

Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Supermode-polariton condensation in a multimode cavity QED-BEC system ALICIA KOLLAR, ALEXANDER PAPAGEORGE, YUDAN GUO, VARUN VAIDYA, BENJAMIN LEV, Department of Physics and Applied Physics, Stanford University — Investigations of many-body physics in an AMO context often employ a static optical lattice to create a periodic potential. Such systems, while capable of exploring, e.g., the Hubbard model, lack the fully emergent crystalline order found in solid state systems whose stiffness is not imposed externally, but arises dynamically. Our multimode cavity QED experiment is introducing a new method of generating fully emergent and compliant optical lattices to the ultracold atom toolbox and provides new avenues to explore quantum liquid crystalline order. We will present our first experimental result, the first observation of a supermode-polariton condensate via a supermode superradiant phase transition.

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Date submitted: 26 Jan 2016

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