

Trip the light fantastic: Using Artificial Materials to Mediate Novel Wave-Particle Interactions

Thursday 10 November 2022 16:15 (1 hour)

This seminar will take place at Daresbury Laboratory and will also be available via Zoom.

In this presentation we explore the ability of artificial electromagnetic materials to manipulate light. These materials are man-made composites, homogenised to act as effective media, whose dispersion relations can be engineered to give rise to novel particle wave interactions, and offer a path to reduce the size/weight of conventional technologies.

We examine the ability of artificial electromagnetic materials to generate EM waves and how they can be used to accelerate particle beams. Using a modified form of Madey's theory we show how the engineered dispersion gives rise to particle-wave interactions, and mediates energy transfer between wave and particle beam. We present our results of using this interaction to generate an electromagnetic wave. Utilising a low-loss, dispersion engineered, artificial material to form an oscillator for the generation of EM waves.

In addition, we examine the use of biological systems as foundries for the mass manufacture of artificial electromagnetic materials, and examine the use of artificial electromagnetic materials as analogs for quantum mechanical processes, such as electron emission from cathodes.

Presenter: SEVIOUR, Rebecca (University of Huddersfield)