Elastodynamic metamaterials

The seminar will be given in English

Current technology enables the production of composites with tailored microstructure at the nanoscale. The nature of the constituents has also changed, with the development of active materials which significantly deform in response to non-mechanical stimuli, and resilient soft materials capable of undergoing large strains. When these artificial composites exhibit properties not found in nature, they are termed metamaterials.

In this talk, I will first overview how my group contributed to understanding the mechanics of these media, paving the way for materials with enhanced properties and functionalities. Then, I will focus on our recent report of anomalous wave phenomena in elastic composites. Specifically, by revising the problem of in-plane waves in periodic laminates, I will demonstrate that waves impinging on such media may anomalously refract negatively—a phenomenon that can be harnessed for cloaking. I will show that the negative refraction is the hallmark of exceptional points in the frequency spectrum, at which two waves coalesce. I will conclude the talk with a glance at our future plans for harnessing counterintuitive phenomena that emerge from exceptional points towards novel applications.