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Critical Initial Slip Scaling for Driven-dissipative Bose-Einstein Condensation[1] WEIGANG LIU, UWE TAUBER, Department of Physics, Virginia Tech — We investigate the universal non-equilibrium critical behavior at the driven-dissipative Bose-Einstein condensation phase transition by means of the perturbative field-theoretic renormalization group method. Such criticality may be realized experimentally in driven open systems on the interface of quantum optics and many-body physics, ranging from exciton–polariton condensates in optically pumped semiconductor wells to cold atomic gases. We describe the critical dynamics through a noisy and dissipative Gross- Pitaevski or time-dependent Ginzburg-Landau equation with complex coefficients. We focus on the universal critical behavior of this system in the early stages of the relaxation process following a quench from an initially (Gaussian distributed) disordered state that is characterized by broken time translation invariance and governed by the "initial slip" exponent θ. We compute θ to first order in the dimensional $\varepsilon = 4 - \mathrm{d}$ expansion with respect to the upper critical dimension d=4, and find that its one-loop value is identical to that of the classical relaxational model A for a two-component non-conserved order parameter.

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