Coherent interaction of a Bose-Einstein condensate with two crossed cavity modes JULIAN LEONARD, ANDREA MORALES, PHILIP ZUPANCIC, TOBIAS DONNER, TILMAN ESSLINGER, ETH Zürich — The realization of cavity-mediated long-range interactions in ultracold quantum gases leads to intriguing new many-body phenomena such as quantum phase transitions to self-ordered superradiant states. While such a state has been observed in a one-dimensional setup, extensions to higher dimensions that aim to exploit multimode configurations have only been suggested theoretically. Such systems are expected to exhibit rich phase diagrams with higher broken symmetries, frustration and glassy behavior. report on our latest results on coupling a Bose-Einstein condensate with two crossed cavity modes. The cavities cross under an angle of 60°, which allows the study of self-ordered phases in different lattice shapes, such as hexagonal and triangular geometries. In addition to this tunable lattice geometry, our setup features a high-resolution imaging system, which will enable us to manipulate and probe the system locally.

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Date submitted: 30 Jan 2015