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Room-temperature polariton condensation and superfluidity in an organic microcavity

STEPHANE KENA-COHEN, Polytechnique Montreal

Bose-Einstein condensation of ultracold atoms and superfluidity have been some of the most stunning demonstrations of macroscopic quantum behaviour. We will show how hybrid light-matter particles called polaritons that form in organic microcavities can show similar behaviour, but in simple room-temperature table-top experiment in ambient conditions. First, we will describe condensation of polaritons under non-resonant excitation in a microcavity containing a thin film of 2,7-bis[9,9-di(4-methylphenyl)-fluoren-2-yl]-9,9-di(4-methylphenyl)fluorene and highlight features such as the formation of long-range spatial coherence, vortices and dynamic instabilities. Then, we will show how under resonant excitation, polariton fluids can exhibit a transition from supersonic flow to superfluid flow and propagate in a sample unimpeded by the presence of scatterers.