University of Crete
**Department of Physics**

# *Physics Colloquium*

Thursday, 16 December 2021 | 16:00 – 17:00, Online with ZOOM

## Passive Nonlinear Targeted Energy Transfers

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**ABSTRACT**

*We explore passive nonlinear targeted energy transfers (TET) in dynamical and acoustical systems based on the synergy of intentional strong nonlinearity, asymmetry, and possible internal scale hierarchy. This is a process where, through predictable design, broadband or narrowband input energy is either irreversibly directed in preferential paths/modes, passively scattered in the frequency/wavenumber domains, dissipated locally, or harvested at a priori designated sites. Interestingly, TET mimics analogous energy cascades occurring often in Nature (e.g., in turbulent flows or granular media), and, as such, benefits from the well-known robust and enhanced dissipative features exhibited by these natural phenomena. Our approach dictates advanced theoretical modelling and analysis accounting for strongly nonlinear effects, but also nonlinear system identification and reduced-order modelling to characterize the experimental realizations that validate the theoretical predictions. We discuss several applications, including implementing intermodal TET, designing, analysing, characterizing, and experimentally testing non-reciprocal lattice materials incorporating internal hierarchical scales, and employing TET for tuning the bandwidths of nonlinear oscillators. The aim is to translate these approaches to new methods, technologies and devices that exploit and showcase nonlinear TET.*

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*ZOOM Link:* https://zoom.us/j/94859117759?pwd=SG95UzQ4UG80cGNVN3BGZ3RLR0hwQT09