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Heating of atom ensembles in magnetic traps due to collisions with hot background gases[1] CHENCHONG ZHU, University of British Columbia, JAMES BOOTH, British Columbia Institute of Technology, KIRK MADISON, University of British Columbia — It is well known that collisions between laser-cooled atoms in magnetic and magneto-optical traps with residual background gas particles result in atoms being lost from the traps, and modifies the energy distribution of the atoms remaining in the traps. The loss rate depends on both the collisional cross section between the trapped and background atoms and on trap depth. Our prior measurements of the collisional cross-section of trapped ^{85}Rb and ^{87}Rb atoms colliding with background Rb and Ar indicated that quantum-diffractive collisions contribute to approximately 50 % of the total collisional cross-section [Phys. Rev. A 80, 022712 (2009)]. In deep traps, a single diffractive collision will not impart enough kinetic energy on the trapped atom to allow it to escape; instead, the atom remains in the trap with, on average, an increased kinetic energy. A series of such diffractive collisions may impart enough aggregate kinetic energy to eject atoms from deep traps. We present experimental measurements and numerical simulations of heating in magnetically trapped Rb ensembles as a function of background pressure.

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Chenchong Zhu
University of British Columbia

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