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Semiclassical Mean-Field Equations for Photon Bose-Einstein Condensates ENRICO STEIN, AXEL PELSTER, Department of Physics and Research Center OPTIMAS, Technische Universitt Kaiserslautern — In recent years the phenomenon of non-equilibrium Bose-Einstein condensation (BEC) has been studied extensively also within the realm of a Bose-Einstein condensate of photons. At its core this system consists of a dye solution filling a microcavity in which the photons are harmonically trapped. Due to cyclic absorption and reemission processes of photons the dye leads to a thermalisation of the photon gas at room temperature and finally to its Bose-Einstein condensation. Because of a non-ideal quantum efficiency, those cycles yield in addition a heating of the dye solution, which results in an effective photon-photon interaction. This talk focuses on the influences of the matter degrees of freedom on both the homogeneous photon BEC and the lowest-lying collective frequencies of the harmonically trapped photon BEC. In order to treat the matter, a modified semiclassical laser model is used. Following this track, the photon BEC is then described by an open-dissipative Gross-Pitaevskii equation, with a temporally retarded photon-photon interaction. The collective frequencies are worked out within a linear stability analysis. In the trapped case the analysis refers especially to the violation of the Kohn theorem, arising from the temporal non-locality of the thermo-optic interaction.

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