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A novel experiment for coupling a Bose-Einstein condensate with two crossed cavity modes JULIAN LEONARD, ANDREA MORALES, PHILIP ZUPANCIC, TOBIAS DONNER, TILMAN ESSLINGER, ETH Zürich — Over the last decade, combining cavity quantum electrodynamics and quantum gases made it possible to explore the coupling of quantized light fields to coherent matter waves, leading e.g. to new optomechanical phenomena and the realization of quantum phase transitions. Triggered by the interest to study setups with more complex cavity geometries, we built a novel, highly flexible experimental system for coupling a Bose-Einstein condensate (BEC) with optical cavities, which allows to switch the cavity setups by means of an interchangeable science platform. report on our latest results on coupling a Bose-Einstein condensate with two crossed cavity modes intersecting under an angle of 60°. The mirrors have been machined in a way to spatially approach them, thus obtaining maximum single atom coupling rates of several MHz. This setup will allow the study of self-ordered phases in different lattice shapes, such as hexagonal and triangular geometries.

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