Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Raman sideband cooling to high phase-space density ALBAN URVOY, JIAZHONG HU, ZACHARY VENDEIRO, WENLAN CHEN, VLADAN VULETIC, Massachusetts Institute of Technology — Raman sideband cooling is a very fast and reliable way of cooling atoms to sub-Doppler temperatures.
However, as virtually all methods of optical cooling, it has so far only reached a maximum phase-space density two orders of magnitude below that required for Bose-Einstein condensation. Here, we present our results on Raman sideband cooling in a 2D optical lattice. We observe only limited losses as the atoms are cooled, partly as a result of using optical pumping light that is far detuned to the red of atomic transition.
By combining this efficient cooling and the compression of the atomic ensemble into individual 1D lattices, we are able to reach phase-space densities on the order of unity in tightly confined tubes, each containing several tens of atoms. We discuss the applicability of this method for a fast and efficient all-optical creation of a degenerate quantum gas.

Alban Urvoy
Massachusetts Institute of Technology

Date submitted: 25 Jan 2017 Electronic form version 1.4