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Ground State Properties of a Homogeneous Bose-Einstein Condensate ROBERT SMITH, IGOR GOTLIBOVYCH, TOBIAS SCHMIDUTZ, ALEX GAUNT, NIR NAVON, ZORAN HADZIBABIC, University of Cambridge, THE DREAM TEAM — We will present measurements of the coherence, energy and free expansion of a quasi-homogeneous atomic Bose-Einstein condensate (BEC) in an optical box potential. We have measured the ground state wave function of a trapped quasi-pure BEC in momentum space using Bragg spectroscopy and compare this with the real-space wave function. We find excellent quantitative agreement with the Heisenberg uncertainty principle and also confirm the expected scaling of the momentum uncertainty with the box length. In addition, by varying the condensate atom number, we have studied the effect of interactions on the momentum distribution and mean-field energy of the condensate. Finally, we will present measurements of the evolution in time of both the mean-field energy and the momentum distribution of a freely expanding condensate.

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