

# LMS – M4S Seminar

## Cellular solids under geometric frustration: Animal architecture and bio-inspired designs

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### Date, time, and venue

April 02, 2026 (2 – 3 pm), Amphithéâtre Pole Mecanique

### Abstract

Lightweight materials and structures with an engineered microstructure are essential in several applications, from enabling new functionality to reducing fuel consumption in vehicles. Examples of these structures are also found in nature. In this presentation, we will first explore how honeybees adapt the construction of their honeycomb under different constraints that prevent the use of a regular hexagonal lattice. We 3D-print experimental frames with imprinted foundations, that the bees extend as they construct the comb. The panels impose a variety of constraints, ranging from crystal misalignment to cells of different sizes. The resulting constructed comb lattices show clear evidence of reoccurring patterns with non-regular geometry and topology that can be related to the behavior of other lattices and self-organized systems, such as graphene and crack networks. We then explore how the architectures found in the honeycomb built by bees can be used as an inspiration on the design of man-made cellular solids.

### About the speaker

Francisco López Jiménez is an Associate Professor in the Ann and H.J. Smead Department of Aerospace Engineering Sciences at the University of Colorado Boulder. He received his B.S. in Mechanical Engineering from the University of Seville, and an M.S. in Aerospace Engineering and a Ph.D. in Aeronautics from the California Institute of Technology. Before joining CU Boulder, he held postdoctoral research appointments at the Laboratoire de Mécanique des Solides (École Polytechnique, France) and the Massachusetts Institute of Technology. His research focuses on the design, fabrication, and analysis of composite materials and lightweight structures.

