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Characterisation of a magneto-optical trap for CaF molecules STEFAN TRUPPE, JACK DEVLIN, HANNAH WILLIAMS, MORITZ HAM-BACH, LUKE CALDWELL, NOAH FITCH, BEN SAUER, ED HINDS, MIKE TARBUTT, Imperial College London — We present a detailed characterization of a magneto-optical trap (MOT) of CaF molecules. We capture approximately 2.2×10^4 molecules in the MOT from a buffer gas molecular beam which is slowed via radiation pressure. At the highest laser intensity, the lifetime of the molecules in the MOT is about 100ms, the trap frequency is 94Hz and the damping coefficient is $390(4)s^{-1}$. The molecules reach an equilibrium temperature of 12mK which is nearly 50 times higher than the Doppler limit. We explore how the scattering rate, trap frequency, damping coefficient and temperature depend on the intensity. We compare our results to standard Doppler cooling theory and to an advanced model that takes into account the effect of polarization gradients.

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