Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Driven-dissipative Bose-Einstein condensation: perturbative field-theoretic renormalization group approach[1] SEBASTIAN DIEHL, Institute for Theoretical Physics, University of Innsbruck, Austria, UWE C. TAUBER, Department of Physics, Virginia Tech — The universal critical behavior of the driven-dissipative non-equilibrium Bose condensation transition is investigated employing the field-theoretic renormalization group method. Such criticality may be realized in broad ranges of driven open systems on the interface of quantum optics and many-body physics, from exciton-polariton condensates to cold atomic gases. The starting point is a noisy and dissipative Gross-Pitaevski equation corresponding to a complex valued Landau-Ginzburg functional, which captures the near critical non-equilibrium dynamics, and generalizes Model A for classical relaxational dynamics with non-conserved order parameter. We confirm and further develop the physical picture previously established by means of a functional renormalization group study of this system. Complementing this earlier numerical analysis, we analytically compute the static and dynamical critical exponents at the condensation transition to lowest non-trivial order in the dimensional ϵ expansion about the upper critical dimension $d_c = 4$, and establish the emergence of a novel universal scaling exponent associated with the non-equilibrium drive.

[1]Research supported in part by the Austrian Science Fund (FWF) with START Grant No. Y 581-N16.

Uwe Claus Taeuber
Virginia Tech

Date submitted: 21 Oct 2013 Electronic form version 1.4