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Polariton Condensation with Localised Excitons and Propagating Photons JONATHAN KEELING, PAUL EASTHAM, MARZENA SZYMANSKA, PETER LITTLEWOOD, University of Cambridge — We calculate the condensation temperature for a model of microcavity polaritons, constructed from localised excitons and propagating photons. This condensation may be described in two different ways. At low densities, it may be considered as B.E.C. of weakly interacting bosons; at high densities a mean-field theory of self-consistent polarisation and optical fields is more appropriate. Considering fluctuations on top of the mean-field theory causes a crossover of the phase boundary from a B.E.C-like $T_c \propto \rho$ at low densities to the mean field theory when T_c reaches the Rabi splitting. Due to the photon component of polaritons this regime occurs at densities much lower than those at which excitons overlap and becomes relevant for current experiments aimed at polariton B.E.C. From the excitation spectrum of fluctuations, one can also predict a number of experimentally accessible signatures which could indicate the presence of a condensate. In particular, we discuss the excitation spectrum, and momentum distribution of emitted photons.

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