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Lithium as a refrigerant for polar molecules A. KAUSHIK, S.K. TOKUNAGA, R.J. HENDRICKS, E.A. HINDS, M.R. TARBUTT, Imperial College London — Gases of ultracold polar molecules offer exciting new possibilities in many areas, including precision measurements [1], simulations of many-body quantum systems [2], and quantum information processing [3]. We aim to cool polar molecules by sympathetic cooling with ultracold atoms inside a suitable trap [4]. This poster presents our work on the production and transportation of a dense ultracold cloud of lithium for use as a refrigerant in sympathetic cooling. Up to 10^{10} lithium atoms are loaded from a Zeeman slower into a magneto-optical trap. Using a moving magnetic trap the atoms are transported to a separate chamber where they will later be co-trapped with molecules. We present the design of our setup and our recent results on transport. We also explore the possibility of electrically polarizing the lithium so that dipole-dipole interactions become important in the gas.

[1] J. J. Hudson, D. M. Kara, I. J. Smallman, B. E. Sauer, M. R. Tarbutt and E. A. Hinds, Nature 473, 493 (2011).
[2] A. Micheli, G. K. Brennen, and P. Zoller, Nature Physics 2, 341 (2006).
[3] D. DeMille, Phys. Rev. Lett. 88, 067901 (2002).
[4] S. K. Tokunaga, W. Skomorowski, P. S. Żuchowski, R. Moszynski, J. M. Hutson, E. A. Hinds and M. R. Tarbutt, Eur. Phys. J. D 65, 141 (2011).

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