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Sub-Doppler laser cooling of potassium atoms

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(Submitted on 12 Jul 2011)

We investigate sub-Doppler laser cooling of bosonic potassium isotopes, whose small hyperfine splitting has so far prevented cooling below the Doppler temperature. We find instead that the combination of a dark optical molasses scheme that naturally arises in this kind of systems and an adiabatic ramping of the laser parameters allows to reach sub-Doppler temperatures for small laser detunings. We demonstrate temperatures as low as 25(3) μ K and 47(5) μ K in high-density samples of the two isotopes 39K and 41K, respectively. Our findings will find application to other atomic systems.

Comments: 7 pages, 9 figures

Subjects: **Atomic Physics (physics.atom-ph)**; Quantum Gases (cond-mat.quant-gas)

Cite as: **arXiv:1107.2337v1 [physics.atom-ph]**

Submission history

From: Manuele Landini [[view email](#)]

[v1] Tue, 12 Jul 2011 16:21:50 GMT (161kb)

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