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Enhanced Longitudinal Confinement in an On-Chip Atom Wave-Guide via Optical Lensing of the Atomic Wave-Packet[1] JASON ALEXANDER, VIOLETA PRIETO, CHRIS ROWLETT, PATRICIA LEE, WILLIAM GOLDING, Sensors and Electron Devices Division, Army Research Laboratory, Adelphi, MD — We report on progress at the Army Research Laboratory towards implementation of a compact and sensitive chip-based cold atom interferometer. The interferometer makes use of ^{87}Rb atoms magnetically confined in a wave-guide near the surface of a lithographically patterned chip. Optical lensing effects in cold atom clouds have been recently demonstrated in free space for both a single Gaussian beam [1] and a moving optical lattice potential [2]. We will discuss a similar focusing and collimation of the atomic wave-packet in the chip wave-guide. This reverses the wave-packet broadening in the longitudinal direction of the wave-guide, and therefore improved contrast in interference fringes and signal-to-noise ratio can be expected.

[1] Zhou et al, Phys. Rev. A **80** 033411 (2009)
[2] Fallani et al, Phys. Rev. Lett. **91** 240405 (2003)

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