Abstract Submitted
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Deep laser cooling and efficient magnetic compression of molecules L. CALDWELL, J.A. DEVLIN, H.J. WILLIAMS, N.J. FITCH, E.A. HINDS, B.E. SAUER, M.R. TARBUTT, Imperial College London — We report on our efforts to lower the temperature of laser cooled molecules and present a scheme based on optical pumping into a robust dark state at zero velocity. Using multi-level optical Bloch equations to simulate this scheme, we show that it may be feasible to reach the recoil limit or below. We demonstrate and characterise the method experimentally, cooling CaF molecules to 5.8(5) μK. We measure the complete velocity distribution directly by rotating the phase-space distribution in a harmonic magnetic trap and then imaging the cloud. Using the same phase-space rotation method, we rapidly compress the cloud. By applying the cooling method a second time, we compress the position and velocity distribution.

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