Electromagnetic modeling of complex optical stacks towards new mesoscopic optical phenomena and photonic devices

One-year post-doctoral position in the group “Light in Complex Nanostructures” at LP2N

Disordered ensembles of complex, strongly resonating nanoparticles in planar geometries are ubiquitous in emerging photonic materials and devices. Their high scientific and technological potential is due to the richness of their optical properties, coming from the individual nanoparticles, their interaction with a structured substrate (a thin-film stack) and their mutual interaction at both short and long ranges. Theoretically predicting the optical properties of such complex nanostructures has however remained a seemingly insurmountable challenge up to now, due to the difficulty to consider simultaneously the coherent phenomena occurring down to the nano-scale – at the level of the individual nanoparticle – up to the mesoscopic scale – at the level of the nanoparticle ensemble.

In this project, we will explore a new approach based on a modal formalism to unlock the key modeling challenges posed by complex optical stacks and develop the first numerical tool able to predict their optical properties. The project is very challenging, yet a successful outcome would enable the design of nanostructured surfaces, fabricable by bottom-up techniques (hence at low cost and on large scales), producing new targeted optical functions. Our research could impact technologies as diverse as photovoltaic panels, organic light-emitting diodes, biosensors, transparent displays for augmented reality, and optical materials engineering for interior design.

The post-doctoral fellow is expected to have advanced skills in optical physics and computational electromagnetics. The one-year post-doctoral position may be extended to a second year, depending on the results of the first year and the funding availability.

Candidates should send their application, including CV and reference contacts, to kevin.vynck@institutoptique.fr and philippe.lalanne@institutoptique.fr.

Starting date: Before June 1st, 2016.

Additional information on the group https://www.lp2n.institutoptique.fr/Membres-Services/Responsables-d-equipe/LALANNE-Philippe

Location
LP2N, Institut d'Optique d'Aquitaine, rue François Mitterrand, 33400 Talence, France

Funding
This project is supported by the Cluster of Excellence LAPHIA of the University of Bordeaux. http://laphia.labex.u-bordeaux.fr/en/