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Pattern formation and gauge-induced domains in a driven Bose-Einstein Condensate KAIXUAN YAO, ZHENDONG ZHANG, LIANGCHAO CHEN, CHENG CHIN, University of Chicago — Floquet engineering, the application of temporal periodic drive to a system, has offered rich opportunities for creating novel quantum dynamics and phases inaccessible in static systems. Here we discuss our recent progress with driven Bose-Einstein condensates based on two examples: pattern formation and quantum phases with density-dependent gauge field. With atomic interactions driven at two frequencies, we observe formation of density patterns with two- (D2), four- (D4) and six-fold (D6) symmetries. The symmetry of the pattern is controlled by the ratio of the frequencies. With simultaneous modulation of lattice phase and atomic interactions, we observe gauge-induced density dependent pseudo-spin domains. Numerical simulations suggest that the two pseudo-spin domains have different densities, similar to a liquid-gas system.

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