

**Speaker:** Andris Erglis, University of Freiburg

**Title:** Photon Bose–Einstein Condensate in and out of Steady State: Theory and Experiment

**Date:** Monday, November 4th, 14:00 pm

**Place:** Seminar room 915

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**Abstract:**

The photon Bose–Einstein condensate (BEC) is a state of light where photons obey the Bose–Einstein distribution and macroscopically occupy the ground mode in the system. In this defense, I will present some of the main results from my doctoral thesis regarding the photon BEC in and out of steady state.

I will begin with a short historical overview of the Bose–Einstein condensation and then give a brief introduction to the photon BEC.

Next, I will move to the results section, which is threefold. First, I will discuss the theory of the photon BEC which we derived using first-principles using open quantum systems and macroscopic quantum electrodynamics approach. One of the main results we found was that the condensate rates depend on the spatial position in the cavity.

Second, I will discuss the photon condensation in a planar cavity towards the continuum limit. We found that at a steady state, along the conventional condensation threshold, a new threshold emerges in the regime of small mode spacing.

Finally, I will present some of the main findings of the experiment regarding periodically driven photon BEC dynamics. We observed that the driven condensate switches between the underdamped and overdamped dynamics for varying average photon numbers in the ground state. The experimental data well agrees with the theory of a weakly driven photon BEC, which was also developed in this thesis.