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Quantum Melting in a Polariton Lattice ALEXANDER EDELMAN, PETER LITTLEWOOD, Univ of Chicago — We study a generalized Dicke model of lattice polaritons, with a pair-potential interaction between excited states of the spin component, in the functional integral formalism. Even considering only zero-temperature equilibrium effects with a uniform photon field, there is a rich phase diagram as a function of light-matter coupling, which includes spatially ordered and superfluid phases. Depending sensitively on the form of the potential, the interaction may induce an instability in the sound mode of the polariton condensate, or destroy the condensate altogether. Zero-temperature fluctuations may likewise melt the spatially ordered phases. We consider implications for cold-atom experiments with tunable interactions, as well as interacting exciton-polaritons accessible in the solid state.

Alexander Edelman
Univ of Chicago

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