Self-organization in optical lattices studied within the positive-P representation RAY NG, ERIK S. SORENSEN, McMaster University — The positive-P representation is a commonly used quantum phase space method in quantum optics. It allows for the conversion of the master equation of a quantum mechanical system to a Fokker-Planck Equation, which can then be mapped on to a set of Stochastic Differential Equations. This makes it an ideal method when dealing with open systems and for studying real time dynamics. We use the positive-P representation to simulate ultra cold atoms trapped in an optical lattice within a cavity in the presence of a coupling to a resonant mode. It has been proposed that in this system the trapped atoms self-organize from a uniform starting configuration of equally occupied lattice sites to one where either only even or odd lattice sites are occupied.

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