Manipulating Quantum Fluids of Polariton Condensates

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In this talk we will review some of the striking physical phenomenology associated with the dynamics of a quantum flow of polariton condensates. Due to their intrinsic dissipative nature and strong non-linearities, polariton condensates display an incredibly span of behaviours ranging from the manifestation of superfluid-like flow [1,2] and quantized circular currents [3] to a complex dynamics of vortex formation and migration [4]. In particular we will show how it is possible to manipulate and control the polariton flow dynamics, with the formation of solitonic rings, expanding shock waves and a resolution-limited long-lived backjet when a drop of polaritons is suddenly created in a previously unperturbed state. Furthermore, given their strong non-linearities and very high propagation velocities, polariton fluids are particularly attractive for their potential use as optical switches in integrated circuits. Among other applications, we will demonstrate the possibility to realize a polariton-based transistor for logic operations made out of polariton fluids [5].

References

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