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Enhanced MOT Atom Number via Zeeman-Shifted Bichromatic Cooling[1] ERIC BLANSHAN, TARA CUBEL LIEBISCH, ELIZABETH DONLEY, JOHN KITCHING, NIST Boulder — A key issue in creating compact cold-atom samples for chip scale atomic devices is that the number of atoms captured in a magneto-optical trap (MOT) scales strongly with the laser beam diameter [Gibble et al., OL**17**, 526 (1992)]. To overcome this effect, we use bichromatic stimulated cooling [Söding et al., PRL**78**, 1420 (1997)] to slow a Rb atomic beam and increase the atom number of a compact trap. By tuning the Rabi frequency and phase, trains of counter-propagating π-pulses are created which, with 4mW of total laser power, exert a cooling force 8x larger than the spontaneous limit. We broaden the velocity range addressed by the bichromatic light via the Zeeman shift from a magnetic field gradient which sweeps the bichromatic force profile from a higher velocity class down to our chosen center velocity, increasing the effective width of the profile by 50%. We report that for effective cooling lengths under 4.5cm, greater MOT number enhancement occurs with swept stimulated forces than with spontaneous forces. This technique may be useful for producing cold atom samples for future compact technologies.

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