

**BOHEME – Bio-inspired hierarchical metamaterials**

***Post-doctoral position in « metamaterials for noise reduction »  
at the Institute of Electronic, Microelectronic and Nanotechnology (UMR CNRS 8520)  
Laboratory of Acoustics, 41 Boulevard Vauban – Lille (FR)***

**Project Context and objectives:** Airborne noise insulators capable of broadband good performances in the sub-wavelength frequency regime is a fundamental problem of interest in many disciplines ranging from physics to engineering. Metamaterials, which are composite structures made of periodic unit cells performing spatial and spectral control of waves due to a frequency-dependent directionality or band gap (BG) effects, are more and more used as an innovative solution to mitigate and control sound and vibrations in general.

In this context, our assumption is that the working principle behind metamaterials is already exploited by Nature, where it has given rise to goal-oriented optimized designs, due to the evolutionary development process, including optimized designs for wave and vibration control. *The main objective of the postdoc position is to conceive, manufacture and experimentally characterize an innovative metamaterial inspired by biological systems to create an innovative lightweight and compact noise insulation screen (operating at the sub-wavelength regime).* Due to the scalability of the wave equations, other domains of applications will be also investigated.

**Main tasks and responsibilities:** The candidate will perform her / his research supervised by Dr. Marco Miniaci, in the framework of the FET-OPEN research project BOHEME on « Bio-inspired hierarchical metamaterials ». She / he will investigate phononic crystals and metamaterials mainly in the context of airborne acoustics, although she / he may also be involved in metamaterial applications in other frequency ranges. Collaborations with foreign renowned research groups is foreseen (Imperial College of London, Politecnico di Torino, ETHZ, Empa, etc.) as well as with industrial partners (Multiwave and Phononic Vibes). The candidate is expected to contribute on the analysis and interpretation of data, manuscript preparation and dissemination of the results in the context of national and international conferences/meetings.

**Required qualifications:** Candidates are required to hold a PhD in engineering, physics, or similar disciplines. A solid background in airborne acoustics and wave propagation in periodic media, phononic crystals and metamaterials is required. Experience in experimental measurements of acoustic / elastic wave propagation is a valuable plus, as well as experience in analytical and numerical methods (MS, FEM, BEM, ...).

**Application:** Applicants are asked to provide the following documents:

- 1) a motivation letter (approximately 1 page) explaining why they are applying for this position
- 2) a detailed CV
- 3) two to three reference letters

Information should be sent to Dr. Marco Miniaci ([marco.miniaci@gmail.com](mailto:marco.miniaci@gmail.com), [marco.miniaci@univ-lille.fr](mailto:marco.miniaci@univ-lille.fr)). The online application procedure is also required (CNRS website).

**Location:** The Institute of Electronic, Microelectronic and Nanotechnology (UMR CNRS 8520 – <https://www.iemn.fr/en/>) is in Villeneuve D'Ascq, close to the city of Lille (France). With a total staff of over

500 persons, the institute has a broad area of research activity ranging from physics to materials science, acoustics, micro- and nanotechnology. The laboratory of Acoustics (where the candidate will have her / his office) is in the city center of Lille (41 Boulevard Vauban), within the « Junia » buildings.

**Starting date:** January 1<sup>st</sup>, 2023.

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