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The design of artificial materials, with emerging anomalous properties, is a very active frontier research today due to the multiple and novel applications based on new physics. These new materials, also called metamaterials, are characterized by their wave phenomenology that defies our intuition: superfocusing, invisibility and slowing down, among others.

The main challenge of metamaterials is their mass production since, so far, only samples whose anomalous emergent properties have been verified in small frequency intervals have been manufactured. The first samples manufactured successfully, at the beginning of our 21st century, were electromagnetic metamaterials, characterized by their negative refractive index. On the other hand, elastic metamaterials present a greater degree of difficulty, due to the coupling between the different polarizations of the mechanical waves, as well as the conversion between them.

In this conference we present experimental evidence of the control of mechanical waves through some structured elastic metamaterials, strategically designed and manufactured in our research group. Some emergent properties of these elastic materials are Bloch oscillations; rainbow entrapment and near-zero group speed.

This frontier research has potential applications in seismology; in the design of modern cities and in the automotive, aeronautical and aerospace industries since comfort, maintenance and mainly the safety of vehicles depend on control of elastic waves and mechanical vibrations in them.

Session Classification: SHORT TALKS

Track Classification: SYMPOSIUM ON SCATTERING, QUANTUM AND CLASSICAL TRANSPORT