

Modified excitation spectrum and superfluidity in open-dissipative polariton condensates

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A unique Bose-Einstein condensate-like state can be produced in semiconductor microcavity exciton-polaritons which exists in the presence of gain and loss, raising the question as to the nature of superfluidity in such an open-dissipative setting^{1,2}. We present a study of off-resonant and perturbative excitation of density waves in a stationary polariton condensate and their propagation dynamics. Via this technique we probe directly the hydrodynamics of a non-equilibrium superfluid, which exhibit dispersive density wave propagation with a supersonic group velocity resulting in the formation of dispersive shock waves. We further present direct measurements of the sound velocity in the polariton condensate.

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