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Controlling Turing Patterns in Spinor Polariton Fluids in Semiconductor Microcavities K.P. CHAN, The Chinese University of Hong Kong, P. LEWANDOWSKI, University Paderborn, V. ARDIZZONE, University Pierre et Marie Curie, University D. Diderot, Y.C. TSE, The Chinese University of Hong Kong, N.H. KWONG, M.H. LUK, University of Arizona, A. LUECKE, University Paderborn, M. ABBARCHI, E. BAUDIN, University Pierre et Marie Curie, University D. Diderot, E. GALOPIN, J. BLOCH, A. LEMAITRE, Laboratoire de Photonique et de Nanostructures, CNRS, P.T. LEUNG, The Chinese University of Hong Kong, PH. ROUSSIGNOL, University Pierre et Marie Curie, University D. Diderot, R. BINDER, University of Arizona, J. TIGNON, University Pierre et Marie Curie, University D. Diderot, S. SCHUMACHER, University Paderborn — The formation of Turing patterns in a coherent quantum fluid of polaritons has been achieved by pumping a quantum well placed inside a double-microcavity with a normally incident laser beam. With an external weak control beam or other asymmetries introduced in the system, the Turing patterns could be switched. On the other hand, recent experiments show that the orientation and polarization of the patterns can also be controlled by the polarization of the incident pump. This introduces the pump polarization as a new control, which originates from the spinor nature of the polariton fluid.We will present our theoretical studies on the polarization control mechanisms using numerical simulations and analytic simplified models. In particular, we examine how various spin-dependent physical factors, including inter-polariton interactions, polariton dispersion and photon-exciton coupling strengths,control the polarization and orientation of the pattern as observed in the recent experiment.

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