

Aurélien Coillet

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Personal details

Age 34 ans.
Nationality French.

Current position

Since 2015 **Assistant professor (Maître de conférences)**, *Laboratoire Interdisciplinaire Carnot de Bourgogne – University of Bourgogne-Franche-Comté, Dijon (France)*.

- Nonlinear dynamics in laser cavities
- Nonlinear optics in nanophotonics components
- Frequency combs in high-Q resonators

Experience

2014-2015 **Research Associate**, *National Institute of Standards and Technology (NIST), Boulder (Colorado, USA)*, in Scott Diddams' group, "Kerr frequency comb generation in microresonators".

- Kerr frequency combs for time and frequency metrology
- Silica and silicon nitride high Q resonators
- Spectral broadening to octave-spanning comb, $f - 2f$ interferometer
- Numerical and theoretical study of the nonlinear dynamics

2012-2014 **Post-doctoral position**, *FEMTO-ST Institute, Besançon (France)*, in Yanne Chembó's group, "Kerr frequency comb generation in crystalline whispering-gallery mode resonators".

- Started the ERC Starting Grant "Nextphase" project, launch the "Frequency comb" research activity at FEMTO-ST
- Kerr frequency comb generation
- Numerical simulations and theoretical analysis of Kerr frequency combs

2008-2011 **PhD. Thesis**, *Laboratoire Interdisciplinaire Carnot de Bourgogne, Dijon (France)*, under the supervision of Pr. Philippe Grelu, "Micro and nano fibres for nonlinear optics".

- Started the micro/nano-fiber research activity at ICB.
- Study of nonlinear effects in optical fibres with diameters $\sim 1 \mu\text{m}$, phase-matched third harmonic generation
- Built devices (ring resonator, Mach-Zehnder interferometer, ...) thanks to evanescent coupling
- Near-field microscopy on microfibres

2008-2011 **Teaching assistant**, *University of Burgundy, Dijon (France)*.

Tutorials and practical works in physics, optics and optoelectronics. Creation of tutorials and exam corrections

2006 **Graduate research assistant**, *Ångström Laboratory, Uppsala (Sweden)*, under the supervision of Bo Thidé, "Calibration of the LOIS antennas".

- LOIS/LOFAR: radio-frequency telescopes (10-250 MHz) using thousands of small antennas on a 350 km-diameter area
- Active antennas, can record the whole electromagnetic field
- Calibration of the properties of the antennas

Education

- 2008-2011 **Ph. D. Thesis**, *University of Burgundy, Dijon (France)*.
- 2004-2008 **BSc and MSc in Physics**, *ÉNS Lyon (France)*.
- Erasmus Semester M1 at Uppsala University (Sweden)
 - Agrégation de Physique (national teaching exam)

Teaching activities

- Since 2015 Professor teaching general physics, optics, optoelectronics, mechanics at various degree levels ranging from first year bachelor to master and engineer school degree. *Université de Bourgogne, Dijon, France*.
- 2008-2011 Teaching assistant: Physics, optics, mechanics. *Université de Bourgogne, Dijon, France*.

Academic activities

- Author 27 articles, 1 book chapter, 4 invited conferences
- Students 5 MSc internships
- Reviewer Optica, NanoPhotonics, Scientific reports, Optics Letters, Optics Express, Journal of Applied Physics, Applied Physics Letters, Journal of Lightwave Technology, Journal of Quantum Electronics
- Scientific expert for the French national funding agency (ANR)

References

Publications

- [1] K. Beha, D. C. Cole, P. Del'Haye, A. Coillet, S. A. Diddams, and S. B. Papp, "Electronic synthesis of light," *Optica* **4**, 406–411 (2017).
- [2] W. Loh, J. Becker, D. C. Cole, A. Coillet, F. N. Baynes, S. B. Papp, and S. A. Diddams, "A microrod-resonator brillouin laser with 240 Hz absolute linewidth," *New Journal of Physics* **18**, 045001 (2016).
- [3] P. Del'Haye, A. Coillet, T. Fortier, K. Beha, D. C. Cole, K. Y. Yang, H. Lee, K. J. Vahala, S. B. Papp, and S. A. Diddams, "Phase-coherent microwave-to-optical link with a self-referenced microcomb," *Nat Photon* **10**, 516–520 (2016).
- [4] A. Coillet, J. Pfeifle, R. Henriët, K. Saleh, P. Schindler, C. Weimann, W. Freude, I. V. Balakireva, L. Larger, C. Koos, and Y. K. Chembo, "Optimally coherent Kerr combs generated with crystalline whispering gallery mode resonators for ultrahigh capacity fiber communications," *Phys. Rev. Lett.* **114**, 093902 (2015).
- [5] P. DelHaye, A. Coillet, W. Loh, K. Beha, S. B. Papp, and S. A. Diddams, "Phase steps and resonator detuning measurements in microresonator frequency combs," *Nature Communications* **6**, 5668 (2015).
- [6] R. Henriët, G. Lin, A. Coillet, M. Jacquot, L. Furfaro, L. Larger, and Y. K. Chembo, "Kerr optical frequency comb generation in strontium fluoride whispering-gallery mode resonators with billion quality factor," *Opt. Lett.* **40**, 1567–1570 (2015).
- [7] R. M. Nguimdo, K. Saleh, A. Coillet, G. Lin, R. Martinenghi, and Y. K. Chembo, "Phase noise performance of optoelectronic oscillators based on whispering-gallery mode resonators," *IEEE Journal of Quantum Electronics* **51**, 1–8 (2015).
- [8] G. Lin, R. Martinenghi, S. Diallo, K. Saleh, A. Coillet, and Y. K. Chembo, "Spectro-temporal dynamics of Kerr combs with parametric seeding," *Applied Optics* **54**, 2407–2412 (2015).

