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Realization of a Magneto-Optical Trap for Cadmium Atoms[1]
MARK ACTON, KATHY-ANNE BRICKMAN, MING-SHIEN CHANG, DZIMITRY MATSUKEVICH, FOCUS and Physics Dept., Univ. of Michigan, PAUL HALJAN, Physics Dept., Simon Fraser Univ., VANDERLEI BAGNATO, Universidade de Sao Paulo, Instituto de Fisica de Sao Carlos, CHRISTOPHER MONROE, FOCUS and Physics Dept., Univ. of Michigan — We report the confinement of cadmium atoms in a vapor cell magneto-optical trap (MOT). Using the closed $^1S_0-^1P_1$ transition (λ=229 nm, $\gamma=2\pi$*90.9 MHz), we are able to trap neutral cadmium atoms and examine the dependence of loss mechanisms, atomic density, and atom number on trapping parameters. This represents the trapping of a new atomic species and the shortest wavelength MOT produced to date. We anticipate that cold Cd atoms will be interesting for future studies in at least two directions: First, the $^1S_0-^3P$ intercombination lines (λ=325 nm) could be useful for optical cooling to very low temperatures ($^1S_0-^3P_1$) and for high resolution optical spectroscopy ($^1S_0-^3P_0$). Second, combining cold Cd atoms with individual laser-cooled Cd^+ ions in a nearby ion trap may allow for studies of cold ion/neutral interactions such as charge-exchange, the transport of a charged "hole" through a gas, and perhaps the transfer of coherence from hyperfine states in the ion to pure nuclear spins in the neutral gas.

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