, Optical Society.
- 2019-2020** Ellis R. Lippincott Award committee, Optical Society.
- 2015-2018** Coblentz Award committee, Coblentz Society.

Other academic service:

- 2022-** Board member, Quantum Electronics and Optics Division of European Physical Society.
- 2011- 2013** Academic senate, Paris-Saclay University (France).
- 2006-2012** Member of the board of directors of Institut des Sciences Moléculaires d’Orsay.
- 2006-2011** Member of the appointment committees of assistant professors in AMO physics at Université Paris-Sud Orsay, at Université Pierre et Marie Curie Paris, and at Université de Reims, France. Several positions examined per year.
- 2004-2012** Elected, then nominated, member of the laboratory council of Institut des Sciences Moléculaires d’Orsay.

Referee:

- 2001-present** Referee for grant agencies (European Research Council, National Science Foundation-USA, French National Grant agency, Israel Science Foundation, Swiss National Foundation, European Commission FET open program, Research Grant Council of Hong Kong). Currently about 5 reports per year.
- 2000-present** Referee for Nature, Science, Nature Photonics, Nature Physics, Nature Chemistry, Science Advances, Nature Communications, and other peer-reviewed journals. Currently about 30 reports per year.

Selection of 5 publications

1. B. Xu, Z. Chen, T.W. Hänsch, N. Picqué, Near-ultraviolet photon-counting dual-comb spectroscopy, preprint at arXiv:2307.12869 (2023).
2. E. Vicentini, Z. Wang, K. Van Gasse, T.W. Hänsch, N. Picqué, Dual-comb hyperspectral digital holography, *Nature Photonics* **15**, 890–894 (2021).
3. G. Millot, S. Pitois, M. Yan, T. Hovannysyan, A. Bendahmane, T.W. Hänsch, N. Picqué, Frequency-agile dual-comb spectroscopy, *Nature Photonics* **10**, 27-30, (2016).
4. T. Ideguchi, S. Holzner, B. Bernhardt, G. Guelachvili, N. Picqué, T.W. Hänsch, Coherent Raman spectro-imaging with laser frequency combs, *Nature* **502**, 355-358 (2013).
5. J. Mandon, G. Guelachvili, N. Picqué, Fourier Transform Spectroscopy with a Laser Frequency Comb, *Nature Photonics* **3**, 99-102 (2009).