SEMINARIO

Álvar Daza Esteban

Departamento de Biología y Geología, Física y Química Inorgánica, U. Rey Juan Carlos

Branched flow and superwires in periodic systems

Abstract: Waves propagating through random media can accumulate in strong branches, intensifying fluctuations and powerful phenomena such as tsunamis. However, branched flow is not restricted to the large scale, and here, we find surprisingly that branched flow is not restricted to random media. We show that quantum waves living in the high Brillouin zones of periodic potentials also branch. Moreover, some of these branches do not decay as in random media but remain robust indefinitely, creating dynamically stable channels that we call superwires. The waves in these stable branches have enough energy to surmount the channel potential and go elsewhere, but classically, nonlinear dynamics keeps them confined within the channel. These results have direct experimental consequences for superlattices and optical systems.

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