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Coherence Length of Cold Exciton Gases in Coupled Quantum[1]
SEN YANG, A.T. HAMMACK, M.M. FOGLER, L.V. BUTOV, Department of Physics, University of California, San Diego, A.C. GOSSARD, Materials Department, University of California, Santa Barbara — We report on emergence of spontaneous coherence of excitons at low temperatures. A Mach-Zehnder interferometer with spatial and spectral resolution was used to probe spontaneous coherence in cold exciton gases, which are implemented experimentally in the ring of indirect excitons in coupled quantum wells. A strong enhancement of the exciton coherence length is observed at temperatures below a few Kelvin. The increase of the coherence length is correlated with the macroscopic spatial ordering of excitons. The coherence length reaches about 2-3 microns at the lowest temperature(1.5K), this corresponds to a very narrow spread of the exciton momentum distribution, much smaller than that for a classical exciton gas.

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