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Dissipative preparation of squeezed states with ultracold atomic gases[1] GENTARO WATANABE, Asia Pacific Center for Theoretical Physics (APCTP), ROLAND CRISTOPHER F. CABALLAR, University of KwaZulu-Natal, SEBASTIAN DIEHL, University of Innsbruck, HARRI MÄKELÄ, Aalto University, MARKUS OBERTHALER, University of Heidelberg — We present a dissipative quantum state preparation scheme for the creation of phase- and number-squeezed states [1,2]. It utilizes ultracold atoms in a double-well configuration immersed in a background BEC acting as a dissipative quantum reservoir [2]. We derive a master equation starting from microscopic physics, and show that squeezing develops on a time scale proportional to $1/N$, where N is the number of particles in the double well. This scaling, caused by bosonic enhancement, allows us to make the time scale for the creation of squeezed states very short. Effects of the dephasing which limits the lifetime of the squeezed states can be avoided by stroboscopically switching the driving off and on. We show that this approach leads to robust stationary squeezed states. We also provide the necessary ingredients for a potential experimental implementation.

[1] G. Watanabe and H. Mäkelä, Phys. Rev. A **85**, 023604 (2012).
[2] R. C. F. Caballar, S. Diehl, H. Mäkelä, M. Oberthaler, and G. Watanabe, Phys. Rev. A **89**, 013620 (2014).

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