

Topological polariton states and Kibble-Zurek mechanism of topological defect formation in zigzag chains of pillar microcavities

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Abstract

We consider a zigzag chain of coupled pillar microcavities, taking into account the polarization of polariton states. We show that the TE-TM splitting, present even in the planar cavities, leads to the appearance of topological polariton states at the edges of the chain. Their polarization depends on the parity of the number of pillars. This follows from a tight-binding model and is confirmed by full numerical simulations. A random choice of polarization of the bulk states during the condensate formation is equivalent to dimerization of polymer chains. We show that topological defects appear as domain walls between polarization domains, analogous to Su-Shriffer-Heeger solitons in polymers. Their density in a polariton condensate is governed by the condensation quench speed via Kibble-Zurek mechanism.