

24 month Post-doc position available at the Acoustic Laboratory of Le Mans University

A 24 month (possible extension of 12 month) post-doctoral position is now available at the Acoustic Laboratory of Le Mans University, UMR CNRS 6613, in the framework of the METARoom ANR/RGC (ANR-18-CE08-0021) project on the design of reconfigurable acoustic panel for the control of audible sound.

Context: The METARoom project (ANR-18-CE08-0021) is jointly funded by ANR (France) and RGC (Hong-Kong) and bring together Acoustic Laboratory of Le Mans University, Hong Kong University of Science and Technology, Hong Kong Baptist University as well as Metacoustic and Acoustic Metamaterials Group around one common goal: the design of a reconfigurable acoustic room.

Abstract of the METARoom project:

The extraordinary functionalities of acoustic metamaterials have led to the realization of wave manipulation techniques previously regarded as impossible with deep subwavelength structures. Unfortunately, since much of metamaterials' properties originate from the resonance phenomenon, the novel functionalities are necessarily restricted to narrow frequency ranges; yet broadband is usually a necessity in practical applications. Recently, breakthroughs in the designed integration strategy have overcome the narrow frequency limitation and showed that some functionalities, such as sound absorption, can be made to be tunable in accordance with the target absorption spectrum. Such designed integration scheme has already led to the formation of a Hong Kong startup company, Acoustic Metamaterials Group (AMG), which has achieved mass production capability of the designed prototypes, and of a French startup company, Metacoustic, which proposes acoustic and vibration solutions consisting in metaporous and metaporoelastic layers. In this project, we would like to extend the previous success in acoustic absorption to open a new frontier in room acoustics, by constructing walls that can passively switch from a totally absorbing to a spatially modulated reflection phase, by utilizing resonances to tune the impedance of the walls. Such change can significantly alter the audio experience of a room, from anechoic-like to the audio feel of a larger room than it is in reality. Traditionally, acoustic wall constructs are static and achieve only one functionality. Moreover, they are efficient at high frequencies but results in bulky and heavy structures at low frequencies. This project aims at designing deep subwavelength re-configurable acoustic metamaterials for altering the room acoustics. We intend to draw on the combined expertise of the Hong Kong and French teams to prove experimentally the effectiveness of such a system in two demonstration rooms, one in Hong Kong and one in Le Mans. The two demonstration rooms will use different integration approaches and different resonators (Fabry-Pérot resonators for the Hong Kong team, and Helmholtz resonators for the Le Mans team) in achieving the same goal. The research and development experience of both teams in theory, simulation, sample fabrication, and implementation will be enriched through each others' approaches, as well as through mutual visits and student exchanges. Both teams will collaborate with AMG and Metacoustic in this project. AMG's role will be to provide space for the demonstration room in Hong Kong, while

the PI, Co-I and students in Hong Kong and in Le Mans will design, fabricate and test the acoustic metamaterials in collaboration with AMG and Metacoustic. We envision new commercial opportunities with the successful completion of this project.

Profile: PhD in wave physics or mechanical engineering with skills in reconfigurable mechanical materials are expected. The candidate should also combine good theoretical, numerical and experimental skills.

Gross annual salary: ~ € 50 000 per year

Location: The Acoustic Laboratory of Le Mans University (LAUM), UMR CNRS 6613, Av. Olivier Messiaen, 72085 Le Mans Cedex 09.

LAUM has approximately 170 employees including 60 full-time researchers and professors. It is a leading institution in Acoustics, with a unique set of equipments for general acoustics. It is associated with CNRS, the National Centre for Scientific Research (CNRS).

Application deadline: 28th January 2019. Application should be done online via <https://emploi.cnrs.fr/Offres/CDD/UMR6613-PAOBER-001/Default.aspx?lang=EN>

Expected starting date: between 1st March and 1st October 2019

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