

Post Title: Postdoctoral Research Fellow in Optical Wave Turbulence
University: University Bourgogne Franche-Comté, Dijon, France
Employer: CNRS
Host Laboratory : Laboratoire Interdisciplinaire Carnot de Bourgogne (ICB)
URL Host Laboratory : <http://icb.u-bourgogne.fr/en/>
Hours: Full Time, initially 1 year
Salary range: gross salary between 2600 and 3000 euros (depending on professional experience)
Closing date: 25 feb 2020
Expected start date: May - June 2020

Applications are invited for a Postdoctoral Research Fellow in Optical Wave Turbulence. The position is part of the ANR funded project ICCI. The research will be supervised by Antonio Picozzi (CNRS, Dijon), Guy Millot (Professor, Dijon), in collaboration with Josselin Garnier (Ecole Polytechnique, Paris).

The project is aimed at studying turbulence of optical waves in the presence of a structural disorder of the medium. Despite significant efforts since several decades, the understanding of fully developed turbulence still constitutes a challenging problem of mathematical physics. In the weakly nonlinear regime systematic methods have been developed in the general framework of the wave turbulence theory. This approach occupies a rather special place on the road-map of modern science, at the interface between applied mathematics and statistical physics. It has found applications in a diverse range of subjects including oceanography, plasma physics, condensed matter physics and more recently in optics. Nonlinear optics allows one to study wave turbulence within rather simple experiments. In this framework, various phenomenological behaviors have been uncovered on the basis of different wave turbulence formalisms (condensation of optical waves in analogy with quantum Bose-Einstein condensation, the formation of large scale collective incoherent structures in analogy with the formation of galaxies, or the formation of strong correlations in analogy with superconductivity).

The wave turbulence theory has been developed under the assumption of perfect homogeneity of the medium. Here we envisage an extension of different aspects of wave turbulence by taking into account for a structural disorder of the medium. Indeed, light propagation in conventional optical fibers is known to be affected by disorder due to inherent imperfections and external perturbations. The theoretical developments will be studied through numerical simulations, which in turn will be used to conceive experiments in optics. In particular, we will study the impact of disorder on the formation of non-equilibrium localized incoherent structures in mono-mode and multi-mode fibers, in analogy with weak Langmuir turbulence in plasma. The impact of disorder on light condensation will also be studied, in relation with spatial beam self-cleaning in multimode fibers. From a broader perspective, the project contributes to the understanding of spontaneous organization phenomena in nonlinear disordered systems.

The successful candidate is an experimentalist in nonlinear fiber optics with strong skills in numerical computational. Solid background in nonlinear waves and stochastic processes is required. Some knowledge in equilibrium and nonequilibrium statistical mechanics is desirable.

Applications should be done on <https://emploi.cnrs.fr/>