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Demonstration of a ^{6}Li magneto-optical trap using the $2S_{1/2} \rightarrow 3P_{3/2}$ transition R. HART, P.M. DUARTE, T.L. YANG, J.M. HITCHCOCK, T.A. CORCOVILOS, R.G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University — We demonstrate narrow linewidth laser cooling on the $2S_{1/2} \rightarrow 3P_{3/2}$ transition of ^{6}Li at 323 nm. Typically, magneto-optical traps (MOTs) of alkali atoms cool on the D2 transition. The linewidth of this transition determines the Doppler limit of cooling which in the case of ^{6}Li is 140 μK, given a 5.9 MHz transition linewidth. Due to a lack of resolved hyperfine structure that prohibits polarization gradient cooling, typical Li MOTs reach minimum temperatures near 300 μK. Cooling on the $2S_{1/2} \rightarrow 3P_{3/2}$ transition, however, allows for a Doppler limit of 20 μK since the transition linewidth is only 790 kHz. We have implemented this cooling scheme and demonstrate ^{6}Li MOT temperatures of 65 μK. With the increased phase space density from this MOT, initial loading of the gas to an optical trap is substantially enhanced. We present our results on the characteristics of the narrow linewidth MOT and our results on the benefits of using this cooling scheme in the preparation of a degenerate gas of fermions.

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