Boson bunching in thermal clouds completes the wave-particle duality:
Hanbury Brown Twiss Effect for Ultracold Quantum Gases
Authors: M. Schellekens, R. Hoppeler, A. Perrin, J. Viana Gomes, D. Boiron, A. Aspect and C. I. Westbrook, Sciencexpress: Science, vol. 310, page 648 (2005)

Recommended with a Commentary by Steve Berry, University of Chicago.

Although a coherent sample shows no such effect, a very cold thermal cloud of metastable helium atoms, released suddenly from a magnetic trap, displays the quantum-statistical "bunching" first recognized by Hanbury Brown and Twiss [Nature 177, 27 (1956)] for photons. This bunching was used, immediately after the discovery of the effect, to measure stellar diameters. Now one can see the effect of quantum statistics precisely analogous to the photon bunching.

In order to see this effect, the authors worked with atoms at about 0.5 microKelvin. It is important that these are not quite cold enough to undergo a BEC transition. The essence of the phenomenon is the correlation that occurs in a randomized, thermal system, and is quite apart from the very strong correlation of a coherent many-body state. The experiment detects the metastable atoms with m=0 only, with a very narrow distribution of velocities. The results are compiled in 3-dimensional histograms giving the distributions of pair separations in each new expanding cloud. The results show unequivocal spatial bunching that increases as the temperature drops--up to the BEC condensation temperature, at which the bunching disappears, quite dramatically.

A related correlation of fermionic atoms was reported earlier this year. [M/ Greiner, C. A. Regal, J. T. Stewart and D. S. Jin, Probing Pair-Correlated Fermionic Atoms through Correlations in Atom Shot Noise, Phys. Rev. Lett. 94, 110401 (2005)].