- [9] A. F. Talla, R. Martinenghi, G. R. G. Chengui, J. H. T. Mbe, K. Saleh, A. Coillet, G. Lin, P. Woafu, and Y. K. Chembo, "Analysis of phase-locking in narrow-band optoelectronic oscillators with intermediate frequency," *IEEE Journal of Quantum Electronics* **51**, 1–8 (2015).
- [10] J. H. Talla Mbé, A. F. Talla, G. R. G. Chengui, A. Coillet, L. Larger, P. Woafu, and Y. K. Chembo, "Mixed-mode oscillations in slow-fast delayed optoelectronic systems," *Phys. Rev. E* **91**, 012902 (2015).
- [11] G. R. Goune Chengui, A. F. Talla, J. H. Talla Mbé, A. Coillet, K. Saleh, L. Larger, P. Woafu, and Y. K. Chembo, "Theoretical and experimental study of slow-scale hopf limit-cycles in laser-based wideband optoelectronic oscillators," *Journal of the Optical Society of America B* **31**, 2310–2316 (2014).
- [12] K. Saleh, R. Henriët, S. Diallo, G. Lin, R. Martinenghi, I. V. Balakireva, P. Salzenstein, A. Coillet, and Y. K. Chembo, "Phase noise performance comparison between optoelectronic oscillators based on optical delay lines and whispering gallery mode resonators," *Optics Express* **22**, 32158–32173 (2014).
- [13] A. Coillet and Y. K. Chembo, "On the robustness of phase locking in Kerr optical frequency combs," *Optics Letters* **39**, 1529–1532 (2014).
- [14] C. Godey, I. V. Balakireva, A. Coillet, and Y. K. Chembo, "Stability analysis of the spatiotemporal lugiato-lefever model for Kerr optical frequency combs in the anomalous and normal dispersion regimes," *Physical Review A* **89**, 063814 (2014).
- [15] R. Henriët, A. Coillet, K. Saleh, L. Larger, and Y. K. Chembo, "Barium fluoride and lithium fluoride whispering-gallery-mode resonators for photonics applications," *Optical Engineering* **53**, 071821 (2014).
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- [17] A. Coillet and Y. K. Chembo, "Routes to spatiotemporal chaos in Kerr optical frequency combs," *Chaos: An Interdisciplinary Journal of Nonlinear Science* **24**, 013113 (2014).
- [18] A. Coillet, J. Dudley, G. Genty, L. Larger, and Y. K. Chembo, "Optical rogue waves in whispering-gallery-mode resonators," *Physical Review A* **89**, 013835 (2014).
- [19] A. Coillet, I. Balakireva, R. Henriët, K. Saleh, L. Larger, J. Dudley, C. Menyuk, and Y. Chembo, "Azimuthal turing patterns, bright and dark cavity solitons in Kerr combs generated with whispering-gallery-mode resonators," *Photonics Journal, IEEE* **5**, 6100409–6100409 (2013).
- [20] A. Coillet, R. Henriët, P. Salzenstein, K. P. Huy, L. Larger, and Y. Chembo, "Time-domain dynamics and stability analysis of optoelectronic oscillators based on whispering-gallery mode resonators," *Selected Topics in Quantum Electronics, IEEE Journal of* **19**, 6000112–6000112 (2013).
- [21] A. Coillet, R. Henriët, K. Phan Huy, M. Jacquot, L. Furfaro, I. Balakireva, L. Larger, and Y. K. Chembo, "Microwave photonics systems based on whispering-gallery-mode resonators," *Journal of Visualized Experiments* **78**, e50423 (2013).
- [22] P. Salzenstein, M. Mortier, H. Sérrier-Brault, R. Henriët, A. Coillet, Y. K. Chembo, A. Rasoloniaina, Y. Dumeige, and P. Féron, "Coupling of high-quality-factor optical resonators," *Physica Scripta* **T157**, 014024 (2013).
- [23] A. Coillet and P. Grelu, "Third-harmonic generation in optical microfibers: From silica experiments to highly nonlinear glass prospects," *Optics Communications* **285**, 3493 – 3497 (2012). Special Issue: Sub-wavelength Light Localization and Focusing.

