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Nonlinear dynamics of the normal and superfluid dipolariton gas in transition-metal dichalcogenide-based heterostructures GERMAN KOLMAKOV, NYC College of Technology, CUNY, TIM BYRNES, New York University, ANDY HE, ROMAN YA. KEZERASHVILI, NYC College of Technology, CUNY —
Propagation of a dipolariton quantum gas in normal and superfluid states in a patterned mictrocavity in the presence of an external electric field is studied. The double layer transition-metal dichalcogenide structure is embedded into the microcavity. The dipolaritons are formed as a superposition of direct and indirect excitons in the layers and cavity photons. By numerically solving the Boltzmann equation for a gas of interacting dipolaritons in a normal state at room temperatures and the Gross-Pitaevskii equation for a dipolariton Bose-Einstein condensate in superfluid state at low temperatures we show that the dipolariton flow can be controlled by the electric field in the cavity. We also numerically studied the dipolariton propagation in channels of various geometries in the cavity and determine conditions when the dipolariton flow can be guided in the channels.

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