



University of Crete
Department of Physics

Physics Colloquium

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Aspects of Nonlinear Topological Photonics

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ABSTRACT

The defining property of a topological system is that it exhibits some physical property that is highly robust to perturbations such as disorder. In recent years, it has been demonstrated that such phenomena are not confined to the domain of condensed matter physics (for example, in the quantum and spin Hall effects), but rather can be found in other contexts such as photonics, ultracold atoms, acoustics, polaritonics, etc. In this colloquium I will present some recent theoretical and experimental results on the interplay between optical nonlinearity and topological physics. First, I'll show that topological edge states can overcome a fundamental trade off that has limited the usefulness of slow-light devices. Next, I will present the observation of topological edge solitons. Finally, time permitting, I will demonstrate how nonlinearity can act to quantize transport in photonic Thouless pumps, despite the absence of perfect band filling. Nonlinearity is a close cousin of interparticle interactions for bosonic systems, so we expect our results to be widely applicable beyond photonics.