- [24] A. Coillet, G. Vienne, and P. Grelu, "Potentialities of glass air-clad micro- and nanofibers for nonlinear optics," *Journal of the Optical Society of America B* **27**, 394–401 (2010).
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- [27] D. Brissinger, B. Cluzel, A. Coillet, C. Dumas, P. Grelu, and F. de Fornel, "Near-field control of optical bistability in a nanocavity," *Physical Review B* **80**, 033103 (2009).

Book chapter

- [28] A. Coillet, N. Yu, C. R. Menyuk, and Y. K. Chembo, "Dynamical regimes in Kerr optical frequency combs: Theory and experiments," in "Nonlinear Optical Cavity Dynamics," P. Grelu, ed. (Wiley-Blackwell, 2015), pp. 163–188.

Invited conferences

- [29] A. Coillet, "Exotic phase-locked states in kerr frequency combs," in "Nonlinear phenomena in optics: theory and experiments," (2015).
- [30] A. Coillet, "Modelling of kerr combs: successes and challenges," in "OSA Incubator on Quantitative Modeling of Frequency-comb Sources," (2014).
- [31] A. Coillet and Y. K. Chembo, "Azimuthal dissipative structures in whispering-gallery mode resonators," in "SIAM Nonlinear Waves," (2014).
- [32] Y. K. Chembo and A. Coillet, "Kerr optical frequency combs: from fundamental theory to engineering applications," in "SIAM Nonlinear Waves," (2014).

Conferences

- [33] S. Papp, K. Beha, P. Del'Haye, D. Cole, A. Coillet, and S. Diddams, "Self-referencing a cw laser with efficient nonlinear optics," in "Nonlinear Optics," (Optical Society of America, 2015), p. NTh3A.6.
- [34] P. Del'Haye, A. Coillet, K. Beha, D. C. Cole, H. Lee, K. J. Vahala, S. B. Papp, and S. A. Diddams, "Coherent broadening of a microresonator frequency comb to an optical octave for f-2f self-referencing," in "2015 European Conference on Lasers and Electro-Optics - European Quantum Electronics Conference," (Optical Society of America, 2015), pp. ED-1a-1.
- [35] D. Gomila, P. Colet, A. Coillet, and Y. K. Chembo, "Noise fluctuations in kerr frequency combs," in "2015 European Conference on Lasers and Electro-Optics - European Quantum Electronics Conference," (Optical Society of America, 2015), pp. ED-P-1.
- [36] A. Coillet, P. Del'Haye, A. Rolland, T. Fortier, H. Lee, K. Vahala, S. B. Papp, and S. A. Diddams, "Phase noise of kerr frequency combs based micro-wave oscillators," in "International Frequency Control Symposium & European Frequency and Time Forum," (2015).
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- [43] A. Coillet, I. Balakireva, R. Henriët, L. Larger, and Y. K. Chembo, "Temporal dynamics of Kerr frequency combs in WGM resonators," in "SPIE Photonics West," (2013).
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- [50] A. Coillet, G. Vienne, and P. Grelu, "Potentialities of microfibers for nonlinear optics," in "Photonics Global Conference," (2010).
- [51] D. Brissinger, B. Cluzel, A. Coillet, C. Dumas, P. Grelu, and F. de Fornel, "Near-field control of optical bistability in a nanocavity," in "Lasers and Electro-Optics 2009 and the European Quantum Electronics Conference. CLEO Europe - EQEC 2009. European Conference on," (2009), pp. 1–1.
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Seminars

Journée scientifique ICB, Laboratoire Interdisciplinaire Carnot de Bourgogne, 6 avril 2017.

Nano-photonique non-linéaire en cavités laser

Nonlinear Waves Seminar, Applied Mathematics Department, University of Colorado (Boulder, USA), November 2014.

Modelling of Kerr frequency combs: successes and challenges

Photonics systems group, FOTON laboratory (Lannion, France), March 2014.

"Nonlinear optics in optical microfibers and whispering-gallery mode resonators"

French-Russian-German symposium on lasers, FEMTO-ST Institute (Besançon, France), November 2013.

"Nonlinear dynamics and frequency combs in pumped crystalline whispering-gallery mode resonators"

Optoelectronic group, *Leader Yanne Chembo*, FEMTO-ST Institute (Besançon, France), December 2011.

"Microfibres for nonlinear optics"

Laser Spectroscopy and Quantum Physics, *Nathalie Picqué and Theodor W. Hänsch group*, Max Planck Institute of Quantum Optics (Garching, Germany), December 2011.

"Microfibres for Nonlinear Optics"

Nanophysics and semiconductor group, *Leader Jean-Philippe Poizat*, Institut Neel (Grenoble, France), October 2011.

"Microfibres for nonlinear optics"

Optical Engineering Department, *Leader Limin Tong*, Zhejiang university (Hangzhou, Chine), October 2008.

"Nonlinear microfiber resonator"

Languages

French Mother tongue

English Fluent

6 months Erasmus student in Sweden, post-doc at NIST

Spanish Basic skills

Skills and Interests

Computer skills Linux and Windows softwares: Matlab, \LaTeX , Comsol, Meep, ...

Sport Gymnastics for 10 years, gymnastics teacher for 4 years, rugby for 3 years

Other interests Guitar, photography, cooking, web development