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Trap depth determination from background gas collision induced loss rates JANELLE VAN DONGEN, University of British Columbia, JAMES L. BOOTH, British Columbia Institute of Technology, KIRK W. MADISON, University of British Columbia — We present experimental and theoretical characterizations of a novel technique to determine the depth of an atom trap from measurements of the loss rate induced by background gas collisions. It is well known that the lifetime of an atomic or molecular trap is ultimately limited by the rate of background collisions, and the precise loss rate depends on the trap depth. Because the differential scattering cross section (for elastic collisions) is highly forward peaked, there are copious glancing angle collisions which impart a very small amount of energy. The consequence is that the loss rate varies substantially with trap depth even for very shallow traps [1]. We present a comparison of this new technique with an established method for MOT trap depth measurements relying on measurements of trap loss induced by optical excitation to a purely repulsive molecular state [2]. The excitation produces particle pairs of a well defined energy whose escape probability provides a measure of the trap depth. [1] Fagnan, Wang, Zhu, Djuricanin,Klappauf, Booth, and Madison, "Observation of quantum diffractive collisions using shallow atomic traps," Phys. Rev. A 80, 022712 (2009). [2] Hoffmann, Bali, and Walker, "Trap-depth measurements using ultracold collision," Phys. Rev. A 54, R1030 (1996).

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