

ΣΕΜΙΝΑΡΙΟ ΚΕΝΤΡΟΥ ΚΒΑΝΤΙΚΗΣ ΠΟΛΥΠΛΟΚΟΤΗΤΑΣ &
ΝΑΝΟΤΕΧΝΟΛΟΓΙΑΣ/ CCQCN SEMINAR

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11:00-12:00

3rd Floor Seminar Room

Turbulent Chimera States in Large Diode Lasers Arrays

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Abstract

Large networks of semiconductor laser arrays have been investigated for fun and profit, experimentally, numerically and analytically from the viewpoint of temporal and spatial coherence for the past forty years¹. The Quantum Complexity and Nanotechnology Team in collaboration with the Physics Department in Astana, are currently dissecting a rather novel complex collective behavior, namely chimera states, where synchronized clusters of photonic emitters coexist with unsynchronized ones. For the first time, they found that such states exist in large diode arrays with nearest-neighbor interactions as the optical frequency detuning is judiciously tuned. Employing a recently proposed figure of merit by Yannis Kevrekidis² for classifying chimera states, they provide quantitative and qualitative evidence for the observed dynamics. The corresponding chimeras are identified as turbulent³ according to the irregular temporal behavior of the classification measure. Finally they argue that such numerical explorations may be the springboard for designing next generation photonic integrated oscillators that emit at will diverse waveforms for chip scale laser radar and microwave applications.

