

Abstract Submitted
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Narrow-Line Laser Cooling and Trapping of Strongly Magnetic Atoms ANDREW BERGLUND¹, JAMES HANSSEN², JABEZ MCCLELLAND³
— Narrow optical transitions can be used for Doppler laser cooling to the sub-microkelvin temperature regime in multi- electron atoms such as the alkaline earths. This technique should also be useful for reaching ultracold temperatures in erbium, a strongly magnetic rare-earth element with a narrow (8 kHz) transition at 841 nm. However, a conventional magneto-optical trap (MOT) on this transition is destabilized by competition between optical and magnetic forces. To overcome this difficulty, we developed an unusual narrow-line MOT using cooling light tuned to the blue side of the atomic transition. In the resulting stable trap, we find that atoms are spin polarized and reach temperatures as low as 1 μ K. These methods should be applicable to the other rare-earth elements and may enable narrow-line cooling of metastable alkaline earths on transitions that are too weak to compensate gravity.

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