Additive Manufacturing (AM) technologies are now capable of fabricating microstructures at the scale of microns, therefore enabling to precise control of the macroscopic physical behavior. This control empowers a wide range of industrial applications by bringing high-performance customized materials. In particular, a promising venue lies in the optimization of material properties such as rigidity or impact absorption.

Microstructures for AM will play a decisive role in the factory of the future, but several challenges remain aside [1]. The dimension of the objects being printed increases, and concurrently, the available printing resolution becomes finer. Thus, the geometry size of microstructures is drastically escalating. From a computational viewpoint, explicitly storing the microstructure geometry (e.g., in an STL file), will eventually render infeasible the whole computational pipeline (numerical simulation, visualization, and computational design of microstructures). From a material science viewpoint, it remains a challenge to properly embed and grade microstructures within an object, and to ensure that they can be directly fabricated with AM processes.

State of the art methods consider periodic microstructures [4, 5, 6], offering compact storage, efficient display, and simulation of the macroscopic physical behavior. However, due to their constrained global structure, periodic microstructures exhibit a poor grading behavior, specially when targeting anisotropic material properties that follow an arbitrary orientation field.

The detailed description of the PhD proposal can be downloaded from [here](#).
Benefits package
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- Sports facilities

Remuneration
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scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

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