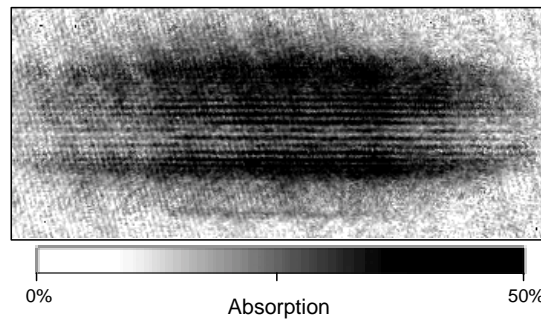


### ***Observation of interference between two Bose condensates***

The spatial coherence of a Bose condensate was demonstrated by observing interference between two Bose condensates [1]. They were created by cooling atoms in a double-well potential formed by magnetic and optical forces. High-contrast matter-wave interference fringes with a period of 15 micrometers were observed after switching off the potential and letting the condensates expand for 40 milliseconds and overlap (see figure). This demonstrates that Bose condensed atoms are “laser-like”; that is, they are coherent and show long-range correlations. Furthermore, we observed high-contrast interference of two atom pulses coupled out from a split condensate using the rf output coupler described above. This proves that the rf output coupler preserves the coherence of the condensates. The controlled generation of coherent atomic beams is the first realization of a basic atom laser.

The observation of interference between two Bose condensates opens up the study of coherent atom beams. It should be possible to study processes like phase diffusion and loss and build-up of coherence in the near future.



Interference pattern observed by overlapping two expanding Bose condensates. The fringe period was 15  $\mu\text{m}$ , and the field of view is 1.1 mm by 0.5 mm.

1. M.R. Andrews, C.G. Townsend, H.-J. Miesner, D.S. Durfee, D.M. Kurn, and W. Ketterle, *Science* **275**, 637 (1997).