

Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Spin squeezing of 10^{11} atoms HAN BAO, JUNLEI DUAN, PENGXIONG LI, XINGDA LU, WEIZHI QU, SHENCHAO JIN, Fudan University, MINGFENG WANG, Wenzhou University, IRINA NOVIKOVA, EUGENIY MIKHAILOV, College of William and Mary, KAI-FENG ZHAO, Fudan University, HENG SHEN, University of Oxford, YANHONG XIAO, Fudan University — Atomic ensemble with large number of quantum-correlated particles is desirable for precision measurement. As a type of such quantum state, spin squeezed state (SSS) has been pursued in both cold atom and warm vapor cell systems with the largest atom number 10^8 . We report experimental preparation of a SSS in a paraffin-coated macroscopic vapor cell in free space, containing 10^{11} ^{87}Rb atoms, by stroboscopic quantum non-demolition measurement and using adiabatic pulse control and motional averaging. We observed 2.38 ± 0.23 dB noise reduction, and 1.31 ± 0.23 dB spin squeezing *below coherent spin state*. Our result presents the highest angular resolution on the Bloch sphere in all SSS up to date, and will open possibilities for quantum metrology and control in large entangled atomic ensembles, with techniques generalizable to other systems such as trapped ions and mechanical oscillators.

Han Bao
Fudan University

Date submitted: 27 Jan 2019

Electronic form version 1.4