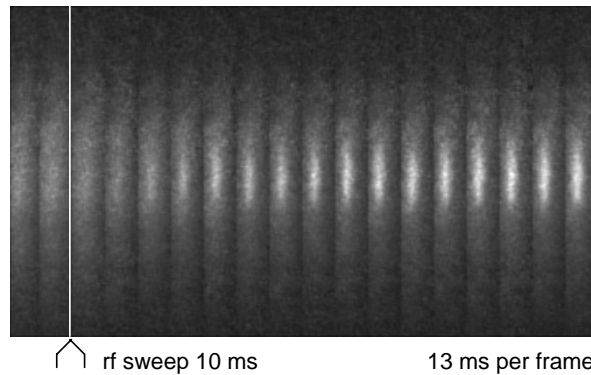


Bosonic stimulation in the formation of a Bose-Einstein condensate

Quantum-mechanical symmetry leads to bosonic stimulation, i.e. the probability of non-condensed atoms scattering into the condensate is proportional to the number of condensed atoms already present. This process is analogous to stimulated emission of photons and can be considered as “matter wave amplification.” When we observed the formation of the condensate after suddenly quenching the cloud below the transition temperature we obtained evidence for bosonic amplification [1]. Bosonic stimulation leads to an acceleration of the rate at which atoms enter the condensate - the formation process therefore starts slowly, speeds up and then approaches equilibrium.



The formation of a Bose-Einstein condensate. Shown is a sequence of 18 phase-contrast images taken in situ of the same condensate. The first two frames show a thermal cloud at a temperature above the transition temperature. The following 16 frames were taken after the cloud was quenched below the BEC transition, and show the growth of a condensate at the center of the cloud at 13 ms intervals. Note the decrease in the number of thermal atoms and their smaller width after the rf sweep. The bright gray levels mark the high column density of the condensate. The length of the images is 630 μm .

1. H.-J. Miesner, D.M. Stamper-Kurn, M.R. Andrews, D.S. Durfee, S. Inouye, and W. Ketterle, *Science* **279**, 1005 (1998).