


UBFCUNIVERSITÉ
BOURGOGNE FRANCHE-COMTÉ

Job title	Postdoctoral Researcher in Physics: Nonlinear wave propagation in multimode optical fibers
Ref	2018-21-MIRCOM-2
Job type (PhD, Post-doc, Engineer)	Post-Doc
Contract duration (months)	23 months
Qualifications (Master degree, PhD...)	PhD
Job hours (full time/ part time)	Fullt time
Employer	UBFC – Université de Franche-Comté
Host Laboratory	ICB UMR 6303 CNRS/Université Bourgogne Franche-Comté
URL Host Laboratory	http://icb.u-bourgogne.fr/en/
Address Host Laboratory	9 avenue Alain Savary, 21078 Dijon, France
Job description	<p><u>Title</u>: Nonlinear wave propagation in multimode optical fibers</p> <p>One important challenge of the project is to provide a deep understanding of spatiotemporal nonlinear dynamics of pulse propagation in silica or mid-Infrared multimode fibers. Silica multimode fibers have recently become a hot research topic from both fundamental and application viewpoints. In particular our goal is to study both experimentally and theoretically the new concept of Kerr-induced spatial beam self-cleaning [Krupa1] which manifests itself as a concentration of optical power from higher order modes of the fiber toward the low-order modes and leads to a well-defined bell-shaped beam profile confined in the fiber core. An attempt to explain beam self-cleaning was based on the nonreciprocal nature of intermodal nonlinear coupling processes [Krupa1]. However, much deeper investigations are required to clearly understand, control, and exploit this spectacular phenomenon. In particular, the relationship between self-cleaning and wave condensation [Picozzi] remains a key issue not yet elucidated. The project aims at exploiting the spatial beam self-cleaning effect for mode-locking in multimode fiber cavities as well as the very broadband frequency conversion obtained by nonlinear intermodal wave mixing in multimode fibers [Dupiol, Krupa2] to generate compact, powerful and broadband light sources and frequency combs in the mid-Infrared. Indeed, mid-Infrared sources are currently largely missing, but their availability is of paramount social importance for non-invasive medical diagnostics based, for example, on dual-comb spectroscopy [Milot].</p> <p><u>Collaborations</u>: SLCO group of ICB/Univ. Bourgogne Franche-Comté, A. Tonello, A. Barthelemy, V. Couderc (XLIM/Univ. Limoges, France), S. Wabnitz (Univ. Brescia, Italy)</p>

	<p>References:</p> <p>[Dupiol] R. Dupiol, A. Bendahmane, K. Krupa, A. Tonello, M. Fabert, B. Kibler, T. Sylvestre, A. Barthelemy, V. Couderc, S. Wabnitz, and G. Millot, Far-detuned cascaded intermodal four-wave mixing in a multimode fiber, <i>Opt. Lett.</i> 42, 1293-1296 (2017).</p> <p>[Krupa1] K. Krupa, A. Tonello, B.M. Shalaby, M. Fabert, A. Barthélémy, G. Millot, S. Wabnitz, V. Couderc, Spatial beam self-cleaning in multimode fibres, <i>Nature Photon.</i> 11, 237 (2017).</p> <p>[Krupa2] K. Krupa, A. Tonello, A. Barthélémy, V. Couderc, B. M. Shalaby, A. Bendahmane, G. Millot, S. Wabnitz, Observation of geometric parametric instability induced by the periodic spatial self-Imaging of multimode waves, <i>Phys. Rev. Lett.</i> 116, 183901 (2016).</p> <p>[Millot] G. Millot, S. Pitois, M. Yan, T. Hovhannisyan, A. Bendahmane, T. Hänsch, and N. Picqué, Frequency-agile dual-comb spectroscopy, <i>Nature Photon.</i> 10, 27-30 (2016).</p> <p>[Picozzi] A. Picozzi, J. Garnier, T. Hansson, P. Suret, S. Randoux, G. Millot, D. Christodoulides, Optical wave turbulence: Toward a unified nonequilibrium thermodynamic formulation of statistical nonlinear optics, <i>Physics Reports</i> 542, 1-132 (2014).</p>
Supervisor(s)	MILLOT Guy (Professor at ICB/University Bourgogne Franche-Comté) ; Guy.Millot@u-bourgogne.fr
Candidate profile	Applicants should have a PhD in physics or optics with solid background in nonlinear pulse propagation in optical fibers. Strong skills in experimental techniques in the field of lasers and optical fibers are expected. Well-developed team working skills are required.
Keywords	Spatio-temporal nonlinear dynamic, Multimode fibers, Spatial beam self-cleaning, Intermodal four wave mixing.
Application deadline	31 th August 2018. Following the deadline, candidates will be rapidly informed of their status.
Starting Job	1 st December 2018
Application	<p>Please send the following documents (all in one PDF file) by e-mail to job-application@ubfc.fr:</p> <ol style="list-style-type: none"> 1) For EU candidates: Copy of your national ID card or of your passport page where your photo is printed. For non-EU candidates: Copy of your passport page where your photo is printed. 2) Curriculum Vitae (may include hyperlinks to your ResearchID, Research Gate Google Scholar accounts). 3) Detailed list of publications (may include hyperlinks to DOI of publications). 4) Letter of motivation relatively to the position (Cover Letter) in which applicants describe themselves and their contributions to previous research projects (maximum 2 pages) 5) Copy of your PhD degree if already available. 6) Coordinates of reference persons (maximum 3, at least your master thesis supervisor): Title, Name, organization, e-mail. <p>If you have questions regarding the application, please contact the supervisor.</p>