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Dissipative phase transition in a BEC with local losses

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I will discuss the dynamics of a BEC subject to local loss of particles. We show there is a critical loss rate at which the system undergoes a continuous dissipative phase transition from a homogenous state into a state which contains a sonic horizon. The latter drastically alters the behavior of the system by screening the drain. Dissipation leads to two types of fluctuations. First, fluctuations are generated by particles emitted in the reservoir. Both above and below the critical loss, these result in thermal emission of phonons with a temperature set by the loss rate and the chemical potential. The second type of fluctuation results from scattering on the drain and gives rise to a particular correlation pattern that can be observed in the density-density correlation. Aside from correlations between in an out scattered modes, outgoing particles are correlated with localized modes through a process that is reminiscent of Hawking radiation.

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