Universality in condensation of exciton-polaritons

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Phase transitions of second order taking place on a finite timescale exhibit a transition from adiabaticity to nonadiabaticity. Such phase transitions can lead to random formation of topological defects if symmetry is broken at the same time, as shown in numerous models ranging from the dynamics of the early Universe, superconductors, to liquid crystals. This process is described by the Kibble-Zurek mechanism which provides power-law scalings due to the underlying universality. We consider the condensation of exciton-polaritons, which is an example of an uncommon phase transtion, in which the transition connects an intrinsically nonequlilbrium state to a quasi-equilibrium state. We show that this process can lead to the formation of domains of polaritons and uncondensed excitons, and demonstrate scaling laws that give an estimate for the number of created defects.

[1] M. Matuszewski and E. Witkowska, arXiv:1212.0805.