Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Dimensional Crossover of Photon Bose-Einstein Condensates ENRICO STEIN, AXEL PELSTER, Department of Physics and Research Center OPTIMAS, Technische Universitt Kaiserslautern — In recent years the phenomenon of equilibrium Bose-Einstein condensation (BEC) of photons has been studied extensively also within the realm of non-equilibrium condensation. At its core this system consists of a dye solution filling the microcavity in which the photons are 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 [1]. This talk focuses on the theoretical description of a dimensional crossover from a two-dimensional photon BEC to a one-dimensional photon gas. To this end we extend the semiclassical mean-field equations for a photon BEC [2] by including the matter degrees of freedom. Our special focus lies on the effect of the retarded photon-photon interaction on the dimensional crossover, which we study for a anisotropic box potential. Finally, we characterise the steady state of the resulting one-dimensional photon gas.

Klärs et al., Appl. Phys. B **105**, 17 (2011)

Stein et al., New J. Phys. **21**, 103044 (2019)

Enrico Stein
Technische Universitt Kaiserslautern

Date submitted: 02 Feb 2020 Electronic form version 1.4