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**Quantum phases and dynamics of bosonic atoms trapped in a single-mode optical cavity** BHUVANESH SUNDAR, ERICH MUELLER, Cornell University — Motivated by experiments performed by R. Landig et al (arXiv:1511.00007), we theoretically explore the behavior of bosonic atoms trapped in a single-mode cavity in the presence of a two-dimensional optical lattice. As explained by arXiv:1511.00007, Rayleigh scattering of light from the lattice-inducing beams into the cavity produces infinite-range cavity-mediated interactions between the atoms, leading to competition between superfluid, supersolid, Mott insulating and charge density wave phases. We calculate the phase diagram for a uniform trap using a variation of the Gutzwiller Ansatz. We also calculate the spatial distribution of the different phases in the gas in the presence of a harmonic trap. We explore hysteretic behavior when parameters of the system are changed.

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