

Quantum phase transitions with global/local dissipation

M. Konopik and E. Lutz^a

Institute for theoretical physics 1, University Stuttgart, 70550 Stuttgart, Germany

We investigate dissipative quantum phase transitions using global/local Lindblad master equations. We consider, in particular, the Dicke model, a paradigm of collective behavior in quantum mechanics that describes the interaction of N two-level atoms with a single-mode bosonic field. The latter has been recently observed experimentally using cold atoms in a cavity. We demonstrate that the local approach fails to predict the occurrence of the quantum phase transition while the global approach correctly yields the correct critical atom-field coupling and the corresponding critical exponent.